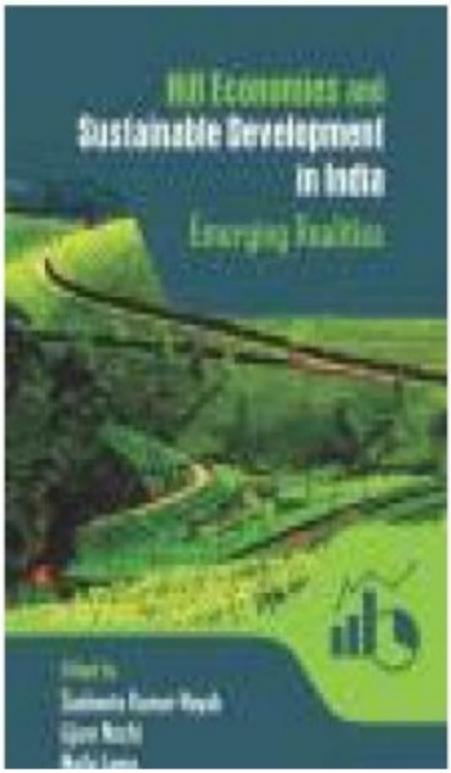
Hill Economies and Sustainable Development in India: Emerging Realities

Lijum Nochi and Maila Lama Sushanta Kumar Nayak
(Editors)



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Medicinal Plants as a Source of Livelihood in Arunachal Pradesh

Tashi Dorjee Bapu and *Gibji Nimasow*

Introduction

Arunachal Pradesh is a tribal inhabited area where the way of living is directly or indirectly based on the natural vegetation or environment. The mountainous region of Arunachal Pradesh is endowed with rich variety of medicinal and aromatic plants of IUCN listed species. The forests of Arunachal Pradesh harbours over 5000 species of plants, over 500 birds, about 85 terrestrial mammals, and a large number of butterflies, insects and reptiles (http://arunachalpradesh.gov.in/forest.htm). Medicinal plants are an important source of raw material for traditional medicines and a large number of people derive employment and income from the collection, processing and trade of these plants (Sarma and Sharma, 2014). Almost 80 per cent of world population relies upon plant based traditional medicines for primary health care (Gopal *et al.*, 2014). Besides, the medicinal plants are also used in modern drug discoveries across the world. Fifty plant species belonging to 29 families have been reported from West Kameng district of Arunachal Pradesh that are used for treating 22 human and 3 veterinary ailments (Namsa *et al.*, 2011). Despite tremendous progress in human medicines, infectious diseases caused by bacteria, fungi, viruses and parasites are still a major threat to public health (Arya, *et al.*, 2010). With the increase in market demand for modern drug manufacturing, the medicinal plants are exploited without any concern for regeneration and conservation. Due to over-exploitation coupled with poor regeneration and pressure from adverse natural factors,

This book entitled "Analytical / Numerical study of Magnetohydrodynamic Flows in Porous Media" is followed by a presentation of an intuitive systematic problem-solving technique that can be used as a model in solving engineering problems. A distinctive feature of this book is its emphasis on the physical aspects of the subject matter in addition to mathematical representations and manipulations. The authors believe that the emphasis in research level should remain on developing a sense of underlying physical mechanisms and a mastery of solving practical problems that an academician/engineers. The authors have found differential equations to be a never ending source of interesting and sometimes surprising, results and phenomena. We hope that users of this book, both scholars and Academicians, will share our enthusiasm for the subject. It is hoped that the mathematical solutions obtained in this book contribute not only to a better understanding of the problems they deal with, but also find significant applications in many engineering, industrial and environment processes and the acquired knowledge in this book can be used by designers to control MHD flow.

Solutions of Boundary Layer Equations

Abdul Batin, M. Sc., M. Phil., Ph.D., Asst. Professor of Mathematics, Indira Gandhi College, Assam, India & published 13 papers. Sahin Ahmed is a Professor of Mathematics, Rajiv Gandhi University, Itanagar, India & published 110 papers & produced 15 & 5 M.Phil./Ph.D. Scholars. Their Research areas are Computer Oriented Fluid Mechanics.

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Batin, Ahmed

Abdul Batin
Sahin Ahmed

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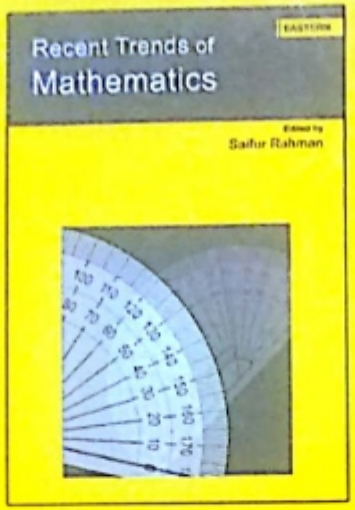

The Book

This book comprises some selected research articles that are presented in the 2nd National Conference on Recent Trends of Mathematics and its Applications held in the Department of Mathematics, Rajiv Gandhi University on 6th and 7th November, 2015. The objective of the conference was to build a bridge between traditional mathematical techniques and recently developed mathematical techniques which may help the present scientific community to transfer the ideas from old to new. This book presents both traditional Mathematics and its recent trends of applications *such as in Theoretical Computer science, Mathematical physics, Neural Networking, Computational Biology etc.*

The Editor

Dr. Saifur Rahman, M. Sc., M. Tech., Ph. D. is an assistant professor in Mathematics at Rajiv Gandhi University (A Central University) who received his M. Sc. and Ph. D. degrees from the Gauhati University, and M. Tech. in computational seismology from the Tezpur University. Prior to Rajiv Gandhi University, he worked as an assistant professor in Mathematics at Arya Vidyapeeth College, Guwahati. He has awarded with joint CSIR-UGC JRF and GATE fellowship. He has more than eight years of experience in teaching and research, and published one book and several research articles in some internationally recognized journals.

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Recent Trends of Mathematics

Rahman

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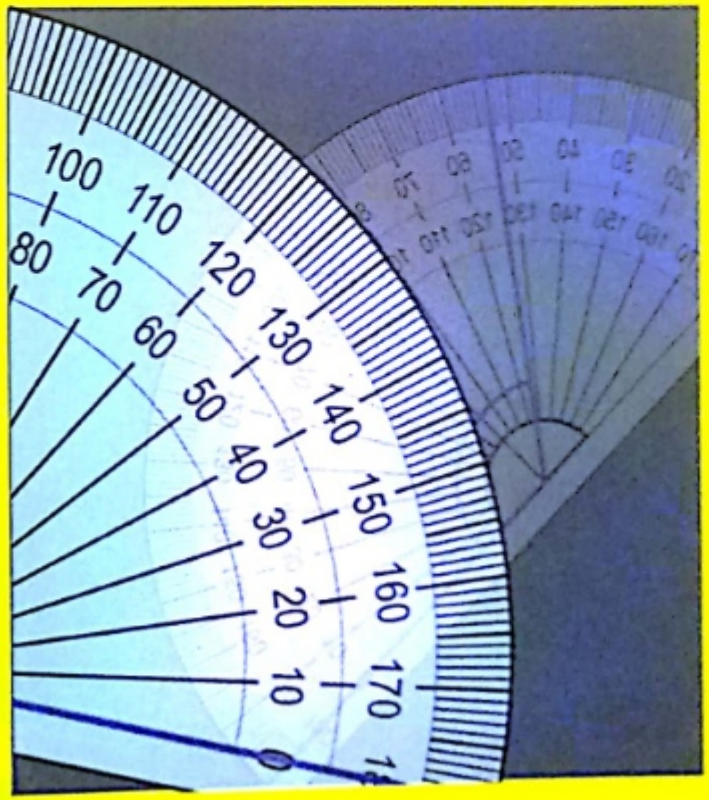
Recent Trends of Mathematics

Edited by
Saifur Rahman



Saifur Rahman
Recent Trends of Mathematics

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Rajiv Gandhi University, Rono Hills, Doimukh
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FOREWORD

I am extremely glad to know that the Department of Mathematics, Rajiv Gandhi University organized the Second National Conference on '**Recent Trends of Mathematics and its Applications**' on 6-7 November 2015 (RTMA-2015) and now publishing the Conference proceedings with ISBN number.

I congratulate the esteemed colleagues of the department for organizing this sequel of national conference and bringing together mathematicians, academicians and scientists from all over the country whose contributions are going to be published in this volume. Their participation in the conference facilitated our scholars to share the results of their research and in solving some of the problems. The present century is the age of skill-development and innovations. We need to create sustainable and knowledge-based economy where the role of universities will become ever more challenging. We shall have to be competitive in to-day's world economy. The young generation with mathematical knowledge should be precise in their thoughts and approach. There should be well planned mathematics popularization and outreach programmes for young students and teachers in the interior areas of the state.

I am confident that our dynamic scholars would make significant contributions in the arena of teaching and research in mathematics and to promote overall economic development of the people of the region and the nation as a whole.

(Prof. Tamo Mibang)

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Credit Card Fraud Detection Using Fuzzy ID3

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***Abstract*—By the exponential growth of Credit Card user the fraudulent transactions also have increased dramatically. The genuine transaction and fraudulent transactions are almost similar, so it is very hard to discover a fraudulent transaction form the genuine one. In this paper we have proposed fraud detection algorithm based on Fuzzy-ID3. Intermediate nodes we split using attribute having highest information gain. The leaf nodes classifies the transactions as fraud,doubtful or normal. Experimental result exhibits that the technique is efficient one in detecting frauds.**

***Keywords*—Cramming,Triangulation, Fuzzy-ID3, Information Gain**

I. Introduction

The credit card fraud is a fraudulent transaction by an unauthorized person for his personal interest and the authorized card holder and the card provider totaly unaware about the transaction for the moment.Credit card fraud is a wide-ranging term for theft and fraud committed using a credit card or any similar payment mechanism as a fraudulent source of funds in a transaction. The purpose may be to obtain goods without paying, or to obtain unauthorized funds from an account. Credit card fraud is also an adjunct to identity theft[26]. Bankers and the commercial establishments are the victims in most of the cases, as the bank authorities do not have the options for the physical verification of users of the card.

The Following are the different ways of credit card frauds:[3]

- An act of criminal deception (Mislead with intent)by use of unauthorized account and/or Personal Information.
- Illegal or unauthorized use of account for personal gain.
- Misrepresentation of account information to obtain goods and/or service.
- Simple theft and Counterfeit the card.
- Card is never received by the genuine owner.

In Germany over the past few years the usage of credit cards have been increasing. The market for credit cards and debit cards has been grown by 23.3% from 2004 to 2009[6]. The Indian credit card market is in its growth phase, it recorded a growth of about 30% a year. Debit cards are growing at 40%. The RBI data put total electronic transaction in the country at over ₹ 2,35,000 crores in 2006-07. This increased to ₹ 3,60,000 crores in the first 10 months (April-January) of 2007-08. At the end of April-January2007-08, all of us together held about 27.5 million credit cards transacted ₹ 47,476 crores through these cards in 10 months of the year[5]. And as per the RBI statistics the amount of transaction done by Credit cards at Point of Sale in January 2012 is ₹ 88676.99 million, in January 2013 is ₹ 113920.31 million and in January 2014 it is ₹ 141620.33 which indicates a huge increase of credit cards user[15].

As the number of users are increasing frauds are also exponentially getting increased though the researchers have developed different techniques to detect the fraud transactions. The review of *Bolton and Hand*[4] have given a depth study of the existing techniques in fraud detection. And it is observed that as the fraud detection problem is a classification problem, mostly the Nural Networks, Rule based approaches, Data Mining techniques and HMM are used to deal with the fraud detection problems. *Maes et al.*[12]have used two machine learning techniques: Artificial neural networks with Feed Forward Multi-layer Perceptron that consists of different layers of perceptrons which are interconnected by a set of weighted connections and Bayesian belief networks in credit card fraud detection. Their idea was to provide some computational learner with a set of training data consisting of some feature values on which fraud detection to be run. After a learning process the program will correctly classify a new transaction as fraudulent or not fraudulent given some features of that transaction. *Gadi et al.*[8] have used Artificial Immune System(AIS) in credit card fraud detection with optimized and robust set of parameters for the best results over other methods. The effectiveness of AIS is compared to other techniques and found beneficial. *Aleskerov et al.*[1]have proposed the CARDWATCH, a database mining system used for credit card fraud detection. It trains the nural network with the past transactions of the customer and then the current spending behavior is observed to detect the frauds. *Halvaiee et al.* [9] using the Hadoop and AIS based on human immune system have introduced a new model called AIS-based Fraud Detection Model(AFDM). They have used an immune system inspired algorithm(AIRS)and have improved the algorithm for fraud detection. *Olszewski*[16] have proposed fraud detection system visualizing the user activities on self organizing map SOM which is a method of mapping a high dimensional data into a 2-dimensional map of neurons and classifying based on threshold value which works for multiple frauds. *Dorronsoro et al.*[7] have developed a model based on neural classifier named Minerva that has number of rating modules and only the

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core modules have nural rating functions. Fishers discriminant analysis classification procedure is combined with the nonlinear projecting capabilities of multilayer perceptrons(MLP)for constructing the neural module of Minerva for credit card fraud detection. *Syeda et al.*[23] have used the Granular Nural Network(GNN) with rule based approach and fuzzy nural network. The fuzzy nural network is trained with training dataset which in turn produces fuzzy rules for checking the transactions. *Srivastava et al.*[22] have modeled the credit card transaction process using HMM which they have used as Fraud Detection System. The FDS will receive the card details and transaction amount to check authenticity. The FDS concern only on price range which is classified into low(l), medium(m), and high(h) and used as observation symbols of the HMM for detection of frauds. *Iyer et. al*[10] have also used HMM and modeled the sequence of operations in credit card transaction processing using HMM to detect frauds. The HMM is trained with the normal behavior of the card holder then the this trained HMM checks the incoming transactions if it is not accepted with sufficiently high probability, it is considered as fraud. *Panigrahi et. al.*[17] have developed a Behavior-based 6−tuple $\{System, C, P, \psi, \theta_{LT}, \theta_{UT}\}$ fraud detection Model. where System is the target system, C is the set of credit cards, P is the set of profiles of Card holders, $\psi(T_{j,\rho}^{C_k})$ is the suspicion score of the j^{th} transaction $T_{j,\rho}^{C_k}$ on card C_k and ρ is the time gap from the previous transaction on the same card, θ_{LT} is the lower threshold, where $0 \leq \theta_{LT} \leq 1$ and θ_{UT} is the upper threshold, where $0 \leq \theta_{UT} \leq 1$. Initial beliefs are assigned to each incoming transaction to determine its deviation from a normal profile. Dempster−Shafer theory is applied to get the overall belief by combining the initial beliefs. Bayesian learning is used to strengthened or weakened the overall belief based on its similarity with the fraud or genuine transaction history. *Shahin and Duman*[20] have developed seven alternative models based on decision tree methods and support vector machine methods and then the performance of the classifier models are checked for different data sets with different sizes. The decision trees they have used are C5.0, C&RT and CHAID and the SVM with polynomial, sigmoid, linear and RBF kernel functions are used. The decision trees attempt to separate the records into mutually exclusive subgroups. *Sahin et al.*[21] to detect fraud transactions proposed a new cost-sensitive decision tree induction algorithm which at the time of selecting splitting attribute at each nonterminal node minimizes the misclassification costs. Proposed new cost sensitive metric Saved Loss Rate SLR to evaluate the performance. *Misra and Dash*[13] have implemented MLP, Decision Tree and Chebyshev FLANN three different approaches and compared the results for credit card fraud detection. The chebyshev Functional Link Artificial Neural Network is a single layer neural network in which the original input pattern in lower dimensional space is expanded to a higher dimensional space by using a set of orthogonal functions[14], [18]. After implementing all these three they have compared and shown that MLP outperforms both the Decision Tree and Chebyshev FLANN for Credit card Fraud detection. *YU and Wang*[27] have proposed a model using outlier detection based on distance sum, that mines the fraud transactions as outliers. They have defined Outlier as: Data set $T = \{t_1, t_2, t_3, ...t_n\}$ U is one data object, If the p parts of data set named S in data set is far way from object U, $S \in T$, $U \in T$, then U is Outlier.

From the literature it is found that most of the researchers have used different form of Artificial intelligence and Data Mining Techniques, like Nural Networks, Hidden Markov models, Outlier based FD, Behavioral based Decision Tree etc. After going through the existing works we feel the need of mathematical solution for the Fraud detection. As the fraud detection itself is a classification problem, we found Fuzzy Logic based decision tree ID3 a suitable technique to develop a more effective fraud detection system. In this paper we have chosen the attribute from the dataset of credit card transactions for which the information gain is highest among all the attributes of transactions for splitting node in decision tree creation process. And the leaf node of the decision tree will classify the transactions either as fraud or normal. We prioritize to focus on in no cost the fraud transactions should be classified as normal. We also have discussed the results to show the effectiveness of our technique.

This paper consists of 4 sections, second section describes the basic problem, the third chapter is about the Fuzzy ID3 in CFD, fourth section describes the results and analysis of Fuzzy ID3 in CFD, and finally the fifth section cocludes the paper.

II. Problem Definition

With the increasing usage of credit cards and debit cards, the frauds related with these are also increasing. In last five years the card holders affected in Germany 10%, in India 27%, in UK 31%, US 37% and all other countries are also being affected seriously[11]. Annual global fraud loses for Credit Card and Debit Card frauds in the year 2008 it is $6.4 Billions in 2009 it is $6.9 Billions in 2010 it is $7.6 Billions in 2011 it is $9.8 Billions and in 2012 it is $11.2 Billions and over all one in four customers becomes the victim of card frauds[25], [11]. These vast increase of Economic loses by frauds mandates the researchers to think about how these frauds can be detected and prevented more and more effectively though it is very difficult. For the development of more effective detection and prevention techniques for fraud it is important to gather adequate knowledge about different types of frauds, how these frauds works.

A. Different Types of Credit Card Frauds:

As the new technologies are being developed day by day, the fraudsters are also developing new types of frauds to by-pass the security mechanisms. There are various types of frauds are there in the current system around the world experienced by the card holders. The highly prevailing frauds experienced by the users are as follows[6], [3]; *a. Theft Fraud/Counterfeit Fraud. b. Application Fraud. c. Behavioral Fraud. d. Bankruptcy Fraud. e. Cramming/Salami Attack. f. Triangulation Fraud.*

1) Theft Fraud/Counterfeit Fraud:: The Theft fraud and the Counterfeit Fraud are inter related. In case of Theft Fraud the Credit Card is stolen by the fraudster or the lost card is found by the fraudster and it is used by him/her many times as possible until the card is blocked by the bank.

In the Counterfeit fraud the Card is used remotely where the presence of physical card is not concern, only the card details are required. The different techniques used by the fraudsters for gathering Card information to use for Counterfeit Frauds are: fake card making,tearing magnetic strip,white plastic,altering card data and skimming. And skimming is mostly used technique in counterfeit fraud, where original data on a credit card magnetic stripe are copied electronically onto another. Cashiers/Employees of business establishments have been found to carry pocket skimming devices, a battery operated electronic magnetic stripe reader, to get details of the card they swipe the cards usually when the card holder waits for the transaction to be validated. With the details obtained by the skimmer the fraudster carries out transactions for shopping, billing, etc. in card-not-present manner[3].

2) Application Fraud:: In Application fraud the fraudster applies with false documents or with stolen documents of someone else to get a Credit Card. The frudster uses a false name with temporary address or may look for someone who is going to leave the address very shortly and his electoral register will be updated after few months or years. As the banks usually checks electoral register to confirm the address of a new customer. That is the fraudster pretends to be some one else; this application fraud is termed as *Assumed Identity*. Also fraudster may give some false statements of his financial status to acquire more Credit Cards than his entitlements by producing some forged financial statement documents; this type of application fraud is called *Financial Fraud*.

3) Behavioral Fraud:: Behavioral fraud occurs when details of legitimate cards have been obtained fraudulently and sales are made on a 'card holder' present basis. These sales include telephone sales and e-commerce transactions, where only the card details are required.[6], [4]

4) Bankruptcy Fraud:: The Bankruptcy Fraud is in which the Card holder knows that he is not able to pay the amount of the items he is purchasing. Later the bank will issue him an order to pay but the card holder will not respond. And finally the customer will be recognized by the bank as in a personal bankruptcy state so the bank will not have any option for recovery. These are considered as charge-off losses not included in Frauds.

5) Cramming/Salami Fraud:: Cramming is when a fraudster using a Credit Card makes piecemeal transactions over a long period of time. The transactions will be so small that card holder may not even notice the charges. In India such a fraud is called Salami attack, where small amounts are fraudulently charged on the card. This type of fraud is active in India.

6) Triangulation Fraud:: The fraudster maintains some web site through which the items are offered pay on delivery at very high discount. The site they maintain looks like a genuine sales site. At the time of ordering online, customer provides card details to the site. Once the fraudsters get the card details, they order items from a legitimate site using some other stolen credit card details. Then the fraudster keeps shopping online using the credit card details of the customer.

These huge economic losses by the frauds leads the card issuers, financial institutions and researchers to develop new fraud detection technologies. Despite the development of new technologies the frauds are increasing day by day. From the literature it is observed that most of the techniques consider the transaction history of the users, study the user behavior to form rules for fraud detection. Then the new transactions are synchronized with those behaviors or rules and if markable deviation is observed then the new transaction will be tagged as fraud otherwise normal.

The problem is to analyze on-line financial transactions, by considering the most relevant feature or attribute of the transactions to detect frauds with reference to the fuzzy set defined for the most relevant attribute.

III. Methodology

Fuzzy Logic is the invention of Zadeh[28] for representing the cognitive uncertainties, measuring the intensity of the truth values for unquantifiable measures or probabilistic measures within the range of 0 and 1.

Let D be the collection of examples or objects or instances represented in set theoretic notion as $\{e_1, e_2.....e_n\}$ where the D is called the universe of discourse and the e_i is the individual example or object(element) of D. A fuzzy set A in the universe of D is described by a membership function $\mu_A(e) : D \rightarrow [0, 1]$ which quantifies the intensity or grade of membership of the element e in the fuzzy set A. The member ship crisp value $\mu_A(e) = 1$ means that e is 100% a member of A and $\mu_A(e) = 0$ means that e is 100% not a member of A, and in case of fuzzy logic $0 \leq \mu_A(e) \leq 1$ which means that e is partially member of A. Hence as the membership values goes more close to 1, the intensity of membership of e in A becomes more strong.

The Id3((Iterative Dichotomiser 3) was developed by Quinlan[19] for dealing with symbolic data by expressing the knowledge as a decision tree. The decision tree is generated as a mathematical model by the training data to classify new instances with simple inference mechanism, in the tree the leaf nodes represents the class names and the branches represent the conditions. A random subset of the training set called *window* is considered and a corresponding decision tree is formed which correctly classifies all the examples in the *window*. The tree is then used in classification of the rest examples of training set. If the tree classifies the entire training set correctly the process terminates otherwise a selection of the incorrectly classified objects is included in the *window* and the process continues. After few iterations a correct decision tree is formed.

a) Example: Suppose the D is the dataset or set of examples and T is the condition applied to classify the data set D with possible outcomes $O_1, O_2, ..., O_n$. Each example will have one of these outcomes satisfying the condition T and will divide the dataset D into $D_1, D_2, ..., D_n$ respectively for each outcome. Recursively for each D_i the decision tree process is repeated and finally we will have the decision tree for all the examples in the dataset D. Classification rules are formed by Climbing down through the branches to the leaf from the root node. Leaves are the class names and the branch are the condition outcomes with intermediate nodes represent the conditions applied on attributes.

In $Id3$ in the decision tree forming process starting from root to leaves at every node (except the leaf) which attribute to be considered for applying the condition for splitting the dataset(node) into different subsets as the nodes of the next level is decided based on information based methods: *Information Content, Expected Information and Information Gain*[19], [2].
Every example e_i in the dataset D is in class c_j with probability

$$p_j = \frac{|D_j^N|}{|D^N|} \tag{1}$$

where the D^N representing the set of examples in node N, D_j^N representing the set of examples in node N belonging to class c^j.
The Information Content for the Dataset in the current node, N:

$$I^N = -\sum_{j=1}^{|C|} p_j \log_2 p_j \tag{2}$$

where C is the set of classes in the dataset in node N.
The expected information in a subtree of node N for an individual attribute $A^k \in A$ in node N:

$$E^{N|A^k} = \sum_{l=1}^{|A^k|} \frac{|D_{a_l^k}^N|}{|D^N|} E^{N|a_l^k} \tag{3}$$

where $D_{a_l^k}^N$ is the set of examples whose attribute value a_l^k for A^k corresponds to the nodes branch i.e. the set of examples in the respective child node of N for the attribute value a_l^k.
The information gain $G(A^k, N)$ for the attribute A^k in node N is:

$$IG(A^k, N) = I^N - E^{N|A^k} \tag{4}$$

The classification problem in which the attributes take cognitive values, determining the correct class is not possible. To solve that kind of classification problems *Umano et al.*[24] have proposed Fuzzy-Id3 algorithm by considering the feasibility of Id3 and Fuzzy Logic.

The fuzzy-Id3 algorithm proposed by[24] works by defining fuzzy sets for all attributes and forms a fuzzy decision tree in the same way as Id3 described above. Here the difference is that in Id3 the information gain is based on the probability of the attribute but in Fuzzy Id3 probability is computed based on the membership values of the attribute.

Suppose we have a set of data D in which each example is described by the attributes $A = \{A^1, A^2, ...A^l\}$ and each example has one of the classes $C = \{C_1, C_2, ...C_n\}$ and the attribute may have the fuzzy values $A^i = \{v_{i1}, v_{i2}, ...v_{im}\}$ for different i, the m may be different. Unlike the general Id3 here $|D|$ is the sum of the membership values of the examples in D.The probabilities and the equations are computed as follows:
The probability for the j^{th} fuzzy set of A^k:

$$p_{kj} = \frac{|D_{v_{kj}}|}{\sum_{j=1}^{m} |D_{v_{kj}}|} \tag{5}$$

where m is the total number of fuzzy sets for the attribute A^k.

The probability of examples with class c_j at node N:

$$p_j = \frac{|D_j^N|}{|D^N|} \tag{6}$$

where j is the class number.
The expected information in a subtree of node N for an individual attribute $A^k \in A$ in node N:

$$E^{N|A^k} = \sum_{j=1}^{m} (p_{kj}.I(D_{v_{kj}})) \tag{7}$$

The Information Content for the Dataset in the current node, N:

$$I^N = -\sum_{j=1}^{n} p_j \log_2 p_j \tag{8}$$

where j is the class number and n is total the number of classes in the dataset in node N.
The information gain $IG(A^k, N)$ for the attribute A^k in node N is:

$$IG(A^k, N) = I^N - E^{N|A^k} \tag{9}$$

Algorithm 1 FuzzITree

BEGIN :

1: Root Node N contains all the Examples e_i with $\mu_N(e_i)$=1.
2: **if** a node N with fuzzy set of data D^N satisfies the following conditions.
   1. $D_j^N \subseteq D^N$ with class c_j satisfies $p_j \geq \theta_r$ $\triangleright$ θ_r is a threshold
   2. sum of the membership values $|D^N| < \theta_n$ $\triangleright$ θ_n is a threshold
   3. No attributes are there to split the node.

   then it is a leaf node with class c_j .
3: **end if**
4: **if** If above conditions are not satisfied **then**
   1. $A_{G_{max}}^k \leftarrow Max(IG(A^k, D^N)\ \forall\ k = 1, ..., l)$
   2. Split the dataset D^N into fuzzy subsets $D_1, D_2, ...D_m$ by branching as per the m no. of fuzzy terms of the attribute $A_{G_{max}}^k$
   3. Label the branches with corresponding fuzzy term $v_{Gmax,j}$.
   4. $\mu_{D_j}(e) \leftarrow \mu_{D^N}(e) * \mu_{v_{Gmax,j}}(e)$.
   5. $D^N \leftarrow D_j \forall j = 1, 2, ...m$.
5: **end if**
6: Repeat the steps from 2 recursively.

END

The credit card fraud detection is a classification problem where the objective is to classify the transactions, and act accordingly to alleviate the loss causing by the fraud transactions. The data used here is of a prominent bank of Singapore and the attributes we considered are:

- branch_code-branch code of transaction.
- cust_ac_no- account number.
- ccy-debit currency in which the transaction is done.

Sl	Br_Code	Ac_No	Ccy	DrCr_ind	Cpty_Ac_I	TTS	Locn	Txn_amt	Class
1	PL0	PL0123	SGD	D	CPTY01	04-Oct-2006 20:29:08	LCN1	1000	1
2	PL1	PL1123	SGD	D	CPTY02	04-Oct-2006 20:29:10	LCN2	1200	1
3	PL0	PL0123	SGD	D	CPTY03	04-Oct-2006 20:29:11	LCN2	2300	3
4	PL1	PL1123	SGD	D	CPTY03	04-Oct-2006 20:31:15	LCN2	1200	2
5	PL0	PL0123	SGD	D	CPTY01	04-Oct-2006 20:33:10	LCN1	1000	1
6	PL0	PL0123	SGD	D	CPTY03	04-Oct-2006 20:33:29	LCN2	1200	3
7	PL0	PL0123	SGD	D	CPTY02	05-Oct-2006 20:30:10	LCN2	1200	2
8	PL1	PL1123	SGD	D	CPTY03	05-Oct-2006 22:15:12	LCN1	1000	1
9	PL0	PL0123	SGD	D	CPTY01	06-Oct-2006 21:30:10	LCN2	650	1
10	PL1	PL1123	SGD	D	CPTY03	07-Oct-2006 15:20:11	LCN2	650	1
11	PL0	PL0123	SGD	D	CPTY01	07-Oct-2006 17:30:15	LCN1	2300	3
12	PL1	PL1123	SGD	D	CPTY03	07-Oct-2006 17:40:11	LCN2	650	1
13	PL2	PL2123	USD	C	SELF01	11-Oct-2006 12:10:16	LUS01	2000	1
14	PL0	PL0123	SGD	D	CPTY03	12-Oct-2006 12:15:15	LCN2	2300	2
15	PL2	PL2123	USD	C	SELF01	13-Oct-2006 12:11:17	LUS01	1800	1

TABLE I. BANK TRANSACTIONAL DATA

SL	μ	Br_Code	Ac_No	Ccy	DrCr_ind	Cpty_Ac_I	TTS	tts_diff	Locn	Loc_diff	Txn_amt	Class
1	1	0.674453	0.674453	0.707107	1	0.037635	7.329548535648148e+005	0	73363	0	1000	1
2	0.2	0.73577	0.73577	0.707107	1	0.15054	7.329548535879629e+005	0	67719.9	0	1200	2
3	0.8	0.674453	0.674453	0.707107	1	0.301084	7.329548535995371e+005	0.05000006407499	67719.9	5643.1	2300	3
4	0.7	0.73577	0.73577	0.707107	1	0.301084	7.329548550347223e+005	2.08333343267441	67719.9	0	1200	2
5	1	0.674453	0.674453	0.707107	1	0.037635	7.329548563657408e+005	4.03333341702819	73363	0	1000	1
6	0.3	0.674453	0.674453	0.707107	1	0.301084	7.329548565856481e+005	0.31666662544012	67719.9	5643.1	1200	3
7	0.3	0.674453	0.674453	0.707107	1	0.15054	7.329558542824074e+005	1.437000000011176e+003	67719.9	5643.1	1200	2
8	0.4	0.73577	0.73577	0.707107	1	0.301084	7.329559272222222e+005	1.546033333372325e+003	73363	5643.1	1000	1
9	1	0.674453	0.674453	0.707107	1	0.037635	7.329568959490741e+005	2.936999999955297e+003	67719.9	5643.1	650	1
10	0.7	0.73577	0.73577	0.707107	1	0.301084	7.329576390162037e+005	2.464983333349228e+003	67719.9	5643.1	650	1
11	0.9	0.674453	0.674453	0.707107	1	0.037635	7.329577293402777e+005	1.200083333272487e+003	73363	5643.1	2300	1
12	0.7	0.73577	0.73577	0.707107	1	0.301084	7.329577362384260e+005	1.400000000372529e+002	67719.9	0	650	1
13	0.5	0.061314	0.061314	0.70711	0	0.564532	7.329615071296296e+005	0	56433	0	2000	1
14	0.8	0.674453	0.674453	0.707107	1	0.301084	7.329625105902777e+005	6885	67719.9	5643.1	2300	2
15	0.1	0.061314	0.061314	0.70711	0	0.564532	7.329635078356481e+005	2.881016666684300e+003	56433	0	1800	1

TABLE II. NUMERICAL NORMALIZED VALUES OF BANK TRANSACTIONAL DATA

- drcr_ind-debit or credit.
- cpty_ac_no-payee account number.
- TTS-Transaction Time stamp.
- locn_ref_no-terminal or PoS reference.
- txn_amt-transaction amount.
- class-class to which the transaction belongs.

Fuzzy sets $\{very\_low, low, medium, high, very\_high\}$ for the attribute *'txn_amt'* are defined here as:
$verylow = \{1/600, 0.8/650, 0.6/700\}$
$low = \{0.3/800, 0.5/850, 0.6/900, 0.8/950, 1/1000, 0.8/1050, 0.6/1100, 0.3/1200\}$
$medium = \{0/1200, 0.2/1250, 0.5/1300, 0.7/1350, 1/1400, 0.8/1450, 0.6/1500, 0.5/1550, 0.3/1600\}$
$high = \{0.2/1550, 0.5/1600, 0.7/1650, 1/1700, 0.8/1750, 0.6/1800, 0.5/1850, 0.3/1900\}$
very high$= \{0.1/1850, 0.3/1900, 0.5/1950, 0.6/2000, 0.8/2050, 1/2100\}$

To get the fuzzy sets for the attributes TTS nad Loc_ref, we have calculated the difference of TTS(in minutes) and Loc_ref of a particular accounts current transaction with the TTS and Loc_ref of the immediate previous successful transaction of that particular account respectively and we have defined the fuzzy sets for the attributes TTS_diff and Loc_ref_diff .
Fuzzy sets $\{very\_low, low, medium, high, very\_high\}$ for the attribute *'TTS_diff'* are defined here as:

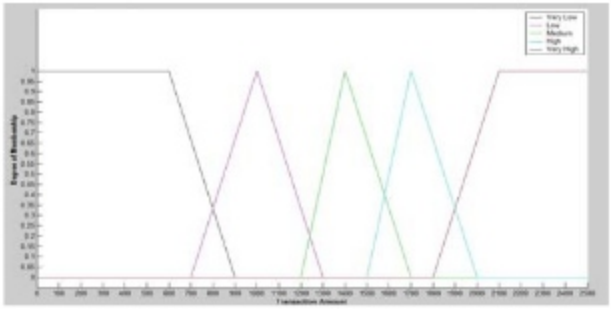

Fig. 1. Fuzzy membership for the Attribute Transaction Amount

$very\_low = \{1/0.05000006407499, 1/0.31666662544012, 1/2.08333343267441, 1/4.03333341702819, 1/10, 0.9/11, 0.85/11.5, 0.8/12, 0.75/12.5, 0.5/15, 0.3/17, 0.10/19, 0/20\}$
$low = \{0/12, 0.0556/12.5, 0.3333/15, 0.3889/15.5, 0.6667/18, 0.7222/18.5, 0.8889/20, 1/21, 0.4444/22, 0.2778/25, 0.2500/25.5, 0.1667/27, 0.0556/29, 0/30\}$
$medium = \{0/25, 0.1489/32, 0.2128/35, 0.3191/40, 0.4255/45, 0.5319/50, 0.6383/55, 0.7447/60, 0.8511/65, 0.9574/70, 1/72, 0.4211/80, 0.3158/90, 0.2105/100, 0.1053/110, 0.0526/115, 0/120\}$
$high = \{0/90, 0.0667/95, 0.1333/100, 0.2667/110, 1/1700, 0.4667/125, 0.60/135, 0.6667/140, 0.7333/145, 0.8667/155, 1/165, 0.4333/175, 0.3667/185, 0.2667/200, 0.1333/220, 0.0667/230, 0.0333/235, 0/240\}$
$very\_high = \{0/210, 0.1667/220, 0.3333/230, 0.50/240, 0.5833/245, 0.75/255, 0.9167/265, 0.9833/269, 1/270, 1/6885\}$

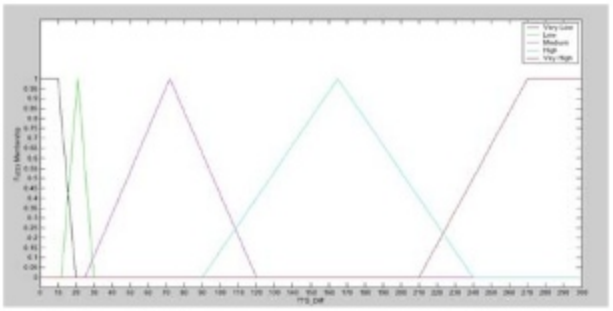

Fig. 2. Fuzzy membership for the Attribute TTS_diff

Fuzzy sets $\{low, medium, high\}$ for the attribute *'Loc_diff'* are defined here as:
$low = \{1/0, 1/5, 0.75/5.5, 0.50/6, 0.25/6.5, 0/7\}$
$medium = \{0/5, 0.1429/10, 0.2857/15, 0.5714/25, 0.8571/35, 1/40, 0.4706/50, 0.3529/60, 0.1176/80, 0/90\}$
$high = \{0/40, 0.1250/45, 0.50/60, 0.8750/75, 1/80\}$
(Here in the figure the distances are marked in miles for

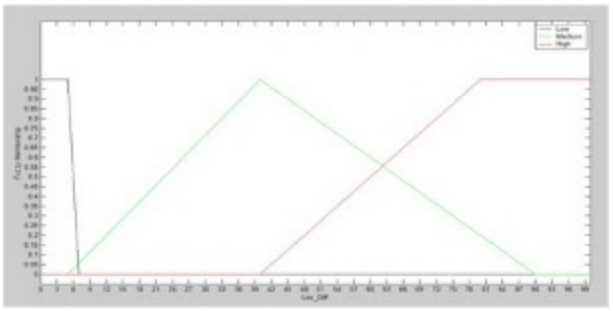

Fig. 3. Fuzzy membership for the Attribute Loc_diff

drawing comfortable.)

IV. Result and Discussion

To select the best attribute for generating the decision tree using Fuzzy Id3 we need to calculate the information gain. Here $|D| = 9.4, |D_{c_1}| = 6.5, |D_{c_2}| = 1.8, |D_{c_3}| = 1.1$ So using the equation-8 the Information Content $I(D) = -\frac{|D_{c_1}|}{|D|}\log_2\frac{|D_{c_1}|}{|D|} - \frac{|D_{c_2}|}{|D|}\log_2\frac{|D_{c_2}|}{|D|} - \frac{|D_{c_3}|}{|D|}\log_2\frac{|D_{c_3}|}{|D|}$ $= 1.1868$

The membership values for the fuzzy sets we have defined for the attribute txn_amt are calculated using the formula defined as:

$$\mu_{D_j}(e) \leftarrow \mu_D(e) * \mu_{v_{Gmax,j}}(e) \tag{10}$$

where $\mu_D(e)$ is the membership value of example e in D and $\mu_{v_{Gmax,j}}(e)$ is the membership value of example e in j^{th} vague set for the attributre A_{max}. i.e. for the transaction 2 amount 1200 has the membership value 0.33 in the fuzzy set *low* of the attribute txn_amt, as per the equation-10 the final membership value will be 0.231 "i.e." $0.70 * 0.33$, where $\mu_D(e)$ is 0.70 and $\mu_{v_{Gmax,j}}$ is 0.33

Now to choose the best splitting attribute we need to calculate the Information Gain individually for all the attributes we have considered as relevant in forming the ID3. The membership values we have calculated considering both the membership values (μ) in the dataset and the membership values in the defined fuzzy set for individual attributes using equation-10. Using these membership values the Information Content and the Expected Information for the relevant attributes are computed as follow.
First we have considered the attribute *txn_amt* for the fuzzy set *very_low* of the *txn_amt* we have
$|D^{v\_low}| = 1.99,$
$|D_1^{v\_low}| = 1.99, |D_2^{v\_low}| = 0, |D_3^{v\_low}| = 0$
Now using the equation-8 the Information Content I^N for this fuzzy set *v_low*: $I^N(D_{v\_low}) = 0$

For the fuzzy set *low* of the *txn_amt* we have
$|D^{low}| = 2.89,$
$|D_1^{low}| = 2.4666, |D_2^{low}| = 0.329, |D_3^{low}| = 0.099$
Information Content I^N for this fuzzy set *low*: $I^N(D^{low}) = 0.7199$

For the fuzzy set *medium* of the *txn_amt* we have
$|D^{medium}| = 0,$
$|D_1^{medium}| = 0, |D_2^{medium}| = 0, |D_3^{medium}| = 0$
Information Content I^N for this fuzzy set *medium*: $I^N(D^{medium}) = 0$

For the fuzzy set *high* of the *txn_amt* we have
$|D^{high}| = 0.04,$
$|D_1^{high}| = 0.04, |D_2^{high}| = 0, |D_3^{high}| = 0$
Information Content I^N for this fuzzy set *high*: $I^N(D_{high}) = 0$

For the fuzzy set *very_high* of the *txn_amt* we have
$|D^{v\_high}| = 2.83,$
$|D_1^{v\_high}| = 1.23, |D_2^{v\_high}| = 0.80, |D_3^{v\_high}| = 0.80$
Information Content I^N for this fuzzy set *v_high*: $I^N(D^{v\_high}) = 1.553$

We calculate the Expected Information for the attribute *txn_amt* by applying equation-7 as:
$E^{N|txn\_amt} = (\frac{1.99}{7.75} \times 0) + (\frac{2.89}{7.75} \times 0.7199) + (\frac{0}{7.75} \times 0) + (\frac{0.04}{7.75} \times 0) + (\frac{2.83}{7.75} \times 1.553) = 0.8356$

Now using the equation-9 we can calculate the Information Gain for *txn_amt* as:
$IG(txn\_amt, N) = 1.1868 - 0.8356 = 0.3512$
Similar way if we calculate the Information Gain for the attributes tts_diff and Loc_diff we will get:
$IG(tts\_diff, N) = 1.1868 - 0.8051 = 0.3817$
$IG(Loc\_diff, N) = 1.1868 - 1.1171 = 0.0697$

The algorithm FuzzITree selects the attribute for which the Information Gain is highest as splitting attribute in current node and it creates branches. This process is repeatedly applied in the new subtrees until it reaches a leaf which determines the class of the transaction for which the path from root to leaf is resembled.

V. Conclussion

We have presented here the mathematical process to create an ID3 decision tree by using fuzzy logic. We have applied our

algorithm FuzzITree on the normalized training data shown in table II. Out of all these attributes we have considered the most relevant attributes txn_amt, tts_diff, and Loc_diff to reduce the irrelevant processing so that the detection can be done in optimal time. As per the execution result of the algorithm on training data it is observed that all the transactions are classified correctly except the transaction no. 7. We have conducted test on some other transactions as well with different values of the attributes in different situations to determine the detection rate and by considering all the test results it is observed that the detection rate is 89%.

We will further proceed our research using fuzzy concept to find the more optimal way for fraud detection purpose. We will be using our algorithm along with the fuzzy neighborhood techniques. Also some empirical studies are going on for further efficient solutions.

REFERENCES

[1] E. Aleskerov, B. Freisleben, and B. Rao. Cardwatch: a neural network based database mining system for credit card fraud detection. In *Proceedings of Computational Intelligence for Financial Engineering (CIFEr), 1997*, pages 220–226. IEEE, 1997.

[2] Łukasz Bartczuk and Danuta Rutkowska. A new version of the fuzzy-id3 algorithm. In *International Conference on Artificial Intelligence and Soft Computing*, pages 1060–1070. Springer, 2006.

[3] Tej Paul Bhatla, Vikram Prabhu, and Amit Dua. Understanding credit card frauds. *Cards business review*, 1(6), 2003.

[4] Richard J Bolton and David J Hand. Statistical fraud detection: A review. *Statistical Science*, pages 235–249, 2002.

[5] Priya Ranjan Dash. Your credit card under watch. *Financial Chronicle. Chennai*, page 16, April 17 2008.

[6] Linda Delamaire, HAH Abdou, and John Pointon. Credit card fraud and detection techniques: a review. *Banks and Bank Systems*, 4(2):57–68, 2009.

[7] Jose R Dorronsoro, Francisco Ginel, C Sgnchez, and CS Cruz. Neural fraud detection in credit card operations. *Neural Networks, IEEE Transactions on*, 8(4):827–834, 1997.

[8] Manoel Fernando Alonso Gadi, Xidi Wang, and Alair Pereira do Lago. Credit card fraud detection with artificial immune system. In *Artificial immune systems*, pages 119–131. Springer, 2008.

[9] Neda Soltani Halvaiee and Mohammad Kazem Akbari. A novel model for credit card fraud detection using artificial immune systems. *Applied Soft Computing*, 24:40–49, 2014.

[10] Divya Iyer, Arti Mohanpurkar, Sneha Janardhan, Dhanashree Rathod, and Amruta Sardeshmukh. Credit card fraud detection using hidden markov model. In *Information and Communication Technologies (WICT), 2011 World Congress on*, pages 1062–1066. IEEE, 2011.

[11] John Kiernan. Credit card and debit card fraud statistics. http://www.cardhub.com/edu/credit-debit-card-fraud-statistics/, 2013. [Online; accessed 12-June-2014].

[12] Sam Maes, Karl Tuyls, Bram Vanschoenwinkel, and Bernard Manderick. Credit card fraud detection using bayesian and neural networks. In *Proceedings of the 1st international naiso congress on neuro fuzzy technologies*, 2002.

[13] Mukesh Kumar Mishra and Rajashree Dash. A comparative study of chebyshev functional link artificial neural network, multi-layer perceptron and decision tree for credit card fraud detection. In *Information Technology (ICIT), 2014 International Conference on*, pages 228–233. IEEE, 2014.

[14] Sudhansu Kumar Mishra, Ganpati Panda, and Sukadev Meher. Chebyshev functional link artificial neural networks for denoising of image corrupted by salt and pepper noise. 2009.

[15] Reserve Bank of India. Bank-wise atm/pos/card statistics. http://www.rbi.org.in/scripts/ATMView.aspx, 2014. [Online; accessed 12-June-2014].

[16] Dominik Olszewski. Fraud detection using self-organizing map visualizing the user profiles. *Knowledge-Based Systems*, 70:324–334, 2014.

[17] Suvasini Panigrahi, Amlan Kundu, Shamik Sural, and Arun K Majumdar. Credit card fraud detection: A fusion approach using dempster–shafer theory and bayesian learning. *Information Fusion*, 10(4):354–363, 2009.

[18] Jagdish C Patra and Alex C Kot. Nonlinear dynamic system identification using chebyshev functional link artificial neural networks. *Systems, Man, and Cybernetics, Part B: Cybernetics, IEEE Transactions on*, 32(4):505–511, 2002.

[19] J. Ross Quinlan. Induction of decision trees. *Machine learning*, 1(1):81–106, 1986.

[20] Y Sahin and E Duman. Detecting credit card fraud by decision trees and support vector machines. In *Proceedings of the International MultiConference of Engineers and Computer Scientists*, volume 1, pages 1–6, 2011.

[21] Yusuf Sahin, Serol Bulkan, and Ekrem Duman. A cost-sensitive decision tree approach for fraud detection. *Expert Systems with Applications*, 40(15):5916–5923, 2013.

[22] Abhinav Srivastava, Amlan Kundu, Shamik Sural, and Arun K Majumdar. Credit card fraud detection using hidden markov model. *Dependable and Secure Computing, IEEE Transactions on*, 5(1):37–48, 2008.

[23] Mubeena Syeda, Yan-Qing Zhang, and Yi Pan. Parallel granular neural networks for fast credit card fraud detection. In *Fuzzy Systems, 2002. FUZZ-IEEE'02. Proceedings of the 2002 IEEE International Conference on*, volume 1, pages 572–577. IEEE, 2002.

[24] M Umanol, Hirotaka Okamoto, Itsuo Hatono, HIROYUKI Tamura, Fumio Kawachi, Sukehisa Umedzu, and Junichi Kinoshita. Fuzzy decision trees by fuzzy id3 algorithm and its application to diagnosis systems. In *Fuzzy Systems, 1994. IEEE World Congress on Computational Intelligence., Proceedings of the Third IEEE Conference on*, pages 2113–2118. IEEE, 1994.

[25] ACI Universal Payments. Annual aci worldwide global fraud report finds one-in-four consumers victims of card fraud. http://www.aciworldwide.com/news-and-events/press-releases/ annual-aci-worldwide-global-fraud-report-finds-one-in-four-consumers-victims-of-card-fraud.aspx, October 16, 2012. [Online; accessed 12-June-2014].

[26] Wikipedia. Credit card fraud — Wikipedia, The Free Encyclopedia https://en.wikipedia.org/w/index.php?title=Credit_card_fraud&oldid=608901232, 2014. [Online; accessed 11-June-2014].

[27] Wen-Fang Yu and Na Wang. Research on credit card fraud detection model based on distance sum. In *Artificial Intelligence, 2009. JCAI'09. International Joint Conference on*, pages 353–356. IEEE, 2009.

[28] Lotfi A Zadeh. Fuzzy sets. *Information and control*, 8(3):338–353, 1965.

A Simple Three-Dimensional Joint Routing and Scheduling Protocol for Multi-Hop Wireless Networks

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***Abstract*—Multi-hop wireless networks are becoming more and more advanced in its technology. In this paper we have presented a simple three-dimensional minimum angle (3DMA) routing and scheduling protocol for multi-hop wireless networks. The 3DMA routing protocol is a distributed routing protocol, in which a sender selects the next hop as forwarder/relay node form the set of its neighbors, for sending data packets towards destination, which node makes minimum angle with the reference line drawn from source to destination. We have implemented the 3DMA algorithm in such a way, that it is always loop free and needs minimum number of hops to reach the destination. Through simulation, performance evaluation and result analysis of 3DMA is done by calculating the end-end throughput and Energy Consumption for each sender for sending data packets from source to destination. Analysis of output results are done by changing location of user, destination and nodes of the network.**

***Keywords*—Multi-Hop, routing, scheduling, throughput, three-dimension, protocol**

I. Introduction

In last few decades a huge number of routing protocols have been proposed, most of them are for two dimensional spaces. These protocols are not applicable in complicated and challenging three dimensional spaces like underwater, air etc. In practice multi-hop wireless networks (mobile ad-hoc networks, wireless sensor networks, wireless mesh networks, vehicular ad-hoc networks etc.) are often deployed in three dimensional spaces for various important applications such as sky space or atmosphere that is airborne network [16][14]; ocean monitoring that is underwater sensor networks [18][6][7][22][17][10]; forest fire monitoring [3][2] and others[1]. Generally 3D embedding gives more accurate network behavior in real world applications [11]. Three dimensional routing protocols are important to gather and collect those phenomena which cannot be collected by 2D routing protocols. The 3D routing techniques provide number of applications for scientific, environmental, commercial and military purpose [4][5] including disaster prevention, pollution monitoring[15], seaward exploration and oil/gas monitoring etc[20][19]. Airborne networks provide air-to-air, surface-to-air and sometimes surface-to-surface communications. In military at the time of war airborne network can enable military planes to communicate with platoons or solders on the ground without any fixed infrastructure[20]. From our study so far, we have found very less number of efficient three dimensional routing protocols have been proposed, because designing of 3D routing protocols are surprisingly more difficult than designing 2D routing protocols. Its a hot topic for the researcher to develop efficient, reliable routing techniques for three dimensional approach. Hence we are motivated to develop efficient routing and scheduling techniques for challenging three dimensional environments.

To obtain the location information in three dimensional coordinates(latitude, longitude, altitude) [20] GPS (Global Positioning System)[8] and other similar techniques are used. Geographical routing protocols do not need route discovery and route maintenance like topological routing algorithms therefore dynamic changes in network can be adjusted easily[1].

We have considered multi-hop wireless network, where each node knows its own location, locations of neighbors and other nodes in the network using centralized location management technique like GPS or locations are pre decided before deployment. Nodes in the network receive and forward packets through one or more intermediate nodes using wireless link for the communication between two end points[13]. In this paper, we have presented a simple three dimensional minimum angle based routing protocol (3DMA). In 3DMA a reference line is drown from source to destination, all the nodes within the transmission range of the sender node are selected as a set of neighbors of the sender, and draws lines connecting the neighbors and the source, forming angles for every neighbor with the reference line. The neighbor that creates minimum angle is selected as a next hop node for forwarding packets to the destination.

This paper is organized as follows. Section II is the related works, section III is the methodology and algorithm, section IV is the performance evaluation and analysis of result and finally section V is the conclusion.

II. Related Works

Research in three dimensional routing in multi-hop wireless networks is gaining popularity because many applications such as air space or atmosphere monitoring, underwater monitoring, forest fire detection, etc. needs three dimensional routing for gathering informations. Wang et.al [23] proposed an efficient sub minimal ellipsoid geographical greedy face routing protocol (EGE3D). In EGE3D a vertical ellipse region is uniquely shaped

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when neighbor nodes of the sender is set to one point in the ellipse. Ellipse zone is constructed from one neighbor node by this sender node and determines that this neighbor on the ellipse will keep the second least angle (sub minimal) to the line from source to destination, where inside the sub minimal ellipse the packets forwarded greedily until a local minimal is obtained. They have used face algorithm to avoid void node problem (VNP). Rubeaai et al. [1] have proposed a three-dimensional real-time routing protocol (3DRTGP) for wireless sensor networks.This protocols achieve real-time routing operations using adaptive packet forwarding region (PFR) and selecting fast forwarding nodes in the PFR. PFR technique limits the number of nodes forwarding towards destination. They have given a heuristic solution for void node problem in 3D wireless sensor networks. The 3DRTGP gives tuning techniques to make the protocol meet the delay and miss ratio requirements of applications. In [11] presented the design philosophy and basic principle like neighbor selection rules, routing hole bypass approaches and classifications of 3D geographic routing (3DGR) protocols and categorized current research work based on different criteria. They compared 3DGR from a variety of perspective and applications like, guaranteed delivery, path quality, reactive, distributed, complexity and communication overhead.They also have discussed various issues of 3DGR routing protocols like, limitations of networks model, lack of multidimensional geographic routing, lack of security in geographic routing protocols. Shah and Kim[20] studied and discussed the various issues related to 3D wireless ad-hoc and sensor networks, mainly about 3D airborne ad-hoc networks (AANET's) and 3D underwater sensor networks (UWWSN). Design requirements and challenges in 3D AANET's and UWWSN are discussed throughly.They also have highlighted the various research issues in 3D wireless ad-hoc and sensor networks. Fariborz Entezami and Christos Politis[9] have proposed a routing protocol 3DPBARP which is a novel, real-time, position based and energy efficient protocol for WSNs based on spanning tree method.They have used greedy forwarding approach when looking for a path to the destination. The protocol uses unique restricted parent forwarding regions(PFR), to cover only the parent node, which reduces the radio range so that minimum number of nodes are covered. It reduces the number of forwarding nodes as a result improve in traffic and packet collision.They have used rainbow mechanism to avoid dead end routes. Zhang et al.[24] studied the problem of how to construct a 3D wireless sensor networks that achieves low connectivity and full coverages by using less number of sensors. They have designed a set of patterns to achieve the full coverage and K connectivity where $k <= 4$. They have proved the optimality of 1-, 2-, 3- and 4-connectivity and full-coverage, and proved their optimality under any value of the ratio of communication range rc over sensing range rs, among regular lattice deployment patterns. They have compared with 14-connectivity and observed when $rc/rs = 1$ the number needed to achieve 14-connectivity is around 2.5 times that to achieve 3- or 4- connectivity and 3.5 times that to achieve 1- or 2- connectivity. The number difference increases as rc/rs decreases. They also have investigated the evolutions among all the proposed low-connectivity patterns. In [13] and [12] Hussain et al have presented a simple routing and scheduling techniques for multi-hop wireless networks based on minimum angle and minimum angle intermediate node. Earlier we have implemented the protocol for 2D spaces, in this work we have implemented the 3DMA for 3D spaces considering some other issues of 3D scenario.

III. 3DMA Protocol Design

In the design of 3DMA routing protocol, it is assumed that each node knows its own location, location of neighbors and the destination location, using GPS or some other centralized location management techniques. We have considered that nodes are homogeneous and distributed randomly in a three dimensional plane. Suppose a 3D multi-hop wireless network consists of a set V of n nodes distributed in a 3D plane $\{X, Y, Z\}$. Each node has transmission range TR. Two nodes u and v can receive and send signal directly if the following equation-1 is satisfied.

$$\|uv\| \leq TR, \tag{1}$$

where $\|uv\|$ is the Euclidean distance between u and v in $\{X, Y, Z\}$ plane. In multi-hop wireless network, it is responsibility of routing protocols to find path between two end points through intermediate nodes. Traffic passes through intermediate nodes from source to destination, intermediate node act as a relay or forwarder. In our proposed protocol we have calculated path from each user to base station which is not much deviated from base station. This is particularly useful when a large number of nodes deployed in larger networks in a 3D plane and route is to be constructed from source to destination. In this paper, we have explained the proposed 3DMA routing protocol for 3D space based on minimum angle with distributed scheduling.

In the design of 3DMA routing protocol, first a reference line is drawn from sender/user/source to destination/base station/sink. Then a set of neighbor nodes are selected within the transmission range TR of the sender node. Suppose a user/sender node U has location (U_x, U_y, U_z) and another node N has location (N_x, N_y, N_z) in a 3 dimensional plane $\{X, Y, Z\}$, Node N will be in the neighbor set of node U, if Euclidean distance $\|UN\|$ between U and N is less or equal to the transmission range TR of U.

After that, selection of an intermediate node (IM) for forwarding or relay packets towards destination form selected neighbor list which makes minimum angle with the reference line drawn from source/user to destination/base station. Suppose sender/user node S has location (U_x, U_y, U_z), location of a neighbor node N is (N_x, N_y, N_z) and the location of the destination D is (D_x, D_y, D_z). For calculating angle $\angle NUD$ i.e. θ formed by node N with the reference line drawn from U to D depends on two vectors, vector from source to destination, $\overrightarrow{\text{UD}}$ and the vector from source to the node N itself, $\overrightarrow{\text{UN}}$. The vector $\overrightarrow{\text{UD}}$ is given by $(U_x - D_x, U_y - D_y, U_z - D_z)$ and $\overrightarrow{\text{UN}}$ is given by $(U_x - N_x, U_x - N_y, U_x - N_z)$. Angle θ made by a node N from list of neighbor nodes, with the reference line drawn from sender U to destination D is calculated by the equation- 2 given bellow-

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$$\theta = \cos^{-1}\Big[\frac{\overrightarrow{\mathrm{UN}} \cdot \overrightarrow{\mathrm{UD}}}{\|\overrightarrow{\mathrm{UN}}\|\|\overrightarrow{\mathrm{UD}}\|}\Big], \tag{2}$$

where $(\overrightarrow{\mathrm{UN}} \cdot \overrightarrow{\mathrm{UD}})$ is the dot product of $\overrightarrow{\mathrm{UN}}$ and $\overrightarrow{\mathrm{UD}}$, $\|\overrightarrow{\mathrm{UN}}\|$ and $\|\overrightarrow{\mathrm{UD}}\|$ is the euclidean vector norms [1]. Among all the neighbors the node that formed minimum angle with the reference line, is selected and used as forwarder towards destination. Now this node acts as a sender node, a reference line is drawn from this new sender node to the destination, then again minimum angle node is selected from neighbor list of this new sender node. Same procedure will be repeated for transferring the role of sender node to chosen intermediate node(IM), till it reaches the destination/ base station as an intermediate node and it will stop there.

Figure-1 describes clearly about 3DMA routing protocol, the nodes are defined by its three dimensional location information. We have considered here only one user/sender node and the range of a node is 25 to understand the protocol clearly. First a reference line (black lines is used in the Figure- 1 for representing the reference line from sender to destination) is drawn from user $U_1(0, 50, 50)$ to the base station $BS(45, 60, 0)$, U_1 finds set of neighbor nodes within its transmission range having location information $(0, 50, 40)$, $(10, 50, 35)$, $(17, 60, 35)$ and $(12, 60, 40)$, lines are drawn from sender to connect all these four neighbors (in Figure-1 blue lines are drawn for connecting sender with its neighbor nodes). Then angles with the reference line drawn from U_1 to BS for these four neighbor nodes are calculated, it is found that the node having location information $(10, 50, 35)$, we have named it as U_{11}, has formed minimum angle with the reference line, so node U_{11} is selected as next hop node/forwarder node towards the destination. We connect U_{11} with U_1 for showing the selected routing path (in Figure-1 red line is drawn for marking the finally selected routing path). Now U_{11} will act as the next sender node, like node U_1 a reference line is drawn from U_{11} to BS, neighbors of U_{11} within its transmission range are $(17, 60, 45)$, $(0, 50, 40)$, $(0, 50, 25)$and $(30, 50, 25)$, the neighbor node having location information $(30, 50, 25)$, named as U_{12} have made minimum angle with the reference line U_{11} to BS, therefore node U_{12} is the next forwarder node towards the destination. In the same way we have evaluated the proposed 3DMA routing protocol for the example network given in Figure- 1, we have found that the node having location information $(42, 62, 10)$, named as U_{13} among all neighbors of U_{12}, have formed minimum angle with the reference line drawn from U_{12} to BS; so node U_{13} is the next forwarder node towards destination (in Figure-1, U_{12} is connected with U_{13} with a red line for showing the selected routing path). Here in the example network shown in Figure-1, U_{13} is the last intermediate node to reach the final destination/base station BS, among the neighbors of U_{13}, the node having location information $(45, 60, 0)$, which is the base station(BS) have minimum angle $(0 \quad degree)$ with the reference line, this means final destination is reached, U_{13} and BS are joined with a red line and here it stops. The path calculated by the 3DMA routing protocol is $U_1 - U_{11} - U_{12} - U_{13} - BS$. It is clear from the Figure-1 that the packets reached at the base station/destination from sender through the minimum number of hops hence least delay, provides best possible link and improved end to end throughput. Path calculated by 3DMA is loop free.

A. Scheduling in 3DMA

In multi-hop wireless network due to interference caused by simultaneous transmission of nodes decrease the performance of network. Reason of interference between wireless devices is the broadcast nature of wireless communication[21]. Higher interference usually results in lower reliability of data transmission. To overcome this problem a Scheduling techniques is used. Packet scheduling is the process of allowing nodes in a network to receive or send packets so that there is no interference with other nodes in the network and maximize the system capacity, which is the most important radio resource management function in networks [21]. Scheduling is responsible to determine which packets are to be transmitted such that resources are fully utilized. In scheduling different links are activated at different time slots, for spatial reuse and higher spectral efficiency, transmission group may be formed for simultaneous transmission over group of links. In the proposed 3DMA routing protocol, at a given time, it is assumed that only one user has data to send to the base station or destination. Therefore only links in the route from that particular user to destination will be activated. If more than one user is ready to send data, then they need to take turn, one user at a time.

IV. Performance Evaluation and Result Discussion:

Performance of 3DMA routing protocol is evaluated by calculating end-to- end throughput and energy consumption, considering simulation parameters which are common for all nodes (as shown in table-I). All the nodes scattered in the network can be source or destination node, in 3DMA one of those scattered nodes is selected as a destination node and some of those as source nodes. We have considered a medium size network and find the route for number of senders to a destination. It is assumed that all nodes in the network knows the location information of itself, its neighbors and other nodes in the network using centralized location management system like GPS, or some other location management techniques or pre decided before deployment. For smaller transmission range we have divided X , Y and Z coordinate of each node in the network by 10.

TABLE I: Network simulation parameters

Network parameter	Value
Data packet size	1 MB
Network Area	$50 \times 60 \times 50$
Number of nodes	65 to 80
Range of node	2.5 Km
E_{elec}	50nJ/bit
E_{amp}	$100pJ/bit/m^2$
Number of Sender	6

In the 3DMA routing protocol for calculating throughput, we have assumed that nodes have burst profiles with modulation and coding rates to obtain different data rates with different transmission distance (as shown in table II).

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Fig. 1. Routing path selection by 3DMA

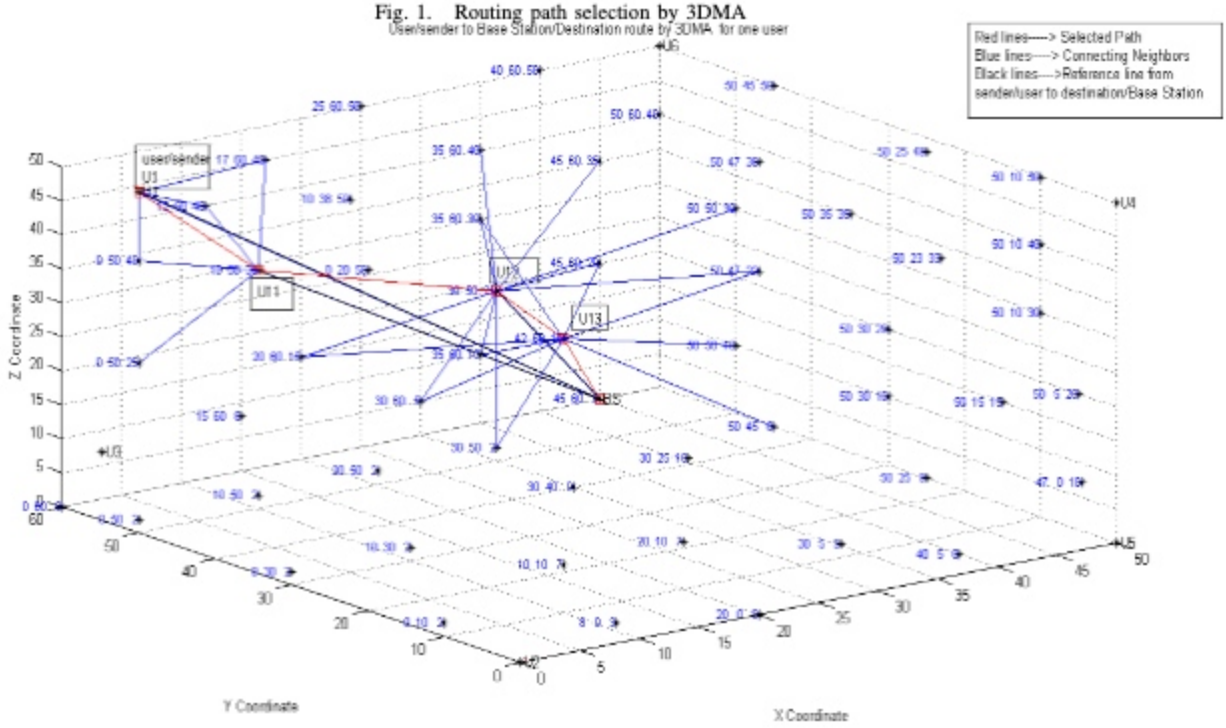

TABLE II: Bit rate and transmission ranges

Modulation	Coding Rate(C_rate)	Transmission Range(in Km)	Bit rates(B_rate) (in Mbps)
QPSK	1/2	$3.5 < l_i <= 5$	2
16-QAM	1/2	$2 < l_i <= 3.5$	5.5
64-QAM	3/4	$l_i <= 2$	11

Table-II shows that for different transmission ranges, different modulation and coding rates are used to obtain different bit rates. Smaller distance gives higher bit rate for data transmission. The 3DMA protocol calculates the time slot $T_i(sec)$ for transmitting data packet of size F (MB) in i^{th} link, having bit rate of a link B_rate (in Mbps) and coding rate C_rate by using the following equation-

$$T_i = \frac{(\frac{F}{C\_rate_i})}{B\_rate_i}, \tag{3}$$

end-to-end throughput ETH of a route from sender to destination is calculated using the equation- 4

$$ETH = \frac{F}{\sum_{i=1}^{pl} T_i}, \tag{4}$$

where pl is the number of links between source and destination i.e. the path length and T_i is the sum of times needed to travel each link in the routing path.
Throughput of the whole network is given by equation- 5

$$ETH_{3DMA} = \sum_{j=1}^{U_n} (\frac{F}{\sum_{i=1}^{pl} T_i}), \tag{5}$$

where U_n is the number of user or sender in the network.

Energy consumption is another important issue in multi-hop wireless networks, specially in multi-hop wireless sensor networks. The 3DMA protocol calculates energy consumption of each node for transmitting and receiving packets. For a receiver node energy consumption per bit in RF module[9] is calculated using the following equation 6

$$E_{rec}(k) = E_{elec} \cdot k, \tag{6}$$

where E_{elec} is the energy required to process 1 bit of message and k is the length of the message in bit.
Energy consumed by the transmitter in RF module[9] is calculated using equation 7

$$E_{trans}(k, d) = E_{elec} \cdot k + E_{amp} \cdot k \cdot d^2, \tag{7}$$

where d is the distance between sender and receiver in meter. E_{elec} is energy required to process 1 bit , E_{amp} is the energy required to transmit 1 bit (nJ Nano-joule, pJ Peta-joule), and k is the length of the message (in bit).

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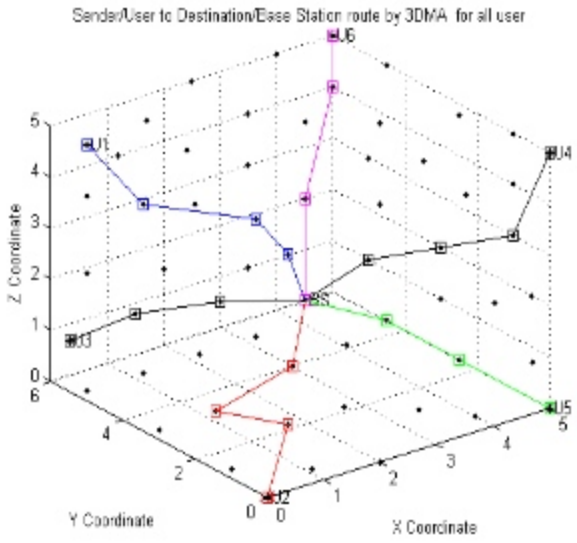

Fig. 2. The First Network

TABLE III: Performance Analysis of first Network shown in Figure-2

Sender	ETH (Mbps)	No. of IM	Time(Sec)	Energy (Joule)
Sender1	1.0313	3	0.9697	1.12×10^{28}
Sender2	0.8250	3	1.2121	1.44×10^{28}
Sender3	2.7500	2	0.3636	0.53×10^{28}
Sender4	0.8250	3	1.2121	1.38×10^{28}
Sender5	1.6500	2	0.6061	1.20×10^{28}
Sender6	1.6500	2	0.6061	0.74×10^{28}

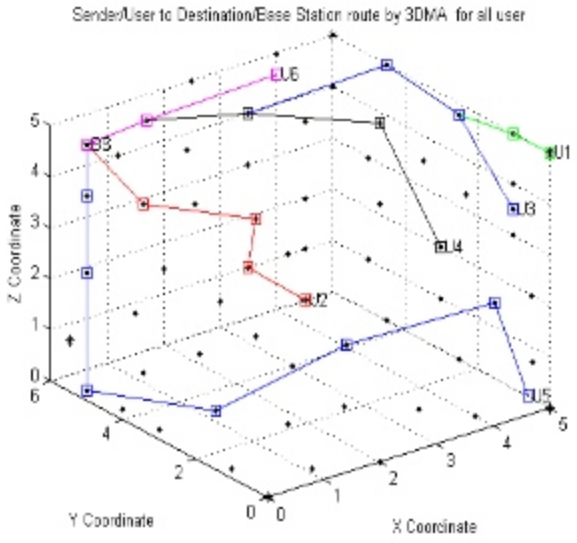

Fig. 3. The Second Network

TABLE IV: Performance Analysis of Second Network shown in Figure-3

Sender	ETH (Mbps)	*No.* of IM	Time(Sec)	Energy (Joule)
Sender1	0.6875	5	1.4545	1.64×10^{28}
Sender2	1.3750	3	1.7273	1.10×10^{28}
Sender3	0.7500	4	1.3333	1.69×10^{28}
Sender4	1.0313	3	0.9697	1.42×10^{28}
Sender5	.5500	6	1.8181	2.14×10^{28}
Sender6	1.3750	1	0.7273	0.76×10^{28}

Figure-2, Figure-3, Figure-4 and Figure-5 are showing the routing path for data transmission by 3DMA routing protocol from 6 senders/users $U1$, $U2$, $U3$, $U4$, $U5$ and $U6$ to base station/destination. In the first network, sender nodes are placed on the edges in other side of network and base station is placed in the center of the network. In 2nd and 3dr networks the base station is placed in one edge and senders are placed in the others edges of the network. Table-III, table-IV, table-V and table-VI are tabulated, the end-to-end throughput for each user, number of intermediate nodes in the routing path between source and destination, total time needed to travel data packets from source to destination, total energy consumption for each sender to transmit data packets to destination.

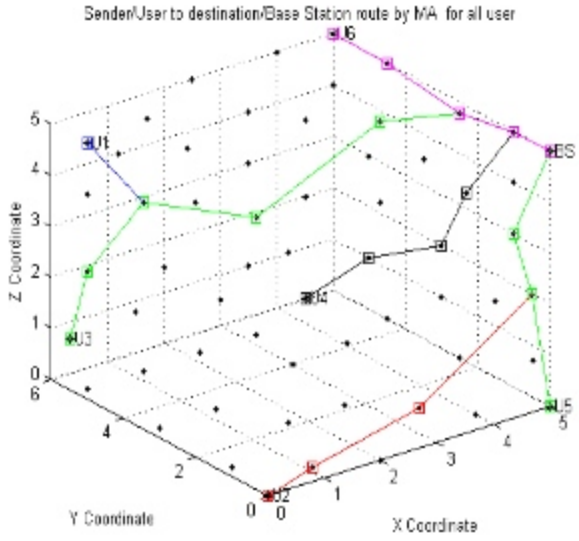

Fig. 4. The Third Network

TABLE V: Performance Analysis of Third Network shown in Figure-4

Sender	ETH (Mbps)	*No.*	Time(Sec)	Energy (Joule)
Sender1	0.6875	5	1.4545	1.86×10^{28}
Sender2	0.7500	4	1.3333	1.47×10^{28}
Sender3	0.6346	6	1.5758	2.04×10^{28}
Sender4	.9167	3	1.0909	1.20×10^{28}
Sender5	1.7686	2	.8485	0.84×10^{28}
Sender6	1.3750	3	0.7273	0.77×10^{28}

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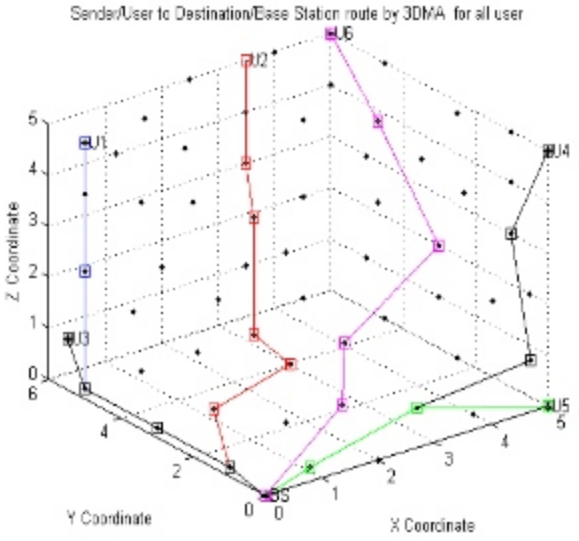

Fig. 5. The Fourth Network

TABLE VI: Performance Analysis of Fourth Network shown in Figure-5

Sender	ETH (Mbps)	*No.*	Time(Sec)	Energy (Joule)
Sender1	0.9167	4	1.0909	1.65×10^{28}
Sender2	0.6347	6	1.5758	1.83×10^{28}
Sender3	2.0627	3	0.4848	0.81×10^{28}
Sender4	.7500	4	1.3333	1.55×10^{28}
Sender5	1.1786	2	0.8485	0.83×10^{28}
Sender6	0.7500	4	1.3333	1.87×10^{28}

From table-III, IV,V and VI, it is observed that, if the link distance between two nodes in the routing path is less, it takes less time for sending data packets between nodes, so it increases the throughput. When distance between sender and destination is long and distance between intermediate nodes are also reasonably long in routing path, then it takes more time to reach the destination, which in turn reduces the end-to end throughput and increases the energy consumption for transmitting data packets. The performance analysis tables shows that if throughput increases then it decrease the energy consumption. If the link distance between two nodes is more, then more energy is needed to transmit the data packets between them. [1]

V. Conclusion and Future Work

In this paper, we have proposed a simple 3 dimensional routing protocol (3DMA) for multi-hop wireless networks, intermediate nodes towards destination are chosen based on the angle which is minimum among all the angles formed by the lines from sender to its neighbors and the reference line from sender to destination. We have calculated efficient routing path for each sender to destination, which takes minimum number of hops to reach the destination, considering that at a time one user node has data to send. Performance of the 3DMA routing protocol is evaluated by calculating, time, end-to-end throughput and energy consumption for each user. After analysis the results we have observed that if distance between two node in the routing path is long then it decreases the throughput and increases the energy consumption for transmitting packets i.e. if throughput increases then amount of energy needed to transmit data packets decreases. The proposed 3DMA routing protocol is loop free. In future work our focus will be on developing efficient scheduling techniques so that at a time more than one user can send data without any interference, considering node mobility of the nodes in network.

[1] Sender,user,source are used synonymously and the base station and destination are used synonymously.

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References

[1] Sarab F Al Rubeaai, Mehmmood A Abd, Brajendra K Singh, and Kemal E Tepe. 3d real-time routing protocol with tunable parameters for wireless sensor networks. *IEEE Sensors Journal*, 16(3):843–853, 2016.

[2] Shitai Bao, Ningchuan Xiao, Zehui Lai, Heyuan Zhang, and Changjoo Kim. Optimizing watchtower locations for forest fire monitoring using location models. *Fire Safety Journal*, 71:100–109, 2015.

[3] Kechar Bouabdellah, Houache Noureddine, and Sekhri Larbi. Using wireless sensor networks for reliable forest fires detection. *Procedia Computer Science*, 19:794–801, 2013.

[4] Ismail Butun, Salvatore D Morgera, and Ravi Sankar. A survey of intrusion detection systems in wireless sensor networks. *IEEE communications surveys & tutorials*, 16(1):266–282, 2014.

[5] Jan Chudzikiewicz, Janusz Furtak, and Zbigniew Zielinski. Secure protocol for wireless communication within internet of military things. In *Internet of Things (WF-IoT), 2015 IEEE 2nd World Forum on*, pages 508–513. IEEE, 2015.

[6] Rodolfo WL Coutinho, Azzedine Boukerche, Luiz FM Vieira, and Antonio AF Loureiro. Gedar: geographic and opportunistic routing protocol with depth adjustment for mobile underwater sensor networks. In *Communications (ICC), 2014 IEEE International Conference on*, pages 251–256. IEEE, 2014.

[7] Rodolfo WL Coutinho, Azzedine Boukerche, Luiz FM Vieira, and Antonio AF Loureiro. Geographic and opportunistic routing for underwater sensor networks. *IEEE Transactions on Computers*, 65(2):548–561, 2016.

[8] Gopal Dommety and Raj Jain. Potential networking applications of global positioning systems (gps). *arXiv preprint cs/9809079*, 1998.

[9] Fariborz Entezami and Christos Politis. Three-dimensional position-based adaptive real-time routing protocol for wireless sensor networks. *EURASIP Journal on Wireless Communications and Networking*, 2015(1):197, 2015.

[10] Guangjie Han, Jinfang Jiang, Na Bao, Liangtian Wan, and Mohsen Guizani. Routing protocols for underwater wireless sensor networks. *IEEE Communications Magazine*, 53(11):72–78, 2015.

[11] Haojun Huang, Hao Yin, Yan Luo, Xu Zhang, Geyong Min, and Qilin Fan. Three-dimensional geographic routing in wireless mobile ad hoc and sensor networks. *IEEE Network*, 30(2):82–90, 2016.

[12] Md Anwar Hussain and Arifa Ahmed. A simple optimized joint routing and scheduling algorithm for multi-hop wireless network. In *Electronics, Communications and Networks IV: Proceedings of the 4th International Conference on Electronics, Communications and Networks (CECNET IV), Beijing, China, 12–15 December 2014*, page 117. CRC Press, 2015.

[13] Md Anwar Hussain, Md Faiz Iqbal Faiz, and Ishita Chakraborty. Simple routing algorithm for multi-hop wireless network. *Journal of Emerging Trends in Computing and Information Sciences*, 4:58–65, 2009.

[14] Abhishek Joshi, Sarang Dhongdi, Rishabh Sethunathan, Pritish Nahar, and KR Anupama. Energy efficient clustering based network protocol stack for 3d airborne monitoring system. *Journal of Computer Networks and Communications*, 2017, 2017.

[15] Abdullah Kadri, Elias Yaacoub, Mohammed Mushtaha, and Adnan Abu-Dayya. Wireless sensor network for real-time air pollution monitoring. In *Communications, Signal Processing, and their Applications (ICCSPA), 2013 1st International Conference on*, pages 1–5. IEEE, 2013.

[16] Elis Kulla, Shinji Sakamoto, Makoto Ikeda, and Leonard Barolli. Manet approaches for airborne networks: a survey. In *Network-Based Information Systems (NBiS), 2013 16th International Conference on*, pages 66–70. IEEE, 2013.

[17] Zonglin Li, Nianmin Yao, and Qin Gao. Relative distance based forwarding protocol for underwater wireless networks. *International Journal of Distributed Sensor Networks*, 10(2):173089, 2014.

[18] Youngtae Noh, Uichin Lee, Paul Wang, Brian Sung Chul Choi, and Mario Gerla. Vapr: void-aware pressure routing for underwater sensor networks. *IEEE Transactions on Mobile Computing*, 12(5):895–908, 2013.

[19] Bushra Rashid and Mubashir Husain Rehmani. Applications of wireless sensor networks for urban areas: A survey. *Journal of Network and Computer Applications*, 60:192–219, 2016.

[20] Babar Shah and Ki-Il Kim. A survey on three-dimensional wireless ad hoc and sensor networks. *International Journal of Distributed Sensor Networks*, 10(7):616014, 2014.

[21] Tsung-Yu Tsai, Yao-Liang Chung, and Zsehong Tsai. *Introduction to packet scheduling algorithms for communication networks*. Sciyo, 2010.

[22] Yu Wang, Chih-Wei Yi, Minsu Huang, and Fan Li. Three-dimensional greedy routing in large-scale random wireless sensor networks. *Ad Hoc Networks*, 11(4):1331–1344, 2013.

[23] Zhixiao Wang, Deyun Zhang, Omar Alfandi, and Dieter Hogrefe. Efficient geographical 3d routing for wireless sensor networks in smart spaces. In *Internet Communications (BCFIC Riga), 2011 Baltic Congress on Future*, pages 168–172. IEEE, 2011.

[24] Chuanlin Zhang, Xiaole Bai, Jin Teng, Dong Xuan, and Weijia Jia. Constructing low-connectivity and full-coverage three dimensional sensor networks. *IEEE Journal on Selected Areas in Communications*, 28(7), 2010.

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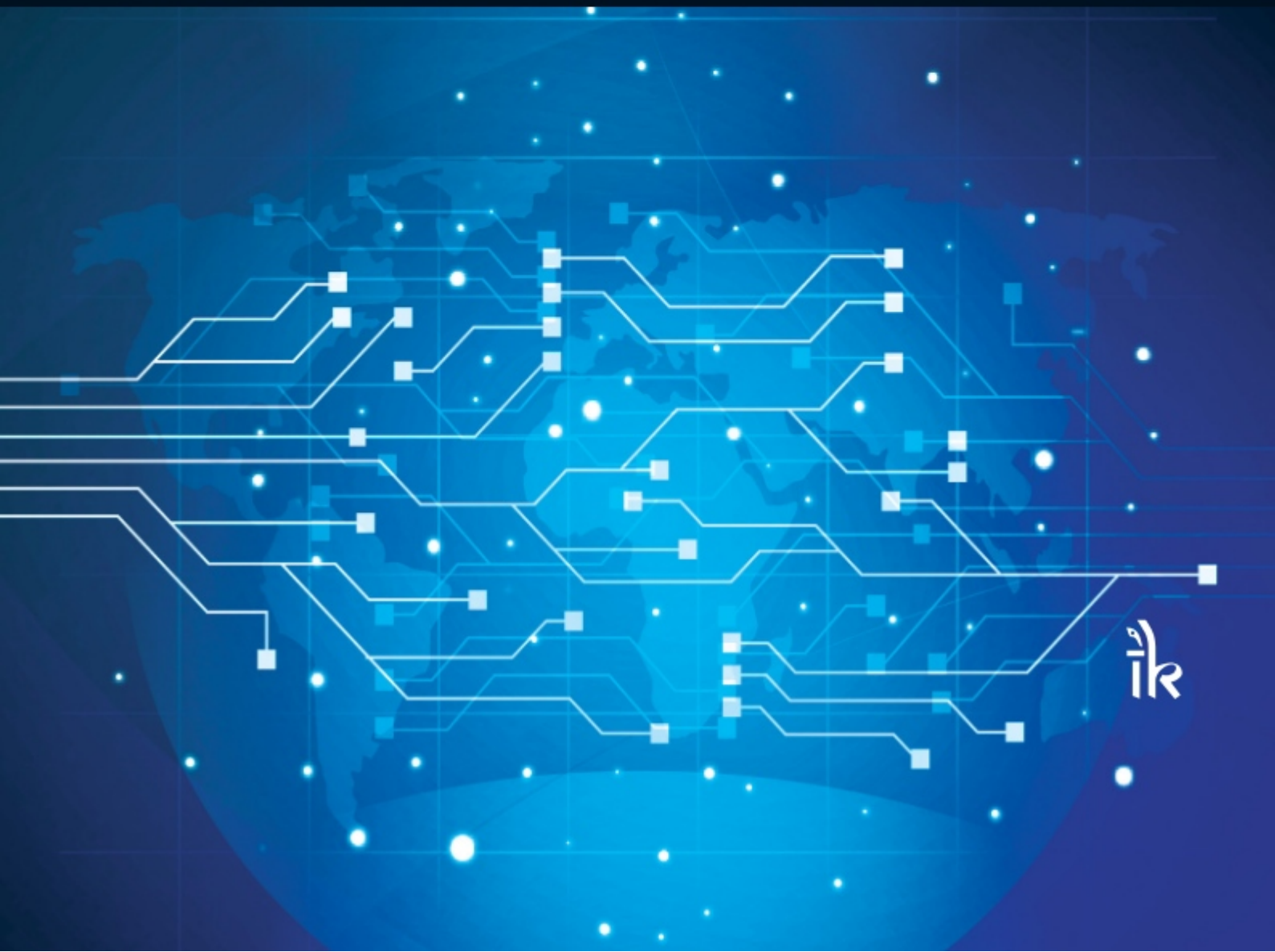

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Preface

The role of Business Analytics and Intelligence (BAI) in solving descriptive, predictive and prescriptive business problems, considering Big Data, has increased manifold in recent years, due to increasing power of Information and Communication Technology. Particularly, many companies are utilizing the BAI as competitive weapon. Understanding the importance of BAI in today's business environment, both Analytical Society of India (ASI), functioning from IIM Bangalore since its inception and Operational Research Society of India Bangalore Chapter (ORSI-BC), functioning from IISc Bangalore since its inception are being jointly organizing an International Annual event on BAI since 2013 onwards to create a platform and facilitate knowledge sharing on advanced data analytics, business analytics, Big data and business intelligence for distinguished academicians, practitioners, and researchers from academia and industry from all over the world. Accordingly, the 6th International Conference on Business Analytics and Intelligence, scheduled during 20-22 December 2018 (ICBAI-2018), accepted 175 presenters' (comprising about 45 percent from Industry and about 55 percent from Academic from all over the world) full-papers, out of 450+ extended-abstracts' blind review processes, discussing related to descriptive, predictive, and prescriptive analytics in all functional areas of management and engineering, are presented in the e-proceeding.

On behalf of the organizing committee of ICBAI-2018, I take this opportunity to express our sincere thanks to those who have helped directly or indirectly to bring out this e-proceeding. I acknowledge the support of every executive committee members of ORSI-BC and ASI for their sustained support in organizing the ICBAI-2018 and coming out with e-proceeding. I am thankful to the sponsors: State Street Global Advisors, Indian Institute of Science, Sabre Airlines Solutions, EY Bangalore, Reva University Bangalore, and Canara Bank IISc Branch Bangalore of ICBAI-2018 for financial support towards the ICBAI-2018 and publishing of this e-proceeding.

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Editor

Dr. M. Mathirajan

Editor

Dr. M. Mathirajan has been working at the Department of Management Studies, Indian Institute of Science (IISc), Bangalore since April 1986 with various academic/faculty-positions. Currently he is a Chief Research Scientist at IISc, Bangalore. He received M.S. (Engineering) degree by research in Applied Operations Research area, and PhD degree in Operations Management area from the Faculty of Engineering, IISc, Bangalore. In addition he holds a M.Sc degree in Mathematics of Madurai Kamaraj University, and Post Graduate Diploma in Operations Research (OR) of Anna University, Chennai.

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Awareness and Affinity towards Green Products among Young Generation: A Case of Arunachal Pradesh

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Abstract— **Environment has become a major issue for the sustenance and survival of living creature. Human societies aspire for continuous development i.e. development of technology, creation of innovative product, enhancing conform and greater communication. These compel to go for mass exploitation of resources that essentially include natural resources. Many a times the human beings overused and particularly most of them are irreversible in nature. In-fact it is an alarming situation, that highest effort should be given to reduce man-made pollution and environment degradation. The concept of green product has been evolved with the principle and commitment of the human races to use or exploit natural resources as least as possible i.e. required for smooth functioning of the civilization. This would enhance the scope for future generation for their survival, growth with sustainability. This mission can only be achieved if the new generation has environmental awareness and affinity towards using green products. The awareness generates through literature studied during school days, the value proposition and commitments of the family and the practices of social groups concerning the issues of the environment. On the contrary it is also imperative to understand whether the society has been adopting green products, whether the green products are available, accessible and affordable by the consumer in the market they operate. This study essentially would attempt to establish relationship among different variables which could be important for enhancing higher use of green products. The study area has been chosen from the largest state of north-east which is coveted by flora and fauna and largely dominated by forest area. Since the study is on understanding the level and intensity of purchase behavior intention of target population, adequate representative sample belonging to young age group of the state has been captured for collecting adequate information to fulfill the research objectives. As the paper is empirical in nature, the data set has been tabulated an analysis using SPSS, AMOS package. The study shows that 'Attitude towards environment' and 'Attitude towards Green Products' of the respondent – consumer towards 'Purchase Intention' for green products. The model is over justified and fit as the R^2 value is 0.87 i.e. 87% of the data set satisfied the model.**

Keywords **- Green product, Sustainability, Affinity, Young Generation, Arunachal Pradesh**

I. Introduction

Green products are energy efficient, durable and often have low maintenance requirements, free of ozone depleting chemicals, toxics compounds and don't produce toxic by-products. Often made of recycled materials or content or from renewable and sustainable sources.

Green product is defined as:

Green products are typically durable, non-toxic, made of recycled materials, or minimally packaged. Of course, there are no

completely green products, for they all use up energy and resources and create by-products and emissions during their manufacture, transport to warehouses and stores, usage, and eventual disposal. So green is relative, describing products with less impact on the environment than their alternatives.

(Ottman -1998, p. 89)

Green product is one of the most popular buzz words in the field of business and academia. In fact the growing concern of environmental issues has compelled both the seller and buyer towards adopting green movement as per as products and services are concerned. The WTO declaration of sustainability reveals that people of today should utilize environmental resources in such a fashion that the upcoming generation would also be able to equitably exploit such resources. The entire world is principally agreed committed to emphasis on usage of renewable products so that the depletion in the environmental resources could be minimized up to a certain extent. Researches are going on how to compensate or replenish the losses or exploitation of resources in order to balance physical, chemical, biological equilibrium of the universe. This should not be a statue of policy rather the policy should be visible flowing in the system through regular implementation and interventions. Otherwise the entire world would succumb the most detrimental ever policy paralysis. This paper would attempt to investigate how the policy framework on sustainability and green issues are being penetrated in the peripheral part of India. This research work would essentially manifest what extent the people at remote corner of India are aware, eager and actively participate in green movement in the same rhythm and spirit as the entire nation in convergent with global expectations and practices.

Literature Review:

Behavioral intentions are defined as a measure of a person's relative strength of purpose to execute certain behavior, **Ng, S., & Paladino, A.** (2009). According to **Rashid, N. R. N. A. (2009),** the green purchase intention as the probability and willingness of an individual to give preference to green product over conventional products in their purchase considerations. However referred green purchase intention as a determination to act in a certain way, **Ramayah et. al (2010).**

Rezai, G., Mohamed, Z., & Shamsudin, M. N. (2011, June) in their study, it was found that there is a significant differences among the respondents' awareness towards green food and age, geographical area, education level and income. The study also indicated that green food is not only about being organic but it also encompasses the concept of food safety, health issues, environmental hazard as well as animal welfare. Thus, the study shows that the target group was aware of the green concept which is a strong indicator of consumers' intention to go green in food consumption.

A conceptualized model developed by **Chan, R. Y., & Lau, L. B.** (2000) consisted of environmental concern, environmental knowledge, green purchase intention, actual purchase behavior and man nature orientation. In the study it was suggests that actual purchase behavior was highly dependent on a person's green purchase intention and the model was aligned with Theory of Reasoned Action and Theory of Planned Behavior by **Ajzen, I.** (1991). The dependent variable – green purchase intention in **Chan and Lau** (2000) study has been measure by using as a single dimension with four statements.

Chen, Y. S., & Chang, C. H. (2012) Green perceived value would positively affect green trust and green purchase intentions, while green perceived risk would negatively influence both of them. Furthermore, their study demonstrates that the relationships between green purchase intentions and their two antecedents – green perceived value and green perceived risk – are partially mediated by green trust. Hence, investing resources to increase green perceived value and to decrease green perceived risk is helpful to enhance green trust and green purchase intentions.

However, the definition given by **Han et. al** (2009) on green purchase intention as 'the likelihood of the hotel consumers of visiting a green hotel, engage in a positive word-of-mouth behavior, and willingness to pay more for the green hotel'. The conceptual model developed in their study aims at investigate the relationship between attitude toward green behaviors, overall image and green behavioral attention among general hotel consumers who were age range 18 years old and above. The study was conducted in U.S. The result reveals that there were three dimensions which are involved viz. visit intention, word-of-mouth intention, and willingness to pay more.

Another study conducted by **Qader and Zainuddin** (2011) aims to identify the

influence of media exposure on purchase intention of lead-free electronic products (green electronics) amongst 170 lecturers in Universiti Sains Malaysia.

They abstracted the green purchase intention as an individual"s plan to involve in some action within a specific time and the probability that individual will perform an eco-behavior. **Qader and Zainuddin** (2011) have operationalized their dependent variable – green purchase intention as a single (1) dimension with three statements to measure intention.

Joshi, Y., & Rahman, Z. (2015) In their study draw the conclusion that the consumers are willing to buy green products although this will somehow does not translate into actual purchases. The authors viewed that companies offering green products should not view their offering just as a unique product that presents new business opportunities, and overprice the product on the basis of it being 'green'. This 'green thinking' should be a part of an organization's work culture and ethics. The company should want to make products that are safe for the environment and accessible to everyone. The retailer should keep a variety of products so that consumers have better and broader choice ranges, thus really encouraging consumers and society to 'go green'.

For the purpose of this study, green purchase intention was abstracted as a one-dimension based on **Chan and Lau** (2000) and **Qader and Zainuddin** (2011) definitions. In addition, the definition of this dependent variable will be consistent with **Rashid, N. R. N. A.** (2009) which defined green purchase intention as the probability and willingness of an individual to give preference to green product over conventional products in their purchase considerations.

Objectives of the study:

1. To study and exhibit the domain of green products in Indian context.
2. To explore the level of awareness and affinity of green products among young generation in the state of Arunachal Pradesh.
3. To understand the influencing factors that enhances purchasing of green products in the study region.
4. To formulate and establish a research frame work incorporating all the influencing variables with reference to purchasing intention of green products.

Purpose of Research:

The purpose of the research work is to understand the level of awareness about

green products and purchasing intention among young generation in peripheral state of India. The objective of the study has been rounding on the core ideas i.e. the extent of attitude of the respondent towards environment and corresponding attitude towards green product which may possibly interact and influence on purchase intention for green products.

Research Methodology:

The study is conducted based on empirical analysis of data set which has been collected from target sample. The study was primarily focused on young generation of the state under study. To capture the views and observation of young generation the sampling framework was designed taking students of different level as stratum. For this purpose the final year students considered representing higher secondary level, undergraduate and post-graduate level. Two stage stratified random sampling method was adopted in order to minimize data inconsistency and biases. Details of sampling plan and data sources are illustrated below:

Sampling Frame:

Two stage stratified random shall be adopted to select the respondent. The unit of sample would be student – respondents who would be appearing final year/semester in academic year 2018 – 19 in respective institution.

Table I

Stage 1 – Randomly selected educational institutes (Goverı and Private)					
Study Region	Name of Stratum (First Stage)	Total no. of Institutions in the study region (Govt. & Private)		No. of Institution selected (First Stage)	Types of Sampling
State Capital of Arunachal Pradesh, India	High Secondary Schools	Govt.	8	2	First Stage stratified Random Sampling
		Private	10	2	
	Colleges	Govt.	03	1	
		Private	08	2	
	Universities/Institution of Higher learning	Govt.	03	1	
		Private	02	1	

Source: *http://www.apdhte.nic.in/colleges.htm, **http://www.rgu.ac.in/, DDSE capital complex, Arunachal Pradesh

Design of research instrument:

The research instrument was designed to understand the influencing factors which impacts on purchase intention for green products. Based on review of leading research papers and interaction with the domain experts and also results of pilot study, a proposed model was designed using assumed independent and dependent variables. All the variables were measure using 5-point Likert scale where score 1 & 5 depicts strongly disagree and strongly agree respectively. Research questions were designed in conformance with each of the variables so as to understand whether these variables have any relationship to each other in the form of independence – dependence framework.

Tools & Techniques to be used for data analysis:

The collected information was tabulated using SPSS and SPSS-AMOS statistical Package to perform Descriptive and inferential statistics including structural equation modelling (SEM) in order to understand interrelationship with varying intensity of all the variables which would yield significant impact on green product purchase behavior among the target segment. This has helped to interpret the extent of awareness and affinity of the target respondent and its implication towards purchase intention of green products.

Table - II

Two Stage Random Sampling Methods for choosing Educational institutes (Government and Private)

Total no. of Institutions in the study region (Govt. & Private)	No. of Institution selected (First Stage)	Name of the Institutions Selected	Population of final year students in each institution selected	Sample selected form each Institutions (Second Stage)	Unit of sample as a Percentage of Population
Govt. – 08	2	GHSS - Ita	366	73	20%
		KV - 2	65	13	20%
Private - 10	2	Green Mount	250	25	10%
		King cup	109	12	10%
Govt. – 03	1	DNGC -02	836	84	10%
Private - 08	2	DBC	348	35	10%
		NENC	04	04	100%
Govt. – 3	1	RGU	660	102	15%
Private - 2	1	Himalaya University	552	52	10%
Total - 30	**09**		**3190**	**400**	**12.53 %**

Analysis & Interpretation

Analysis

Based on literature review and information collected from various dependable sources attempts were made to devise and indicative lists of green products which are being used or emerging in the market both for consumer and industrial purpose. Attempts were also made to make a working definition or a broad spectrum of conditions to consider green product.

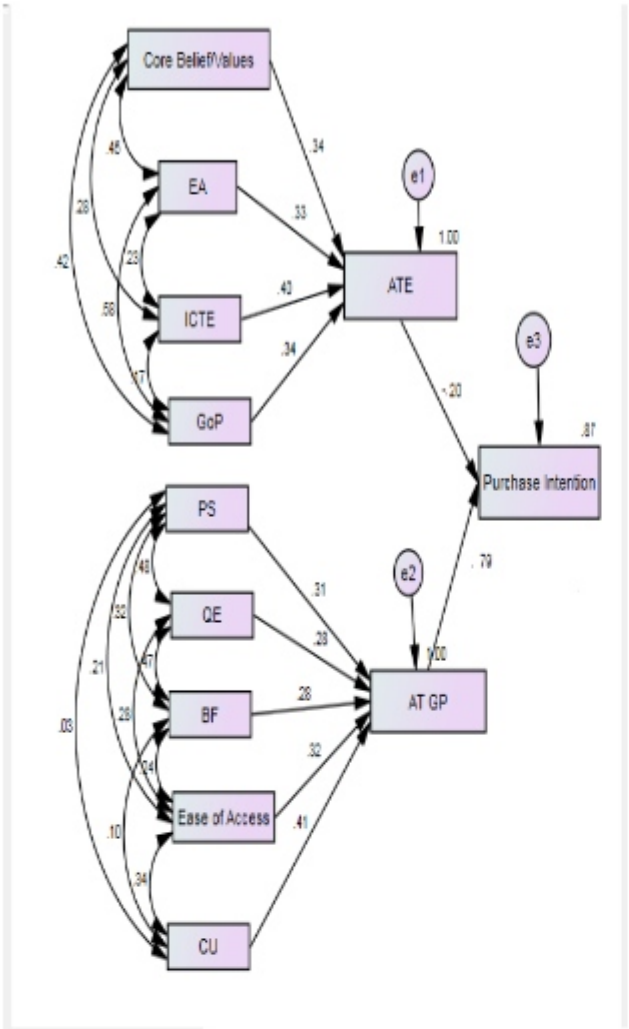
The concept of green product is vast and there is no single definition which can exhibit its spirits and essence in toto. The underlying presupposition is the green product is supposed to be the ultimate solution in the eyes of sustainability. The green product should confirm the following conditions:

a. It should be produced using green technology.
b. It should contribute least possible carbon emission and impacts on least depletion of ozone layer.
c. The products and its ingredient's should be mostly recyclable.
d. Follow the modern concept of circular economy.
e. Green products should be composed of nature based material rather a synthetic ingredients.
f. Ideally green products should have a definite and short life span and devoid of any chemical synthetic material and preservatives i.e. perishable in nature.

Table III

Example of Green products in different sectors	
FMCG	- Biodegradable Detergents - Soaps - Green tea - Eco friendly Disinfectants - All types of papers (writing papers, tissues, toilet)
Consumer Durability	- Recyclable batteries - LED light bulbs and tubes. - Solar panels - Clay based cutlery and crookery's
Health	- Biodegradable fittings & fixtures. - Cotton based consumables for dressing or bandit materials - Cotton bed sheet - Eco friendly disinfectants - Biodegradable gloves
White Goods	- Stacked washing machine and clothes dryer. - Gas fireplace. - Refrigerators. - Vacuum cleaner. - Electric water heater tank. - Small twin window fan.
Packaging material	- Edible package material like ice-cream cone. - Paper bags. - Tetra pack package
Transportation	- Bio fuel - Low carbon emission gas (CNG) - Recyclable tires

Sources: complied from https://www.conserve-energy-future.com/25-green-eco-friendly-products.php



From the above statistics it is evident that both 'attitude towards environment' and 'attitude towards green products' of respondent-consumer towards purchase intention for green products. However, the attitude towards green products of the respondent were found more significant i.e. 0.79. whereas for attitude towards environment the obtained value is 0.20.

The R^2 value is 0.87 which is highly significant and exhibit that the model is satisfied and justified by 87% of the data set.

The attitude towards green product (ATGP) is positively impacted by Price Sensitivity (PS), Quality Enhancement (QE), Brand Familiarity (BF), Ease of Access and Convenient to Use (CU).

ATGP ←═══ PS = 0.31

ATGP ←═══ QE = 0.28

ATGP ←═══ BF = 0.28

ATGP ←═══ Ease of Access = 0.32

ATGP ←═══ CU = 0.41

Similarly Attitude towards Environment (ATE) positively influence by four independent variable viz. Core Belief/Values, Environment Awareness (EA), Individual Commitments towards Environment (ICTE) and Government Policies initiated towards Environment (GoP) .

ATE ←═══ Core Belief/Values = 0.34

ATE ←═══ EA = 0.32

ATE ←═══ ICTE = 0.40

ATE ←═══ GoP = 0.34

The statistics for determining model fit are enveloped below:

Sample Size= 400

Degree of Freedom= 40

CR > ± 1.96

P value= 0.000, Chi-Square value = 218.8

GFI = 0.818

RMSEA = 0.125

AGFI:

CFI = .779

NFI = .777

TLI =.735

Limitation of the study

The study was designed to capture relevant information from the sampled respondents who are studying in different institutions in the capital complex of the state of Arunachal Pradesh. This study could be extended to all other districts of Arunachal Pradesh to understand the level of awareness and affinity in the heterogeneous environment, geo-political factors and diversified cultural values and practices i.e. spread over across all the distinct major and minor tribe of the state. The study cannot be holistic and comprehensive in nature with the tantamount of cross-sectional data. However, it could be more effective if longitudinal data could be captured and analyzed. The study outcome could be more convincing if samples could be captured on regular interval following the stratified random sampling method. Since the concept of green product is apparently new in the region, the study might suffer from non-sampling errors. There is in need of Modification Indices as Chi-Square & RMSEA value is high. AGFI values are slightly lower.

Scope for further study

The study was conducted to understand the level of awareness and affinity among the young generation residing in a mountainous forest dominated state of north-eastern region which is somehow different from the tier-I and tier – II cities in regard to the lifestyle pattern, the level of consumerism. In fact the people at large in the region are more close to nature in the spectrum of biodiversity. The intention behind the study is to understand what extent the indigenous society is influenced by the ultra-modern lifestyle, hardcore consumerism with the advent of massive globalization leaving behind their core value and commitments towards nature. If these societies are aroused by the growing affinity towards usage of non-green products, it would be detrimental for the human civilization to sustain and survive. The study explicitly attempts to know the level of awareness among these population and whether such awareness essentially yield for developing higher purchase intention of green products or not. On the contrary, the study also focused on other cues of green products like price, ease of access, branding, ease of availability, quality enhancement and their possible impacts on purchase intention for green

products particularly in the indigenous community.

Recommendation

This study shows that respondent consumer of the region under study are more concerned towards Price Sensitivity (PS), Quality Enhancement (QE), Brand Familiarity (BF), Ease of Access and Convenient to Use (CU) which forms attitude of the consumer towards green products that essentially influence purchase intention towards green products. On the contrary independent variables like viz. Core Belief/Values, Environment Awareness (EA), Individual Commitments towards Environment (ICTE) and Government Policies initiated towards Environment (GoP) also impact collectively towards forming attitude towards environment (ATE) and that essentially influence Purchase Intention (PI) for Green Products. However ATE ⟵ PI = 0.2 and ATGP ⟵ PI = 0.79 respectively. This represents that among the respondent consumer there is a need of enhancing higher environmental awareness or commitments towards environment among the young population of the state. Since the target population mostly engaged in school, colleges and university, the academic institution must organized environmental awareness camp in the campus as well as through outreach programmes so that this could influence the young generation for enhancing higher purchase intention of Green Products. On the other hand the entire world is moving towards green movement which would definitely enhance the smaller markets with good quality and affordable green products with higher accessibility by the consumer across the country. Unless the awareness and commitment towards environment is firmly reinforces, the improvement in supply side would not achieve the desired results.

Conclusion

This study attempts to understand the views, observations and the sense of commitments of young educated respondents of a north eastern state. The underline spirit behind this study was to explore the level of penetration of green movement from mainland India to the remotest corner of the country particularly among the budding leaders of the future. This study prescribed that all the state and non-state stakeholders should design and delivered environment related campaign or dedicated illustrative module in the course curricula as a means of time bound and OOP action plan. The term development has been perhaps wrongly or narrowly manifested within the locus of massive infrastructure, construction, and building of engineering structures to jump

from natural green to jungles of concrete. The north eastern states are still alive with its flora and fauna. If the adoption of green products has not been incorporated by upcoming generations, the flood of indiscriminate and irresponsible consumerism would sweep the core values of sustainability for the region and for the entire nation.

References

[1] I. Ajzen, "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179-211, 1991.

[2] R. Chan and L. Lau, "Antecedents of green purchases: a survey in China", *Journal of Consumer Marketing*, vol. 17, no. 4, pp. 338-357, 2000.

[3] Y. Chen and C. Chang, "Enhance green purchase intentions", *Management Decision*, vol. 50, no. 3, pp. 502-520, 2012.

[4] F. Durif, C, Boivin and C. Julien, "In search of a green product definition", *Innovative Marketing*, vol. *6*, no.1, pp.25-33, 2010

[5] H. Han, L. Hsu and J. Lee, "Empirical investigation of the roles of attitudes toward green behaviors, overall image, gender, and age in hotel customers' eco-friendly decision-making process", *International Journal of Hospitality Management*, vol. 28, no. 4, pp. 519-528, 2009.

[6] Y. Joshi and Z. Rahman, "Factors Affecting Green Purchase Behaviour and Future Research Directions", 2018.

[7] S. Ng and A. Paladino, "Examining the influences of intentions to purchase green mobile phones among young consumers": An empirical analysis. 2009

[8] J. Ottman and N, B Books, Green marketing: opportunity for innovation. *The Journal of Sustainable Product Design*, pp *60*, 1998

[9] R. Pavoni and D. Piselli, "THE SUSTAINABLE DEVELOPMENT GOALS AND INTERNATIONAL ENVIRONMENTAL LAW: NORMATIVE VALUE AND CHALLENGES FOR IMPLEMENTATION", *Veredas do Direito: Direito Ambiental e Desenvolvimento Sustentável*, vol. 13, no. 26, p. 13, 2016.

[10] I. Qader and Y. Bin Zainuddin, "The Impact of Media Exposure on Intention to Purchase Green Electronic Products amongst Lecturers", *International Journal of Business and Management*, vol. 6, no. 3, 2011.

[11] T. Ramayah, J. Lee and O. Mohamad, "Green product purchase intention: Some insights from a developing country", *Resources, Conservation and Recycling*, vol. 54, no. 12, pp. 1419-1427, 2010.

[12] N. Rashid, "Awareness of Eco-label in Malaysia's Green Marketing Initiative", *International Journal of Business and Management*, vol. 4, no. 8, 2009.

[13] Golnaz Rezai, "Consumers' awareness and consumption intention towards green foods", *African Journal of Business Management*, vol. 6, no. 12, 2012.

Website/ Web pages accessed on 08.06.2018

- http://www.sielnet.org/Resources/Documents/Lydgate.docx
- www.conserve-energy-future.com/25-green-eco-friendly-products.php

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4 Emerging factor markets in Indian agriculture

Water and rental of capital goods

Anup Kumar Das and Jitu Tamuli

1 Introduction

As discussed in chapter 3, the availability of factors of production, especially land and labour, with farm households is not always in right proportion. Such imbalances in factor endowments across farm households have been the root causes of the emergence of land lease and labour markets in agriculture (Ray, 2011). Such markets allow farm households with factor endowment imbalances to trade their surplus factor for the factor in which they are poorly endowed. Notwithstanding the factor-endowment imbalance correcting effects of such markets, a disproportionately large number of holdings in the small and marginal size classes has attracted the attention of researchers not just from equity concerns but also from efficiency considerations. It used to be argued that for adoption of productivity enhancing practices, a cultivation unit should be of a minimum viable land holding size. The case of relatively higher cost of construction of well and installation of pump-set than the returns from them when landholding is small and fragmented compared to large and consolidated holdings as explained by Vaidyanathan (1986) supports this view.

Dobbs and Foster (1972) and Dutta (2007) found evidence of an adverse impact of small and fragmented landholdings on incentive to investment in tube well technology for groundwater irrigation. Further, cultivation in small and fragmented landholdings were found to be inconvenient for use of heavy machinery, such as tractors, power tillers and pump-sets (Singh, 2011). In order to reorganize small and fragmented holdings into viable cultivation units from the point of view of various good practices, including farm mechanization, consolidation of holdings was conceived as an important component of India's land reform agenda in the post-independence period. In practice, however, this component has been executed in only a few pockets in the country (Misra and Puri, 2004).

Despite consolidation of landholdings remaining unimplemented in most parts of India and average size of individual holding going down over the years (Indian Journal of Agricultural Economics, 2014), mechanization of farm operation seems to be on the rise and has been adopted even by small and marginal size farms in recent times. This has been possible because of the strengthening of factor markets in agriculture, with the emergence of water markets and rental

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Explorations: Teaching and Learning English in India

Issue 2: Overview

Assessing learning (1)

All three papers in this issue of *Explorations: Teaching and Learning English in India* investigate the professional practice of assessing learners. This professional practice includes designing tasks to measure learners' progress and applying assessment criteria in appropriate ways. It also includes developing skills in analysing learners' errors and providing constructive feedback. Through this professional practice, teachers can use assessment effectively to monitor learning and use data from assessments to inform teaching.

Jayati Chatterjee and **Dhriti Sundar Gupta** investigate current ways of testing learner language skills at secondary school level. They examine test candidates' views and performance and recommend both formative and summative testing. **Kirti Kapur** also researches current practice, finding that approaches are inconsistent and proposing the design and use of standardised rubrics. **Kuheli Mukherjee** and **Kalyan Chattopadhyay** investigate how secondary school teachers can give feedback on the writing performance of their learners and suggest more focused and consistent feedback to help learners to gain greater writing competence in English.

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Jayati Chatterjee is Assistant Professor of Linguistics at the English and Foreign Languages University, Shillong Campus, Meghalaya, India.

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About the English Language Teaching Research Partnerships (ELTReP) Award programme

India has a long tradition of educational research but the results of this have not always reached the wider world. Through a range of programmes, British Council India places considerable emphasis on encouraging and supporting inquiry. A key strand of that work between 2012 and 2016 has been the English Language Teaching Research Partnerships (ELTReP) Award programme. The programme aimed to facilitate high quality, innovative research to benefit the learning and teaching of English in India and to improve the access of ELT policy makers, professionals from

India and the United Kingdom and the global ELT community to that research. All writers contributing to the eleven issues of *Explorations: Teaching and Learning English in India* were selected and supported in their research by the ELTReP Award programme.

All three papers in this issue have been written by practitioners in the field, whether teachers, lecturers, educational department personnel or other roles that involve day-to-day contact with the teaching and learning of English. The researchers, many of whom will be seeing their work published for the first time, have designed and implemented their studies and present results which in each case are innovative and thought-provoking. Each paper reflects the creativity, detailed awareness of context and practical suggestions of a wide range of writers, from different backgrounds and working in different situations.

We very much hope you enjoy *Explorations: Teaching and Learning English in India* and that you feel the insights the papers provide into a variety of educational environments are applicable to your own context, wherever you may be working.

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The impact of English language testing practice on Indian ESL learners: a study

Jayati Chatterjee and Dhriti Sundar Gupta

1. Introduction

Language testing is an inalienable component of any formal language-learning situation. Consequently, language testing attracts critical attention from teachers, students and testing practitioners in the field. How do the testees view a test? To some, it is a ritual to secure a placement to a higher class. Some feel it paves the way for entering a larger domain of education or any professional field. Some believe it exhibits the testees' proficiency in English. The varied opinions of the testees make the topic worthy of investigation. The project investigates the impact of English language testing practice on the ESL learners in the Indian subcontinent.

Several examination boards operating at the national and state levels conduct high-stake tests for English as well as other subjects for class 12 in India. It is assumed, after twelve years of exposure to English, the learners have reasonable mastery of the four skills, i.e. LSRW (listening, speaking, reading and writing) in English. Despite their differences in teaching–learning material, syllabus, pattern of test paper, imparting the four major language skills to the learners is a common objective of the English courses across these boards of secondary education. The content of the tests conducted by the boards are based on specific syllabuses and every year the English language tests, conducted by several boards certify a galaxy of testees as high achievers. Have these high scorers in the English language tests mastered LSRW skills in English? The question is reinforced by Hughes' comment (1989): 'successful performance on the test may not truly indicate successful achievement of course objectives' (p.11). The high achievers in English in the final examination of class 12, conducted by several boards of higher secondary examination are expected to have general proficiency in English. However, teachers teaching at the tertiary level have observed that many of the higher education aspirants fail to meet the benchmark of proficiency in English, required for pursuing an academic or professional course. The problem demands some attention. How far the English language testing practice can address the problem is the thought that has motivated this study.

2. Research questions

This study investigates the empowering ability of the ESL test-practice at the +2 level across national and state examination boards. The investigation focuses on how far these tests assure skill development among Indian ESL learners so as to place them on the global platform.

The following are the research questions which this study has addressed.

1. To what extent does the testing practice of +2 level measure the development of LSRW Skills in ESL learners across educational boards?
2. To what extent do the views of test takers ensure the predictive validity of the tests in English at the +2 level?

3. Research methods

The present study is a combination of qualitative and quantitative research. The data is collected through a survey method.

Sampling: Six examination boards are selected from the north, south, east and west of India for the study. To maintain confidentiality, the six boards are named as Board A, B, C, D, E and F. Thirty testees who have successfully passed the higher secondary examination from each board have been selected for the study. The respondents have completed a questionnaire and have taken a proficiency test.

Instruments: Primarily, two instruments are developed for the investigation: a structured questionnaire for the testees and a test paper modelled on a globally accepted general proficiency test module. The purpose of this questionnaire is to find out the general opinion of the testees and the teachers on the core English test of the class 12 board examination and thereby investigate the impact of these testing practices on Indian ESL learners.

4. Findings

This section will summarise and comment on the testees' responses to the questions on the questionnaire. Survey findings can be found in Appendix 1.

In response to the question whether the English language test of the Class 12 board examination was a fair and accurate test of their English language skills, 70 to 90 per cent of testees across the boards appear satisfied with the ability of the test to evaluate the testees' total and sub-skills of the English language. It largely matches with their response to the class 12 tests being a confidence and proficiency booster. This view indirectly confirms the positivity of the test impact. However, only 50 per cent of the respondents from Board D and 60 per cent from Board B strongly agree with the statement and this percentage of agreement is lower than the range of agreement (75 to 85 per cent) offered by respondents from other boards. The difference signals some gap in the learners' understanding of the non-immediate test objectives. Twenty to 30 per cent of the total respondents do not consider the class 12 tests as a confidence and proficiency booster and their response calls for an analysis of the test design with necessary modifications.

According to the survey, 65 to 70 percent of the respondents show their confidence in the test design. They feel the test can bring out the degree of their flexibility in using LSRW. However, only 45 to 50 per cent of test-takers from Board E and Board A recognise a proportional link between their score in the class 12 test and their flexibility in using English contextually. Although the testees find that the test is an authentic representative of their language (English) skills in general, they are not sure if their test-scores (class 12) indicate their flexibility in using LSRW in English separately. Ten to 40 per cent of them, consequently, remain undecided. A sizeable section (20 per cent) do not agree that either the class 12 test (English) can judge their acquired language skills or the test can be a confidence-booster in using the language. Such responses could be converted to more positive ones by exposing them at school to frequent mock tests with special focus on language use.

Nearly 60 to 90 per cent of the testees emphatically accept the fact that the test they have taken at the class 12 (Board Examination) is a test of their ability to communicate with native speakers. The response is in tune with their acceptance of the test being a true mode of exhibiting their skills. However, 10 to 35 per cent of the test-takers do not perceive the correlation. One may note that while 45 per cent of the respondents of Board D and Board F agree with the statement, 55 per cent of them are either undecided or disagree with it. A large

number of respondents show disagreement with the statement and it seems for them that the test impact is limited to immediate placement of the testees to the next level. The complete negative response to the statement (i.e. the test is a true mode of exhibiting their skills) indicates that the test-takers need to see other effects of such tests beyond the placement of testees as a part of the teaching programme.

Fifty to 90 per cent of the respondents acknowledge that the test under consideration measures the degree of their command over English. A higher degree of command will prove the test-takers' effectiveness at using the language in their respective professional domains. The response matches with the testees' earlier positive attitudes to the test. Ten to 50 per cent of the respondents react negatively, indicating their inability to comprehend or to accept the far-reaching predictable effect of the test. They do not interpret a test score beyond placement. The larger sections of Board E (70 per cent) and Board F (60 per cent) reject the statement, showing their inability to accept the test as an indicator of greater benefits. It may require redesigning the test to make the test-takers realise the larger benefit of tests in English, i.e. examining the testees' ability to use the language in future professional contexts.

A large number of the respondents find a perfect co-relation between the difficulty level of the test items and the teaching inputs received in their classes (English). The response signals test-preparedness, ensures good scoring, is likely to familiarise the prospective testees with the unique features of the language, and thereby contributes in enhancing their proficiency level. However, a sizable group of 25 per cent to 35 per cent of respondents remain undecided. They do not seem to perceive any co-relation between items taught and the items tested. Such a response calls for the construction of tests, based on teaching-learning inputs; tests that help the learners and testees to understand that learning and testing are not isolated domains but are complementary to each other.

Sixty to 95 per cent of the respondents feel that the test does give the testees a good scope of exhibiting their knowledge of the target language, i.e. its structure and its use. It may be inferred that they have had sufficient practice and are aware of the area where they are likely to make errors. Such response reinforces their positive attitude to the test. However, five to 40 per cent of respondents do not share their opinion. They are either fuzzy about their knowledge of the language or they find that the test cannot bring out what they know about the language. The negative impact may indicate that the test does not select items to test the test-takers' knowledge but to test the memory of the testees.

While commenting on the test-impact, 65 to 85 per cent of the test-takers agree that the test proves to be a tool of identifying their strength and weakness in using English. Their positive response shows that the test is likely to distribute equal importance to the LSRW so that the testees identify their acquaintance with the language skills and sub-skills. Fifteen to 35 per cent of respondents offer negative responses, thus questioning the test impact. They may not find all the test items test their language skills in all the four domains equally.

Sixty to 95 per cent of test-takers feel the test checks their acquaintance with the syllabus and the response may reflect that the test is primarily based on the class 12 prescribed syllabus. The disagreement of five to 40 per cent may indicate that some testing items do not seem to have any direct co-relation with the prescribed syllabus but have been selected to test the test-takers' concept and knowledge of the general use of the language. While 40 per cent of testees from Board F accept the statement position, 60 per cent of them do not find their acquaintance with the syllabus being tested. They need to be made familiar with the primary and the secondary objectives of the test.

Thirty-five per cent of the respondents accept that the test and assessment have measured their learning retention indicating it may be a test

of memory. The response contradicts their view that the test is able to acquaint them with their strengths and weaknesses in using the language. The testees seem to be confused between their strengths and weaknesses as regards their ability to use the English language and their strong and weak memory of the classroom learning inputs. However, a noticeable section of ten to 45 per cent disagrees with the statement, suggesting that the items should be tested contextually. One may argue that most of the testees may have attended classes regularly and have sufficient practice in the parallel, mock-format of the application-based version in the board test paper. The format may have been imprinted in their memory. Consequently, they feel that the class 12 test and assessment measure the retention of their learning.

As a post-test effect, 65 to 95 per cent do not lose interest in English, proving the success of the test designer. Only five to 35 per cent claim to have lost interest, probably as a consequence of their poor score. Their response reinforces their discomfort with the test-items, selected from a domain outside the prescribed syllabus.

Sixty to 85 per cent of respondents do not consider the test as a realistic placement test but 15 to 45 per cent of the respondents do. Though the majority is benefited by the test, a sizable section does not appear to receive any rewarding effects from the test, which may require a deliberation on how to motivate the learners through tests. Seventy-five per cent of testees from Board D find the test a mere ritual, suggesting that Board D needs to make efforts to redesign the tests and make the testees clear about its objectives beyond mere scoring for higher placement.

Sixty-five to 100 per cent agree that the test is able to identify those areas of the test-takers' learning which call for improvement. The response seemingly refutes a part of the previous response. Some test-takers benefited by the test as they feel that the test scores can make them recognise their aptitude in language learning. However, these testees consider these tests as rituals because testing is a mandatory component of the educational system and the test-format is stereotypical. Twenty to 35 per cent of respondents do not receive any guidance from the test as regards the improvement of their learning. Once again the larger impact of the test is missing.

More than half of the respondents do not feel that the test and assessment generate nervousness because they seem to be clear about the test objectives. Moreover, their preparedness has made them familiar with the test pattern. However, 20 to 55 per cent of the testees feel nervous while taking the tests and receiving the assessments, which may indicate their lack of confidence rather than any intrinsic shortcomings in the test. One may note that from Board E, 55 per cent feel nervous as regards the test and assessment in English and 45 per cent disagree with the statement. In Board F the response is equally divided (50 per cent each). The testees of these two boards need to be given more mock tests at the school level to combat the fear of tests in English. The test papers need to include test items well distributed in the scale of easy-moderate-difficult.

In response to the question regarding the test of different skills and sub-skills and the adequate marks allotment, more than 75 per cent of testees claim their listening skill is often tested and adequately assessed. It indirectly proves the presence of trained teachers who are formally taught how to test the listening skills of the learners of English. The response appears supportive of the presence of an infrastructure for testing listening skills in schools. Fifteen to 25 per cent of testees however disagree with the statement, which indirectly implies unsatisfactory testing and assessment of their listening skill. It could be due to inadequate infrastructure and untrained teachers in some institutions/schools. In this context, one may note that while 45 per cent of testees from Board C are happy with the test of their listening skills, 55 per cent find that this skill is neither adequately tested nor assessed. This response calls for a deliberation on the distribution of marks of the skills being tested by the board examination English test paper. More than 70 per cent of test-takers accept

that reading skills are adequately tested, and assessed. The allotment of marks to the questions testing reading skill is adequate. Nevertheless, five to 30 per cent of testees do not agree with the response and their position questions the level of the acquisition of their reading skill.

More than 55 per cent of respondents claim that their oral production is adequately tested and assessed but 30 to 45 per cent of them do not find their oral skill is adequately tested and assessed or the marks allotment to the questions testing oral skill is satisfactory. Seventy to 80 per cent of respondents acknowledge that their pronunciation is adequately tested and assessed. However, 20 to 30 per cent of testees do not approve of the test, assessment and marks allotment as regards their pronunciation in English. The gap between the positive and negative responses projects that the test of oral skill varies in school examinations across different educational boards. One may note that nearly 15 per cent of test takers from Board C positively respond to the test of oral production and pronunciation but the majority of them, i.e. 65 to 80 per cent, negatively respond. Such a response leaves considerable doubts as regards the focus and testing methodology of the oral skill in English. The test designers need to revisit the test objectives and the selection of test items to promote and assess oral proficiency in English.

More than 65 per cent of testees are happy with the test of grammar, perhaps because they scored well and gained confidence but ten to 35 per cent of them offer a negative response. It questions their ability to generate grammatically acceptable English sentences or their discomfort with some grammatical items or their confidence in using their grammatical skill.

More than half of the total test-takers are satisfied with the test and assessment of their knowledge of words and phrases in English but 20 to 45 per cent of testees disagree with the statement. The varied responses may indicate that a sizeable section expects isolated testing of the testees' vocabulary and probably does not understand that the test of vocabulary can be embedded in the test of other skills. It may be pointed out while 45 per cent of testees from Board C appear satisfied with the test of vocabulary skills, 55 per cent of testees seem to be dissatisfied. It may indicate that the vocabulary test items in the test paper do not have an adequate marks distribution or there is no correlation between the teaching of vocabulary items and the testing of them.

The testing of writing skills is more frequent. Therefore, it is not surprising that nearly 81 per cent of the total respondents find the testing and assessment of writing skills in English in their respective board examinations quite satisfactory. However, 19 per cent of the testees express dissatisfaction, indicating that they are unable to relate their scores on the English test to their ability in writing. One may notice that as regards Board D and F the range of negative response is 30 to 45 per cent. It may reflect that these testees are not comfortable with free response questions. Perhaps they are more comfortable in writing those answers that they have learned through rote methods.

According to the survey, most of the testees are unaware of IELTS/TOEFL, as they do not plan to pursue higher studies abroad. However, 35 per cent, who are likely to be the above average group, have explored the eligibility conditions of studying in Europe and in the USA. The argument is supported by the total positive response to the statement that these tests are required for fulfilling the eligibility criteria of admission to any academic programme abroad.

Nearly 86 per cent of the survey respondents express a need for a pan-Indian English language proficiency test. They may be looking for a common assessment process of Indian students' proficiency in English. In fact, such a test is likely to dissolve board-specific parameters and to select its own test items and test designs. It would prepare students for any international proficiency test in English and assess the testees' proficiency in English in relation to international standards. However, 16.7 per cent do not approve of any pan-Indian English language proficiency test, probably because they are apprehensive of its difficulty level or they may not be quite willing to leave the familiar comfort zone of their

board examination. Since a sizeable section of the respondents feel that their respective board examination can be considered equivalent to IELTS/TOEFL, they do not require any pan-Indian common proficiency test. However, 73.3 per cent of the population do not find any match between the respective board examinations and IELTS/TOEFL. They seem to be more critical of the selection of test items and test design and the test purpose of the two proficiency tests concerned.

In Figure 1, the testees from the low to high achievers group have been placed according to their scores in English in the class 12 board examination. However, their class 12 board examination score does not explain the cause of the variation visible in their performance in the skill-based proficiency test. The performance in the listening skill test is mostly uniform and the score in the listening comprehension test is comparatively higher than the scores in the tests of other skills across the testees. It appears that the listening comprehension test and assessment done in the class have benefited them in learning the skill. It matches their response to Q1 in the learners' questionnaire.

The score in the oral production test shows the next best performance of the testees. All the groups have done reasonably well and show proficiency in speaking. The test-takers' good performance on the oral test is not surprising.

In an urban set up the test-takers often have to communicate in English and face a test of their skill, and gradually improve their performance. The difference between the scores in listening and speaking tests may indicate they are able listeners but they are hesitant speakers. Moreover, the listening comprehension test in the sample proficiency test paper is comparatively more guided than the speaking production test, where to answer the questions the testees require a perfect combination of facts, structural knowledge of the language, good pronunciation and self-confidence. However, the positive result of the test matches their responses regarding the test and assessment of the speaking skill through oral production.

There is a moderate performance in the written production and reading comprehension test. Developing their writing skill is the most difficult task and the test-takers do not seem to be very comfortable in combining content with vocabulary and structures of English fluently and accurately. The testees mostly follow the rote method in preparing selected topics and textual answers. Most of them rarely offer genuine free response to a topic. Outside the classroom, their reading and writing skills may be tested infrequently as compared to the tests of their speaking and listening skills, which are required frequently to communicate with others in a cosmopolitan urban area.

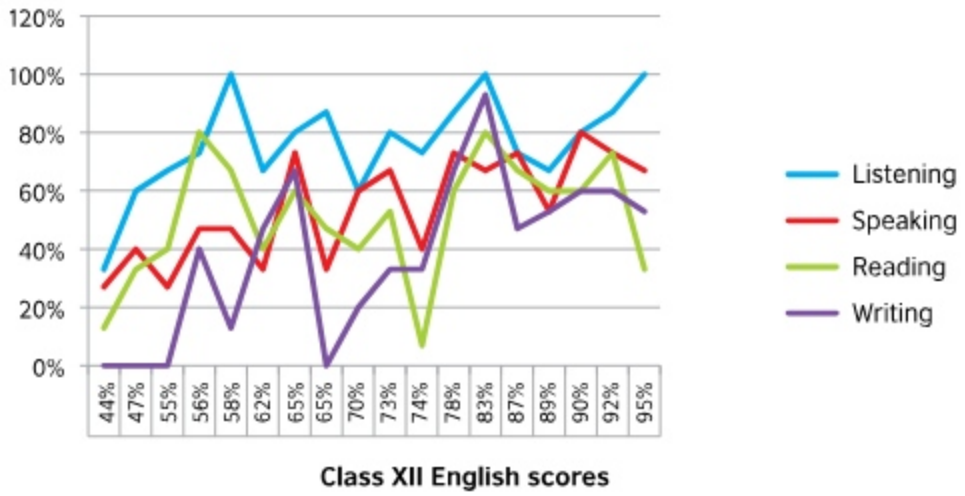

Figure 1: Scores in English in the class 12 Board examination

One may notice that the moderate to high achievers (i.e. those who have scored in English 50 to 80 per cent in class 12 board examination) have shown the most balanced performance in the proficiency test. However, the group of highest scorers have performed poorly in the reading comprehension and written production tests. Their board examination score in English may indicate their textual knowledge and not their mastery of the reading and writing skills in English.

5. Conclusion and suggestions

The result of the survey shows that the test-takers claim to have acquired a certain level of proficiency to become familiarised with the four skills in English in any given context and they believe test practice at the +2 level certifies their position. However, the study finds that there is a substantial gap between their belief and their performance. The study uncovered a wide range of issues concerning the existing testing practice of the +2 level across educational boards in India. The following suggestions are based on the major findings of the study.

a) workshop and training programmes for test designers and teachers on testing and assessment should be conducted so that there is a correlation between teaching-learning and testing of the four skills, and between board examination and school examinations

b) the test designers need to revisit test objectives and the selection of test items to promote and assess the ESL learners' proficiency in all the four language skills

c) representatives from all boards need to revisit the test objective and test design of the existing testing module and develop a uniform practice for testing and assessing Indian ESL learners' proficiency in English which matches international requirements

d) a detailed, descriptive assessment layout which explains the correlation between the test scores and the language performance of the test takers needs to be developed and made available to the test takers and the test designers.

References

Alderson, JC and Buck, G (1993) Standards in testing: a survey of the practice of UK Examination Boards in EFL testing. *Language Testing* 10(1), 1–26.

Alderson, JC, Clapham, C, and Wall, D (1995) *Language Test Construction and Evaluation*. Cambridge: Cambridge University Press.

Bachman, LF and Palmer, AS (1996) *Language Testing in Practice*. Oxford: Oxford University Press.

Bachman, LF and Palmer, AS (2010) *Language Assessment in Practice: Developing Language Assessments and Justifying their Use in the Real World*. Oxford: Oxford University Press.

EALTA (n.d.) EALTA: Guidelines for Good Practice in Language Testing and Assessment. Resource Document. European Association of Language Testing and Assessment

Available at: www.ealta.eu.org/documents/archive/guidelines/English.pdf

Fulcher, G (2010) *Practical Language Testing*. London: Holder Education.

Fulcher, G and Davidson, F (2007) *Language Testing and Assessment: An Advanced Resource Book*. Oxon: Routledge.

Heaton, JB (1988) *Writing English Tests*. London: Longman.

Hughes, A (1989) *Testing for Language Teachers*. Cambridge: Cambridge University Press.

Kunnan, AJ (ed) (2000) *Fairness and Validation in Language Assessment*. Cambridge: Cambridge University Press.

Oller, J (1979) *Language Tests at School*. London: Longman.

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Appendix: Survey results

Q1. The English language test at class 10/12 was a fair and accurate test of my English language skills (total and sub-skills).

Q2. The test score was directly proportional to the degree of my flexibility in using English.

Q3. The test boosted my confidence level or proficiency in using the language in non-exam/outside school contexts.

Q4. The test identifies my ability to communicate with native speakers of English.

Q5. The test identifies and ensures the usability of my command over English in your prospective specialised stream/professional domain.

Q6. The difficulty level of the test items matched the teaching input in my English classes at school/ college.

Q7a. The class 10/12 test and Assessment in English showed what I know about the language.

Q7b. The class 10/12 test and Assessment in English acquainted me with my strengths and weaknesses in using the language.

Q7c. The class 10/12 test and Assessment in English showed my acquaintance with the syllabus.

Q7d. The class 10/12 test and Assessment in English measured my learning retention.

Q7e. The class 1012 test and Assessment in English made me lose interest in English.

Q7f. The class 10/12 test and Assessment in English appeared to be a 'ritual' of the curriculum.

Q7g. The class 10/12 test and Assessment in English provided me with information about which area to improve or learn better.

Q7h. The class 10/12 test and Assessment in English made me feel nervous.

Q8a. The following are often tested or assessed and adequate marks are allotted to each of them: listening comprehension.

Q8b. The following are often tested or assessed and adequate marks are allotted to each of them: reading comprehension.

Q8c. The following are often tested or assessed and adequate marks are allotted to each of them: oral production.

Q8d. The following are often tested or assessed and adequate marks are allotted to each of them: written production.

Q8e. The following are often tested or assessed and adequate marks are allotted for them: vocabulary.

Q8f. The following are often tested or assessed and adequate marks are allotted for them: pronunciation.

Q8g. The following are often tested or assessed and adequate marks are allotted for them: grammar.

Q9. Are you familiar with the names of any of the following tests? **IELTS-TOEFL**?

Q10. What is the purpose of these tests? (Tick the appropriate box)

For pursuing higher studies abroad in any discipline	
For passing Indian civil service examination	
For admission into different universities in India	
Don't Know	

Q11.Do you think the English language test at Class 10/12 can be considered equivalent to **/IELTS/ TOEFL**?

Q12. Do you think that there is requirement for a pan-India English language proficiency test?

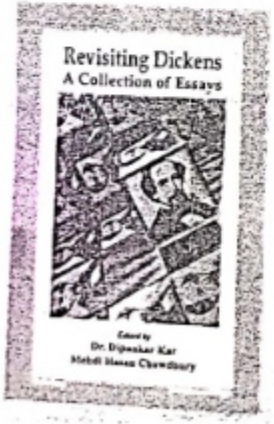
Revisiting Dickens
A Collection of Essays

Edited by

Dr. Dipankar Kar

Mehdi Hasan Chowdhury

Revisiting Dickens: A Collection of Essays



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last essay in this anthology, co-authored by Banajit Sarma and Rumi Das, engages with the question of child labour/abuse and its projection in Dickens' works. It is hoped that the readings of Charles Dickens offered here will stimulate readers to rediscover and rethink the author in novel ways.

Reading the Relationship among Love, Marriage and Class in Charles Dickens' *Hard Times*

Dr. Miazi Hazam

Charles Dickens, as pointed out by David Cecil in his book, *Early Victorian Novelists* (1934), is perhaps the most flawed but the most lovable of all Victorian authors. One of the reasons for the great success which he had as a novelist in spite of all the technical flaws was his mastery in story-telling and his choice of themes which touched the heart and life of the common readers. Hailed as a socially-responsible novelist and yet many-a-times criticized for playing too much with the emotions of his readers, he has, nonetheless, chosen themes that

transcend the limitations of Victorian time and space. However, it is not that the themes were irrelevant or less relevant during his days; rather it is to affirm that their relevance has continued till date and generated a lot of enquiry into his works. While unhappy childhood, suffering of the poor and the underprivileged, the pathetic condition of the working class, the difference between the rich and the poor in the society and the education system which he held as faulty, love and marriage also occur as his recurrent themes.

Whether it is the highly autobiographical *David Copperfield* (1850) or *Hard Times* (1854) or *Great Expectations* (1860), love, marriage and dejection have found their way into these three novels as an important theme. The usual and perhaps the spontaneous explanation provided for the recurrence of these themes has been the reference to the author's own life, which, as known to most readers of English literature, was not a happy one in terms of love and marriage, and rightly perhaps so. The point of departure that I want to make in this paper is by adding the element of 'class' – both in the social and economic senses, to the complex representation of love, marriage and dejection as found in *Hard Times*. This would invariably mean the application of a Marxist-oriented interpretation into the proposed text since it is almost impossible to speak of or attempt to discuss the issues related to class without a reference to the Marxist standpoint. Also, given the historical context of the

novel, it would only seem fit to apply some elements of Marxist criticism into the reading of love, marriage, dejection and class. The reason for applying Marxist criticism also arises from the fact that this 1854 novel, the tenth of the author, is normally categorized as a social criticism and industrial novel. In fact, the primary approach towards the novel has been of a text which vehemently critiques the dehumanizing tendency of capitalism in the wake of industrialization in England, and by extension, the European continent as a whole. It can also be noted here that Marx himself used references from Charles Dickens in his works, as Tony Davies notes in 'Marxist Aesthetics':

> Himself an aspiring poet in his twenties, [Marx] admired his compatriots Goethe, Schiller, and Heine. His works teem with allusions and quotations from, further afield, Virgil and Dante, Cervantes and Calderon, Voltaire and Victor Hugo, Dickens, Thackeray, and dozens of other writers in as many languages (Rice and Waugh, 141).

It is possible to read *Hard Times* as a thesis-novel since its plot and narrative are completely hinged on the anti-thesis between the 'head' and the 'heart', or in other words of the clash between 'intellect' and 'emotion'. The theme of the novel is primarily the failure of the application of Utilitarian ideas and principles, particularly in the realm of education, consequently affecting humane quality, since Dickens felt that such utilitarian education does not lead men to build a better society; rather, because of

its closeness to the motifs of industrialization and capitalism, it had turned into a tool for creating people who would be potential addition to the insidious process of capitalist exploitation as managers and propagators of the process. It is also well known that one of the major concerns of Dickens with his contemporary society was his dissatisfaction with the educational system which was gradually finding acceptance in the country and was also being practiced in various institutions, the example of which is the school of Mr. Gradgrind where the children are taught nothing but 'facts'. It is this emphasis on the hammering of facts into the impressionistic minds of the little children to the detriment of fancy that the novelist vehemently criticizes in this novel. In order to prove how the nurturing of facts to the utter negligence of fancy can result not only in the failure of proper development of the children but also degenerate them into monstrosity of nature is very properly reflected in the complex web of relationships that the different characters share in the novel.

As per the conceived structure of the novel based on binary opposition, the themes have also been integrated in a similar manner with the scales tilted in favour of the heart and emotions against that of the head and rationality. An important aspect in the development of the themes of love, marriage and dejection in the novel is Dickens' emphasis on the critique of the utilitarian educational system. This is done by putting the characters under the system and by showing how they either fail or succeed

depending on how much they either imbibe or reject the philosophy of "facts and facts alone" propounded by the two upholders of utilitarian flag – Mr. Gradgrind and Mr. Choak'umchild. It is also to be noted here that while the children from the lower rung of English society manage to keep the integrity and humanity within their breast intact, or at least less mauled, the ones belonging to the upper rung turn into monstrosities of nature or at the best into human beings without proper humanity within them. It is in the development of the theme of human relationships that the author successfully shows the failure of such an educational system based primarily on the emphasis on rationality and facts.

Based on the structural aspect of the novel, the pairs of lovers (or couples) have been taken from the two diametrically opposite classes of the English society – the affluent and the poor – in order to highlight the difference in the type of life lived by each class. Though it should also be accepted here that in spite of the fact that Charles Dickens aimed at representing the 'lived' experience of these two diametrically opposed classes, he cannot be absolved from the guilt of romanticizing the latter at the cost of the former, especially with the application of the 'grotesque', which was one of his favourite tools for caricature and irony. Writing, for Dickens then, is "...not to be a mere recreational doodling, [it] is a productive and purposive activity, relational in its ends, and constrained by the

conditional possibilities of a particular social situation and historical moment" (Waugh., 142).

This discrepancy in portrayal is evident when one considers the two couples, Mr. Josiah Bounderby and Louisa Gradgrind on the one hand and Stephen Blackpool and Rachael on the other. It is clear that while the marriage between Mr. Bounderby and Louisa fails because of more than one reasons, the primary being a love-less marriage based on a misunderstanding of the self and the vast difference of age between the husband and the wife, the unhappiness in the married life of Stephen Blackpool is because of the drunkenness of his wife. However, the two couples who belong to the two different layers of the English society tell us much more than are visible on mere simplification, and this is possible only when one goes analyzing the experiences of the couples on the basis of class.

This reading emphasizes on class as a tool for examining love, marriage and dejection in the novel because, as already stated, class distinction, or rather the formation of and solidification of the capitalist and working class was a direct outcome of the rise and development of industrialization in England. It may also be mentioned here that the rise of industrialization with all its consequent evils was a process which had disturbed not only the fiction writers of the Age, but had found its way in the genre of poetry too, an instance being William Blake's poem *And Did Those Feet in Ancient Time* which refers to the mills and factories as "Satanic

Mills". In *Hard Times* the reference to the factory workers as "hands" is an instance of the denial of the human status of the workers and hence an act of dehumanization and capitalization of human beings. It is also equally important to note that the functioning of the workers' union has also not been projected in a favorable light. It rather seems that the poor worker is sandwiched between the Union and capital, and one who does not adhere to the demands of the Union is branded as a 'black sheep' by the other members of his/her own class. Of course, as is common with Dickens' way of portraying things, allegations have also been held against him for the manner in which he has portrayed the functioning of the labour and the labour union. While he has portrayed Stephen Blackpool as an innocent victim, he has cast Slackbridge and the other members of the Union in a negative light and deliberately neglected some of the positive changes that labour unions had achieved in favour of the workers.

When it comes to dejection in marriage, it is true that both Mr. Bounderby and Stephen Blackpool face dejection in their marriage, yet while it is evident in the case of Blackpool who suffers immensely from the drunkenness of his wife, it is not so with Mr. Bounderby because the social status as well as the absence of all sorts of emotions on the part of Louisa evolves a different dynamics. Dickens has represented the suffering of Stephen Blackpool to such an extent that along with him the readers tend to sympathize with his decision to be released

from the vows of wedlock so that he can live his own life for whatever number of years he has at his disposal; and perhaps settle down with Rachael, whom he considers his Angel and his only true friend and sympathizer who has stuck to him and his wife during all the days of misfortune. There is also a sort of unspoken understanding between the two which is quite clear to the readers that it speaks of unexpressed and unrequited love between them. There are several passages in the novel that tell of Stephen Blackpool's admiration for Rachael as being more than just admiration but like an invisible bond of love which he is unable to utter and which, unfortunately, both are unable to express until Blackpool embarks on his last journey holding Rachael's hand in his. What he had not succeeded in achieving in life, he gets in his death.

On the other hand, Mr. Bounderby and Louisa, though they do not exhibit any problem in marriage from the conventional sense, lack the bond that should have existed between a husband and a wife under normal circumstances. The reason can again be cited as the lack of human feelings in the soul, or should we say the heart, of Louisa who unlike other 'normal' girls of her age, has never known what love is and hence does not feel any of the attachment which roots out of it. It is only when James Harthouse enters into her life that she begins to feel a hitherto unknown and uncomfortable attraction towards him which she doubts may be love, though she is never sure of it; and it is this feeling that finally leads to the shocking confession before her

father and her turning into a tragic character. For this, she squarely blames her father for turning her into an unfeeling, heartless being, so that once she really begins to live and feel, she is unable to bear the pressure and pain of living and breaks down. She separates from Mr. Bounderby and tries to find some solace in her loneliness. Hence, both the couples representing the diametrically opposite social classes suffer from dejection in marriage because of different reasons. So, where does the difference lie?

The difference lies in the possibility and/or impossibility of legal separation or divorce in the case of the couples. In the case of Mr. Bounderby and Louisa there is the possibility of obtaining divorce and settling down separately if they desire so, but in the case of Stephen Blackpool divorce is a distant dream even if he were to desire and ask for it, as it is evident in his discussion with Mr. Bounderby when he approaches him for suggestion regarding his release from the torment that he has been undergoing in the hands of his wife during all the years of marriage. In his discussion with Mr. Bounderby it becomes clear that it is not possible for a person of lower means to achieve divorce since it involves a process which demands a fair amount of money as well as time. It is indeed a long process for acquiring divorce under the existing contemporary legislative system as Mr. Bounderby explains to Blackpool in the following passage in the novel:

> 'Why, you'd have to go to Doctors' Commons with a suit, and you'd have to go to a court of Common Law with a suit, and you'd have to go to the House of Lords with a suit, and you'd have to get an Act of Parliament to enable you to marry again, and it would cost you (if it was a case of very plain-sailing), I suppose from a thousand to fifteen hundred pound,' said Mr. Bounderby. 'Perhaps twice the money.' (*Hard Times*, 62).

And Blackpool reacts in his own individual way by uttering, 'Tis just a muddle a'toogether, an the sooner I am dead, the better' (62). No doubt, life becomes a sickness for this poor man with death as the only cure of what he calls a "muddle".

It is thus, required to look here at the then existing marriage and divorce laws in force in England and how it made it impossible for the poor to come out of the bonds of marriage in spite of problems and maladjustments, and how it was a luxury affordable only by the rich.

However, before proceeding into the complexities of marriage and divorce laws in England in Dickens' time, it seems relevant to note Marx's classic statement about the crucial relationship between base and superstructure which was later to constitute the framework of *Das Kapital*:

> In the social production of their life, men enter into definite relations that are indispensable and independent of their will.

> relations of production which correspond to a definite stage of development of their material productive forces. The sum total of these relations of production constitutes the economic structure of society, the real foundation, on which rises a legal and political superstructure and to which correspond definite forms of social consciousness. The mode of production of material life conditions the social, political and intellectual life process in general... (*Marx and Engels in Literature and Art*, 313)

This relationship between the conditioning of "the social, political and intellectual life" by the material concerns is what functions behind the legislation of laws in any economy by those who hold the keys to power and decide things in favour of their material prosperity: hence, when Stephen Blackpool meets Mr. Bounderby for seeking suggestions regarding any possible scope of release from his miserable state of existence, Mr. Bounderby lashes out at him telling that he can detect the desire for venison soup in the actions of Stephen – here, venison soup implies the ultimate of material luxury for Mr. Bounderby.

In the Victorian society, the problems which confronted the poor and women in seeking divorce are detailed in the given passage:

> The main problems, which plagued individuals in seeking divorce in the Victorian, concerned constraints based upon

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> sex and wealth. *Before the Matrimonial Causes Act of 1857, no courts existed to hear divorce cases, the only way to obtain a divorce, applying to Parliament for a private act, had only been achieved by four women in English history (Feinberg). This parliamentary method proved far too costly for women and the poor, remaining the privilege of the male landed gentry and aristocracy. Here, a circumstance arose where ideal starkly contrasted with reality in terms of how efficacious a manner the procedures of divorce functioned in. Believed universally applicable, this method of administering the legalities of divorce proved not only narrow and inequitable, but also inefficient as it occupied far too much of Parliament's time.* The House of Lords, who received petitions for divorce, felt the ever compounding depletion of its resources, and this factor served as yet another motivating force behind the soon to arise reform legislation against such maladroit proceedings (Finlay, 2) (Italics mine).

This is exactly the same procedure that Mr. Bounderby tells Stephen Blackpool, asking him at the same time to leave his idea of getting a divorce from his wife. It is also important to note here that the procedure for obtaining divorce was difficult for both women and the poor, while it was obtainable by the male landed-gentry. This is a clear example of how different classes are affected differently by the same legislation which is supposed to suit all

and that too equally. The above-quoted passage also records the realization of the failure of the existing divorce laws in its universal applicability to all classes equitably. At the same time, it is also an indication of how legislation, society and economy were inextricably inter-connected during Dickens' time and how they still continue to be so. It is the socially-conscious novelist in Dickens that made him address the social ills of his time.

Dickens' class-consciousness and the relationship between love, marriage and dejection are evident in his other novels too. In *Great Expectations*, Pip's failure in winning the hand of his beloved Estella is decided to a large extent by the disparity of class between them. Again, as in *Hard Times*, the 'coldness' of Estella in *Great Expectations* is the result of 'nurture' rather than 'nature' as with Louisa Gradgrind – a result of the teaching that they receive in their childhood which takes away their innate humanity. In *Hard Times*, it is Mr. Bounderby and his philosophy of facts becomes the undoing for Louisa while in *Great Expectations*, it is the deviant desire of Miss Havisham which becomes the undoing for Estella; yet in both the cases, it is the initial intervention of the adult world in the natural growth of children that proves to be catastrophic. So far the highly autobiographical *David Copperfield* is concerned, it is undoubtedly the author's own life reflected into art.

To conclude, it is the bringing in of the element of class in *Hard Times* that makes love, marriage

and dejection more complicated in its presentation, thus, allowing for further and deeper analysis into the text and theme.

Works cited :

1. Baxandall, Lee. Ed. *Marx and Engels on Literature and Art.* Moscow: Progress Publishers, 1976.
2. Cecil, David. *Early Victorian Novelists: Essays in Revaluation* (1980 reprint). London: Constable. Print.
3. Davies, Tony. 'Marxist Aesthetics'. *An Oxford Guide to Literary Theory and Criticism.* Ed. Patricia Waugh. New Delhi: OUP, 2006. Print.
4. Dickens, Charles. *David Copperfield.* 1850. (2004 reprint). New Delhi: UBSPD. 2004. Print.
5. ——. *Hard Times.* 1854. (2012 reprint). New Delhi: UBSPD, 2012. Print.
6. ——. *Great Expectations.* 1861. (2003 reprint). New Delhi: UBSPD. 2004. Print.
7. Finlay, Henry. "Difficulties of Obtaining a Divorce in Victorian England".<www.123HelpMe.com>. 11 January 2015. Web.
8. Rice. Philip and Patricia Waugh. Eds.*Modern Literary Theory: A Reader.* New York: Hodder and Hodder. 2001 reprint. Print.

GENDER IMPLICATIONS OF TRIBAL CUSTOMARY LAW

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Status and Role of Women in Contemporary Nokte Society

WANGLIT MONGCHAN

Nokte (also spelt as Nocte) is one of the major tribes concentrated chiefly in Tirap district of Arunachal Pradesh. They are also found in neighbouring Rajnagar under Bordumsa circle in Changlang district of Arunachal Pradesh and in the bordering areas of Joypur in Dibrugarh district of Assam. According to the Census of India, in 2001 the total population of Nokte was 33,680. The Nokte are mainly agriculturists and practise *jhum* or shifting cultivation.

In Nokte society, though men are more dominant, women do enjoy a certain amount of freedom and privileges. They have their own positions determined by social norms, ideas and values, customs and beliefs, attitudes and social behaviour. This paper, attempts to examine how women in contemporary Nokte society are positioned in various spheres – social, political, educational, economic and religious – in order to understand their status and role.

Position of Women in the Social Sphere

The family in Nokte society is patriarchal, patrilineal and patrilocal. This implies male dominance. The man is the head of the family. He is responsible for protecting and looking after the welfare of the family. He generally takes all the decisions pertaining to the family. In important matters, however, the woman (wife) is consulted and her views are taken into account. At times when the man is away, the woman takes charge of the family.

In terms of occupation, there is a difference in the activities done by women and men. Activities related to agriculture like hoeing, planting, weeding and harvesting are done by women. Similarly, household chores such as cooking, washing, fetching water, collecting firewood, looking after children, pounding rice and preparing rice beer are performed by women. But cutting and clearing the jungles or the *jhum* land, constructing houses, hunting, fishing, and works which are supposedly difficult for women are done by men. Though this division is maintained, at times when the woman goes out to the field or for some other work or falls sick, the man takes care of household works especially collecting firewood, fetching water, cooking and looking after children.

In social programmes and at functions women play major roles. They are busy in brewing rice beer, collecting vegetables, leaves, etc. for the celebration.

Intelligible Semantic Level Speech Compression Algorithm by Preserving Emotional Content

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***Abstract*—**Speech encoding refers to compression for transmission or storage, possibly to an unintelligible state, with decompression used prior to playback. This paper attempts to formulate the semantic level compression technique on speech signals by preserving its prosodic features. LPC analysis will be done to identify the feature of the input speech. GMM will be used to preserve the emotional content while encoding. ANN will be utilized to identify the best features for encoding. Using such semantic based coding will highly reduce the computational overhead in speech coders.

Keywords— Speech coding; G.723.1, iLBC; fuzzy clustering; Windowing; ANN

I. INTRODUCTION

It is called the Three-dimensional sound compression of Google and its founders insist on strict anonymity of its compression method. On this particular compression method, it has assembled a method for encoding multiple directional audio signals using an integrated codec by a wireless communication device.

The clinking use and buzzing popularity are proof that the Three-dimensional sound compression already a success with its the ability to capture, compress, and transmit three-dimensional (3-D) audio. And it's no wonder — looking at what the menu has in store for the VoIP enthusiasts. The modern VoIP can offer recording a plurality of directional audio signals and a taste-bud sating dessert of transmit three-dimensional (3-D) audio with ultimate compression.

Still, the mystery that's impossible to crack is: who among the VoIP codec will give the best compression rate. The speech codec founders often opt to remain secret and inform the users with a best value rather than its average score. The codecs considered for the comparative study: G. and iLBC, does it slightly differently and usually teams up with best or highly talented VoIP solutions networks that create a special meal for its users.

This paper is organized as follows. Section II describes various existing speech coding techniques. Section III describes the proposed speech coders and its Features. Section IV describes The Comparative Study. Finally, Section V concludes the paper.

II. EXISTING SPEECH SYSNTHESIS TECHNIQUES

All around world, similar secret VoIP codecs are springing up which take the formality out of the voice chatting experience and inject a new sociable element. They offer an enticing combination of superlative clarity that we were not able to make till now, combined with best sample rate and variable bit rates — and carefully chosen — network standards.[1]

Even though these are exclusive, low-delay CELP, Lossy codecs like G.728 are available they are not widely uses since it does not offer VBR ,Stereo and Multichannel access for its users.[1] Whenever some codec adds a the favor ,high compression rate beyond certain level it goes through the weakness [2]. so needs a vets on it and adds them on the selection list for the suitable speech communication standards only after that.

The coding strategy for this study was limited to standards within the following 14 sectors defined according to the ITU-T Perceptual evaluation of speech quality (PESQ) tool Sources (P.862 (02/01):

Narrow-band speech coding

- G.723.1, G.726, G.728, G.729, iLBC and others for VoIP or videoconferencing
- Full Rate, Half Rate, EFR, AMR for GSM networks
- SMV for CDMA networks

Wide-band speech coding

- G.722, G.722.1, Speex and others for VoIP and videoconferencing
- AMR-WB for WCDMA networks
- VMR-WB for CDMA2000 networks

The G.722 uses a lossy sub-band ADPCM algorithm with a sampling rate of 16kHz . It works on bit rate of 64 kbit/s (comprises 48, 56 or 64 kbit/s audio and 16, 8 or 0 kbit/s auxiliary data) and will have 14 bits/sample with a latency of 4ms.it support constant bit rate (CBR) and does not support variable bit rate(VBR)[3]. The G.722.1 uses a Modulated Lapped Transform, (based on Siren Codec), Lossy algorithm. It works on bit rate of 24,32 kbits/sec and will have 16

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bits/sample with a latency of 40ms.it support constant bit rate (CBR) and does not support variable bit rate(VBR). The G.722.1C uses a Modulated Lapped Transform, (based on Siren Codec), Lossy algorithm. It works on bit rate of 24,32 kbits/sec and will have 16 bits/sample with a latency of 40ms.it support constant bit rate (CBR) and does not support variable bit rate(VBR).

The G.722.2 (AMR-WB) uses a multi-rate wideband ACELP, Lossy algorithm with a sample rate of 16KHz. It works on bit rate of 6.60, 8.85, 12.65, 14.25, 15.85, 18.25, 19.85, 23.05, 23.85 kbit/s and will have 14 bits/sample with a latency of 25ms.it support constant bit rate (CBR) and variable bit rate(VBR). The G.723 uses a ADPCM, Lossy algorithm with a sample rate of 8KHz. It works on bit rate of 24, 40 kbit/s and will have 13 bits/sample..it support constant bit rate (CBR) and does not support variable bit rate(VBR). The G.723.1 uses a MP-MLQ, ACELP, Lossy algorithm with a sample rate of 8KHz[4]. It works on bit rate of 5.3, 6.3 kbit/s and will have 13 bits/sample with a latency of 37.5 ms .it support constant bit rate (CBR) and does not support variable bit rate(VBR).

iLBC, another codec does it slightly differently. The iLBC uses a block independent linear predictive coding Lossy algorithm with a sample rate of 8KHz. It works on bit rate of 15.2 kbit/s for 20 ms frames, 13.33 kbit/s for 30 ms frames. It support constant bit rate (CBR) and does not support variable bit rate (VBR)[5].

Shift the scene to G.729 and the tables of modern VoIP coding techniques. The recent turnaround of the speech coding like G.729(used in videoconferencing also built largely on this simple insight, as well as on the related fact that broad coverage strengthens coding standards for a sophisticated VoIP. There is an important lesson here for the proposed by the recent developments of speech coding standards.

III. PROPOSED ALGORITHM

. The Codec Description

- The input speech will be given for LPC analysis for getting the LPC$e(n) = x(n) - \sum_{k=1}^{p} \alpha_k \; x(n-k)$. The result will be the smaller varying error coefficients according to the syllable, $\alpha_1, \alpha_2, \alpha_3$,----------$\alpha_p$. These parameters are to be found with the help of LPC . We get the this signal in Its z - transform X(z) =$\frac{1}{1-\sum_{k=1}^{p} \alpha_k z^{-k}} E(z)$,. The result will be have p equations and p unknowns ($\alpha_1, \alpha_2, \alpha_3$,----------$\alpha_p$) at every 20ms . so we need to find $\alpha_k' s$ on every 20ms. Since this is not computational efficient , auto correlation method wil be usesd.so , we get $S_n(m)$=S(m+n)w(m) ; where (m) is the window ; 0<=m<=N-1. So we have $E_n = \sum_{m=0}^{N+p-1} S_n^2(m)$. With this we will get $\emptyset_n(i,k) = R_n(i-k)$, where R_n (k)= ∑_(m=0)^(N-1-k)▒〖S_n (m) 〗 S_n (m+k) ; R_n (k) is going to be even function. With this for i—1,2,----p we will get a matrix

$$\begin{bmatrix} R_n(0) & R_n(1) & R_n(2) & \dots & R_n(p-1) \\ R_n(1) & R_n(0) & R_n(1) & \dots & R_n(p-2) \\ R_n(2) & R_n(1) & R_n(0) & \dots & R_n(p-3) \\ \dots & \dots & \dots & \dots & \dots \\ R_n(p-1) & R_n(p-2) & R_n(p-3) & & R_n(0) \end{bmatrix}$$

$$\mathbf{X}\begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ . \\ \alpha_p \end{bmatrix} = \begin{bmatrix} R_n(1) \\ R_n(2) \\ R_n(3) \\ . \\ R_n(p) \end{bmatrix}$$

interestingly , since the diagional elements are the some and its a Toeplits matrix , its computationally easy for LPC for computing its α_s

- At the time LPC is going ahead with the analysis of probabilistic features Gaussian Mixture Model (GMM)-based emotional voice analysis will be done in the same frame to find the prosodic features. Simultaneously the features of the speech signal are extracted by the MFCC block. The total number of samples chosen in a frame is 256 and overlapping samples with the adjacent frame will be 128. We acquire MFCC cepstral coefficients at the output of MFCC block. In GMM, K-mean algorithm is used to obtain a cluster number specific to each observation vector and sets the centroid of the observation vector. After clustering the model, it returns one centroid for each of the cluster K and refers to the cluster number closest to it. K-mean algorithm is described as the squared distances between each observation vector and its centroids. In the training section parameters of GMM model are produced iteratively by expectation-maximization (EM) algorithm. Euclidean distance is found out between observation vector and its cluster centriods to match the spoken word with the present database[3]. The proposed method is depicted in the figure 1.
- the matrices α ,e and w will be taken into feed forward neural network, A feed forward neural network algorithm includes the following steps:
    1. Initialize weights and biases to small random numbers.
    2. Present a training data to neural network and calculate the output by propagating the input forward.
    3. changing in numbers of hidden layers and transfer function for every hidden layer and for output layer and also changing in number of neurons in every hidden layer until reach to maximum recognition and language identification rate or to minimum error.

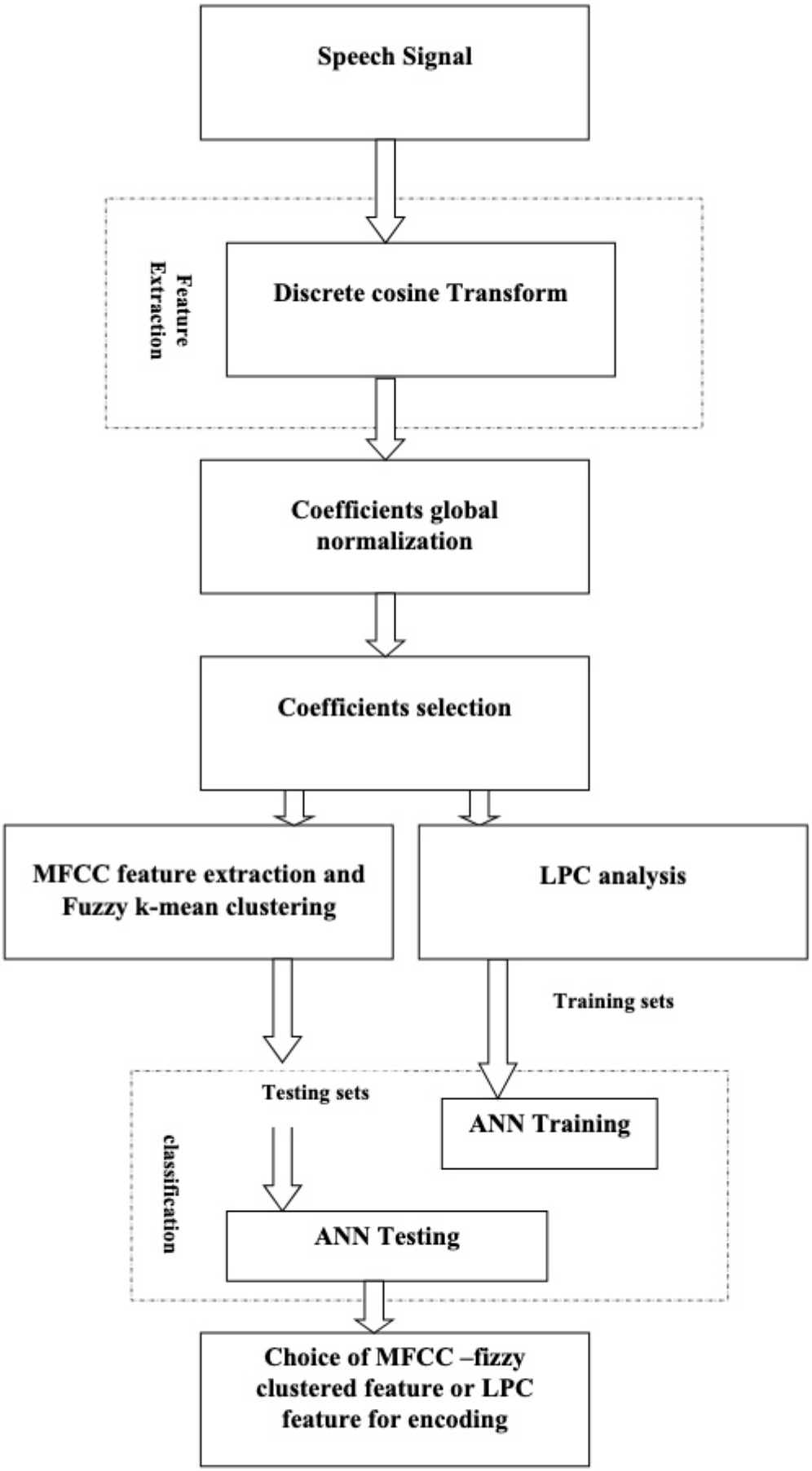

Fig 1. The Proposed encoding method

- The feed forward neural network will give Choice of MFCC –fizzy clustered feature or LPC feature for encoding

IV. RESULTS AND DISCUSSION

The study starts with comparative analysis of proposed method with the algorithm: iLBC

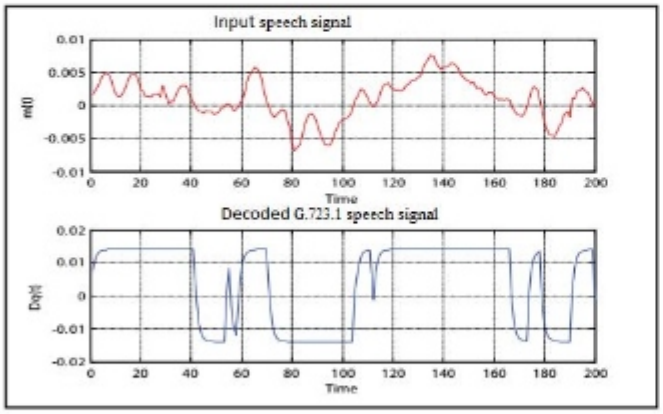

Fig.2 Encoding and Decoding for iLBC

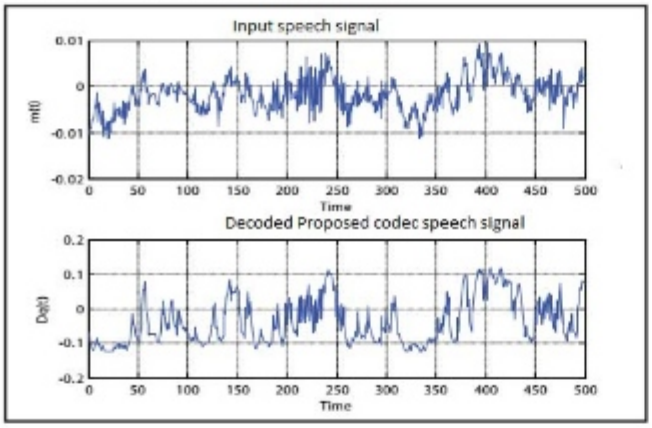

Fig.3 Encoding and Decoding for proposed systems

MATLAB simulation of the input voice for iLBC and proposed coders have been plotted graphically (Fig.1-Fig.2). The proposed method reproduces the signal more closely to the original signal as compared to other coders . It is noted that as the bit-rate goes down, the computation requirements increases highly for different bits used. This is the motivation for the proposal of semantic based speech code. LP estimation for iLBC is depicted in fig-3.This introduces a delay as well as an increase in the cost of implementation. However, for equal number of bits used bandwidth in G.723.1and iLBC is reduced highly than waveform coders, making them most suitable in bandwidth scarcity situations.

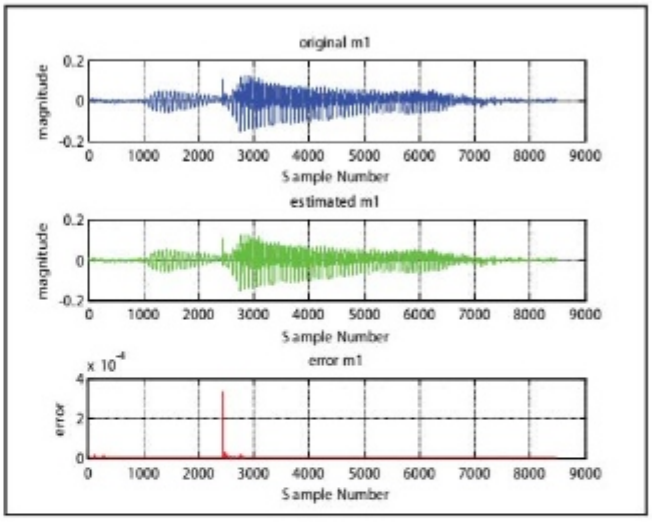

Fig 4. LP estimation for proposed method

V. CONCLUSION

In this paper, a novel semantic based speech compression methods which achieve the best possible speech quality low bit rate, with constraints on complexity and delay.

This paper proposes a mechanism to encoding speech by preserving its emotional content. The emotional preservation was achieved with the help of GMM using GMM where in the semantics of the speech may be identified with its emotional content. Since the accuracy is a concern in GMM, LPC also will be incorporated and a better choice of either GMM or LPC feature for decoding will be done with the help of ANN.

Speech coding algorithms are improving day by day to address the issues of speech communication standards. Even though this issue is addressed and solved, the VoIP industry demands lower bit energy efficient speech codes.

References

[1] Ying-Hui Lai, Fei Chen , Yu Tsao ,"Adaptive Dynamic Range Compression for Improving Envelope-Based Speech Perception: Implications for Cochlear Implants " Springer, Emerging Technology and Architecture for Big-data Analytics,pp 191-214, April 2017

[2] Stanislaw Gorlow ; Joshua D. Reiss ."Model-Based Inversion of Dynamic Range Compression" IEEE, IEEE Transactions on Audio, Speech, and Language Processing , Page(s): 1434 - 1444 ,Volume: 21 Issue: 7, July 2013

[3] Virendra Chauhan, Shobhana Dwivedi, Pooja Karale, Prof. S.M. Potdar "SPEECH TO TEXT CONVERTER USING GAUSSIAN MIXTURE MODEL(GMM) ", International Journal of Engineering Research and Applications (IJERA), ISSN: 2248-9622, Vol. 2, Issue 3, May-Jun 2012, pp.1169-1173.

[4] Dhinesh Babu L.D, P. Venkata Krishna, "Honey bee behavior inspired load balancing of tasks in cloud computing environments", Applied Soft Computing 13 (2013), pp.2292–2303.

[5] Matthias Schmidt,Niels Fallenbeck,Matthew Smith,Bernd Freisleben,"Efficient Distribution of Virtual Machines for Cloud Computing",Proceedings of the 2010 18th Euromicro Conference on Parallel, Distributed and Network-based Processing,IEEE Computer Society Washington, DC,(2010), pp.567-574

Efficient Distribution of Virtual Machines using Honey Bee Windowing in Cloud Computing

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***Abstract*—This paper presents an approach for developing virtual computing layer which is used by the cloud terminals during the virtual infrastructure downloading. The virtual computing layer is cable of image creation, maintenance and downloading on behalf of the cloud terminals. Using such virtual computing layer will considerably reduce the load maintained between the virtual computing client and the server. It also schedules the image downloading in the cloud infrastructure based on software image windows. The Honey bee foraging algorithm performs the work in different phases while creation of virtual images. The forage bees will search for the suitable image portion in the neighborhood and the scout bees will bring the found portion from the location indicated by the forage bees.**

Keywords— Cloud Computing; Distributed Virtual Environments; Honey Bee Algorithm; Windowing

I. INTRODUCTION

In recent years, the advance in virtualization is being driving the evolution of networking technologies. Even though the performance issues of the virtualized software are a matter of concern, virtualization technology is widely accepted by a large mass. Emergence of huge bandwidth networking technology has posed new challenges for developing high performance virtualized software. The major challenge in virtualized client-server interaction is its performance degradation, due to packet loss from a remote server. This major challenge can be addressed by introducing dedicated cloud terminals between virtual client and server.

In realistic environments, there exist more complicated application scenarios, such as migrating VM due to re-source preemption, which may lead to dynamic changes in reliability parameters of the host server[1]. This paper proposes scalable client-server interaction software wherein, the client interacts with its nearby cloud for downloading its virtual computing environment. The objective evaluation of the results shows that, the proposed technique provides high robustness against packet loss and also achieves a better performance while downloading larger software for the client even when the interaction with the server owe indirectly with a nearby cloud terminal.

This paper is organized as follows. Section II describes the overview of scalable client-Server virtualized environment and about operating system downloading from a server through cloud terminal. Section III describes an efficient Honey Bee Windowing algorithm that significantly improves the performance of the virtualized client-server interaction. Finally, Section IV concludes the paper.

II. SCALABLE CLIENT-SERVER VIRTUALIZATION

A. Client Server Virtualization

The I/O facility in existing method of client server virtualization involves the use of I/O operation of TCP for individual files when an operating system is to be downloaded from the server to the client. This creates a bottleneck for the client, mainly when the server sits apart and also if there is fairly high packet loss in the interaction. To avoid such a performance bottleneck, the advantages of cloud computing will play an important role. But, the cloud computing terminal usually works as a facilitator for the client, where in the service requested by client will be given from its perimeter. This again may degrade the performance of client-server interaction. Hence, the optimal solution for performance degradation can be provided by upgrading cloud computing device from a mute downloader to an organizer. The main tasks of the organizer is to download the files for the first request from its terminal and then to organize these files into a single image. Once the image generation is done, depending on the criteria of the client request, the same will be passed to the client. Upon receiving, the client will extract required files from this image file for its overall activity.

B. Window Based Mechanism

Cloud message widowing will be done in order to reduce the delay for the first request from the client. Downloading individual files for both the computing environment and the operating system and then making it as an image is an extremely time consuming task. So, the image creation will be divided into a group of sub activities for making a full unified image – that is a window of n slots will be created in the cloud terminal [2] where in the slots will be filled either from the VC server or from the nearby cloud that has the same (required) slot. So when the terminal first contacts the nearby cloud it simultaneously sends the request to the other nearby clouds and to the VC server. Since downloading and making sub image from VC server is a time consuming process, it will give the preference to the Virtual Terminal (VT) neighbor.

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Thus, the image creation in VT will be faster and may be given to the client.

C. Brief on Cloud Computing

Nowadays, cloud computing is used for solving many problems of wider scope and greater depth. It has given new avenues for performance as several companies and products finds newer ways to cut cost and improve productivity in the process. 82% of the companies reportedly saved money by moving to the cloud. According to research by computer weekly publisher, TechTarget, around 53% of the organizations worldwide are now using some or the other form of cloud services. In near future cloud may become the default delivery method for new IT products. An outline of a cloud infrastructure is given in Fig.1.

Fig. 1. A cloud infrastructure

There is an estimated one Exabyte of data stored in the cloud and its global data center traffic is higher than three Zettabytes [4].

D. Virtual Machine

Virtual machine is the emulating software, which emulates a physical computing environment where in an operating system or a program can be installed and executed. Usually, virtual machines are deployed within a virtualization layer that runs over other operating system (OS), generally called as the host OS. Thus, many individual and independent virtual computing environments (i.e., guest OS) can be deployed on top of the host OS using a single virtualization layer. The major advantage of VM is that it ensures applications and services that run within VM cannot interfere with the host OS or the other VMs.

The virtualization layer typically manages the requests arising from the VMs for resources, such as CPU, memory, network and other hardware resources, by translating these requests to the underlying physical hardware. For optimizing hardware resource utilization, VMs are usually moved, copied and reassigned between host servers [5].

Since each virtual machine though cloud exists in its own space that's not tied down to data center, it simplifies the entire architecture when comes to performance measure of that virtual machine.

E. The Study and Cause of Study

This study is based on VMX server and VMware cloud foundry, which is already gaining attention from various open source and cloud companies. The random arrival of load in a cloud server environment can cause some server to be heavily loaded while other server is idle or only lightly loaded [3]. So, the experts believe that cloud foundry has not offered robust service hence had shown two serious outages recently. The first outage was the intermittent failure in the Droplet Execution Agents, which is considered as the serious outage to be solved productively, otherwise the failure may spread to the other nodes as well and the total infrastructure may collapse. Second more significant outage was the cut off customers' access to their applications and network all together.

Ironically, the second outage was a result of human error in an effort to avoid outages such as the first one on the longer run, which only blocked customer's access to the backend of their applications. But the first one was never a direct human error but it was due to the elevated asymmetric load in Droplet Execution agents. A solution to the above issue is proposed in this paper through Honey Bee Windowing algorithm.

III. HONEY BEE WINDOWING ALGORITHM

This algorithm is derived from honeybee foraging algorithm. It adapts the behavioral of honey bees for finding and bringing food [4]. This algorithm is based on the behavior of honey bee which forage (search widely for food). When the honey bee finds one location of food, it comes back to the beehive to inform this using a waggle dance. This display of dance gives the idea of the quantity of food and also its distance from the beehive. Scout bees then follow the forage to the location of food and reap it.

The proposed algorithm is similar to the behavior of forage and scout bees while it makes widow for the image to be given to the client by the cloud. Overall activity of software image creation in different nodes of system is depicted in Fig.2.

Step 1: In this resource allocation model a Server Colony (SC) will be maintained, which is the service provider for the Virtual Software Infrastructure (VSI) of the clients. Clients are customers which sends a job request say x, indirectly through the Cloud Infrastructure Terminal (CIT_p) maintained between VITs and SC. As explained in the Section II, here the cloud terminal is no more a mere downloader, but it measures the feasibility of fetching the job requested by the client to its entirety as fast as possible. For this the virtual terminal first checks in its heap whether the job request's window is available locally or not. If it is unavailable a 'read image' request on behalf of the client will be given directly to the Server Colony (SC). Now the SC will give back the response based on the condition –the question arises here is, is it the first request for the Virtual Software Infrastructure (VSI_i)? If

the answer is 'YES', SC will make the VSIi and its corresponding Slot Advertisement Window for i(SAW_i). Each entry of SAW_i will contain a vector <Slot number, owner cloud(s)>, Where each slot size will be a couple of pages (fixed). Now slot one with SAWi will be given to CITp. So, initially SAW_i's first entry will be <1, p>. On the other hand if the answer is 'NO', SC will fetch the slot (x, SAW_i) and will be given to CITp. Server on demand software image creation process is depicted in Fig.3.

In CITp, SAW_i will be given to its Wall of Advertisement (WoAi). WoA may contain information about all VSIs loaded in SC. From WOAx temporary slot Advertisement Window ($tSAW_i$) will be created and based on this a window formally created in the heap of CITp. Parallel to this operation step-2 operation will be done by CITp.

Step 2: CITp forage bees will pass to other clouds, for the discovery of remaining slots. Upon receiving the request from step-2 of CITp, a CIT say q (CITq), will give to the discovery packet its information, if it contains any of the slots of VSIi investigated by the forage bee from VITp. Now the bee will go back with information and do a waggle at beehive (VITp).

Step 3: On waggle dance of bees CITp updates its WOAp and $tSAW_i$ will be generated.

Step 4: Being $tSAW_i$ with probable owners of the slot, the scout bees will go to that location and begins to reap. If the slot is not presently available with CIT, bee will request the present Cit for the next probable CIT having the slot and goes to that CIT and so on. Finally the scout bee will go back with slot once it gets its food otherwise when it visits a predefined number of CITs (say 5).

Step 5: Scout bees comes back with slot from where it got the slot a tuple (slot number, location). Now, window filling at location VITp will be initiated after a predefined time tp (say average time to visit a maximum of CITs in sequence). In the meantime at regular intervals r, that is at r, 2r, 3r… tp steps 2, 3 and 4 will be repeated. By the time tp, CITp expects all the scout bees to come back and fills the window with slots it reaped.

Fig. 2. Honey bee windowing process

Fig. 3. Server on demand software image creation process

IV. CONCLUSION

In this paper, an extensive load balancing approach is presented for cloud computing which can be used in virtual computing infrastructure. The study considered the loads of both virtual computation server as well as the cloud computing server, in maintenance as well as the data processing and data storage.

The asynchronous elevated load in the cloud terminals is a matter of concern when it deals with large 'software as service' infrastructure, like virtual computing infrastructure. For typical Cloud Computing Infrastructure, downloading may consume comparatively more load than Virtual Storage Infrastructure. So, the cloud infrastructure deals with Virtual computing devices must have better strategy of downloading, maintenance and processing the image which client gets from the server.

This paper proposes a mechanism where the load in cloud terminals may get decreased when image creation is to be divided into a group of sub activities, which in turn will help in making a unified full image. This can be accomplished using windowing strategy where in filling of the windows may be done though the efficient algorithm of honey bee forage.

The conclusion is that the asynchronous increasing load in the cloud computing terminal may be reduced when it incorporates the windowing strategy for image creation and honey bee foraging technique for downloading the image in scheduled manner. Using this approach, it is found that cloud computing service can provide better performance especially when the clients' requests are highly computational and frequent with the server.

REFERENCES

[1] Matthias Schmidt,Niels Fallenbeck,Matthew Smith,Bernd Freisleben," Correlation Modeling and Resource Optimization for Cloud Service with Fault Recovery", IEEE Transactions On Cloud Computing,IEEE Computer Society, , 2168-7161 (c) 2016 IEEE

[2] Jiyin Li, Meikang Qiu, Jain-Wei Niu, YuChen and Zhong Ming, "Adaptive Resource Allocation for Preemptable Jobs in Cloud Systems ," IEEE International Conference on Intelligent Systems Design and Applications, pp. 31-36, 2010.

[3] Jaspreet kaur "Comparison of load balancing algorithms in a Cloud", International Journal of Engineering Research and Applications (IJERA), ISSN: 2248-9622, Vol. 2, Issue 3, May-Jun 2012, pp.1169-1173.

[4] Dhinesh Babu L.D, P. Venkata Krishna, "Honey bee behavior inspired load balancing of tasks in cloud computing environments", Applied Soft Computing 13 (2013), pp.2292–2303.

[5] Matthias Schmidt,Niels Fallenbeck,Matthew Smith,Bernd Freisleben,"Efficient Distribution of Virtual Machines for Cloud Computing",Proceedings of the 2010 18th Euromicro Conference on Parallel, Distributed and Network-based Processing,IEEE Computer Society Washington, DC,(2010), pp.567-574

Text Independent Gender Identification in NoisyEnvironmental Conditions

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***Abstract*—Thispaper proposes a competent system that is not only text independent in identifying gender of a speaker but can also work efficiently in noisy environmental conditions in real time. The noisy environmental conditions are the places where noise signals are generated at different SNRs (Signal to Noise Ratios) such as train station, restaurant, exhibition hall, airport, and so on. The algorithms used in the proposed system are MFCC (Mel-Frequency Cepstral Coefficients) for feature extraction from the speech and ANN (Artificial Neural Network) for classification between the genders (Male and Female).**

Keywords—Gender Identification; Noisy Environment; MFCC; ANN

I. INTRODUCTION

Literature survey shows that the gender identification is a crucial task for carrying out efficiently other speech processing tasks such as speaker recognition, language identification, speech compression, and so on. There already exist many gender identification systems few of them worked considering different parameters of speech such as pitch, ZCR (Zero Crossing Rate), STE (Short Time Energy), and so on. Few other gender identification systems have used different combinations of algorithms such as Gaussian Mixture Model (GMM), Multilayer Perceptrons (MLP), Vector Quantization (VQ) and Learning Vector Quantization (LVQ) along with Mel-Frequency Cepstral Coefficients (MFCCs) [1]. Most of these existing systems are either text dependent or works with a clean speech (i.e. without background noises), which is not acceptable in real world scenario and hence a failure. Therefore, a system for automatic gender identification of a speaker which is text independent and also works perfectly in different noisy environmental conditions is very essential in the field of speech processing.

The remainder of this paper is organized as follows. Section II describes the methodology used in the proposed text independent gender identification system. Section III describes the implementation of the proposed system using the methodologies mentioned earlier in Section II. Section IV represents the experiments conducted on the final implemented system to evaluate its performance in term of accuracy and their respective results. Finally, Section V concludes the paper.

II. METHODOLOGY

The basic methodology involved in speech based gender identification is broadly divided into two procedures. The first procedure is to extract features from the speech signal and the second procedure involves classification of the extracted features properly into two gender groups (male and female). There exist different procedures for feature extraction from speech signal but the proposed system employs MFCC. Similarly, for classification process the method used is feed forward neural network with back-propagation training algorithm.

A. Mel Frequency Cepstral Coefficient

The following diagram depicts various steps involved in calculating the MFCCs.

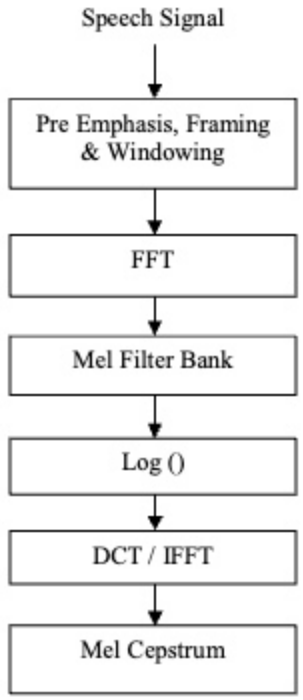

Fig.1. A flowchart of MFCC calculations

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MFCC is a well-known feature extraction method, used in the field of speech processing, which employs logarithmic Mel Scale that works based on human hearing scale. To be precise, the Mel Scale is linear up to 1000 Hz and logarithmic at frequencies higher than 1000Hz. Thus, to calculate Mels for a particular frequency f in Hz, we use the following formula [2].

$$mel(f) = 2595 \times \log_{10}(1+f/700)$$

B. Fuzzy C-Mean Clustering

FCM clustering is also called soft clustering technique where data elements can belong to more than one cluster to some degree that is specified based on a set of membership levels. The purpose of clustering at this stage is to identify natural grouping of data from a large data set to produce a concise representation of a system's behavior.

In FCM, the center of a cluster c_k is the mean of all points, weighted by their degree of belonging to the cluster. Any point x has a set of coefficients giving the degree of being in the k^{th} cluster $w_k(x)$. It also depends on a parameter m, which controls how much weight is given to the closest center.

$$c_k = \frac{\sum w_k(x)^m x}{\sum_x w_k(x)^m}$$

C. Back Propagation Neural Network

Back Propagation Neural Network (BPNN) is a simple feed forward neural network with back propagation learning algorithm. The back propagation learning algorithm used here is the *trainscg* (scaled conjugate gradient), whose advantage over other training algorithms is that, it requires less memory and much faster than standard gradient descent algorithms. The function of BPN is to learn the mapping of a set of input MFCC patterns to a set of output patterns. As the network is trained with different MFCC patterns, it develops the ability to generalize over similar features in the different patterns.

D. Spectral Subtraction Method

As the purposed system works in the noisy environmental conditions, an algorithm must be required for noise removal from the input speech signal. There exist many noise removal techniques but our system utilizes Spectral Subtraction Method (SSM) as it considerably reduces the noise level keeping other important features of the original speech signal intact.

The working principle of the SSM is quiet straight forward, it involves estimating of an average signal spectrum and noise spectrum in parts of the recoding and then subtracted from each other so that the average SNR (Signal to Noise Ratio) is improved. If y(m) is the noisy signal and n(m) is the estimated noise then the desired signal x(m) without noise is given by,

$$x(m)=y(m)- n(m)$$

III. System Implementation

The following Fig.2 shows the different stages involved in purposed competent system for gender identification [3], in noisy environmental conditions.

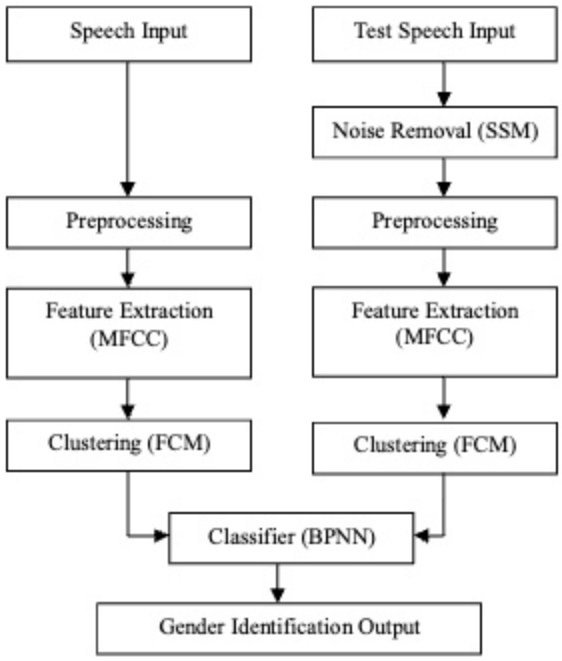

Fig.2. Stages of text independent gender identification system

A. Input Speech Signal

Input speech signals are taken from noisy speech corpus (NOIZEUS). This corpus consists of thirty IEEE sentences which are originally taken from IEEE database [4] spoken by male and female speakers. These thirty IEEE sentences are phonetically balanced with relatively low word context predictability and also include all phonemes in the American English language [5]. These sentences were recorded using Tucker Davis Technologies (TDT) recording equipment in a sound proof booth. These 30 sentences are then corrupted by various real world noises (taken from AURORA database) at different SNRs of 0dB, 5dB, 10dB and 15dB. The real world noises include noises at the airport, exhibition hall, train station, street, restaurant, and so on [6].

B. Noise Removal From Speech Signal

The purposed system works on the speech signals at a sampling rate of 16 kHz, thus it requires the sentences in NOIZEUS to be re-sampled which are at the sampling rate of 8 kHz. The noise is removed from the input speech signal using the spectral subtraction method as briefed in the Section II.D.

C. Preprocessing

After the background noise is removed, the input speech signal is divided into frames of 20ms. Each time frame has an overlapping of 50% with the next frame. Overlapping is necessary during the segmentation for smooth transition from one frame to another. Frames are then windowed with Hamming window to remove any discontinuities at the edges. For the current sample n, the Hamming window W(n) is calculated as follows:

$$W(n) = 0.54 - 0.46 \cos\left[\frac{2\pi n}{N-1}\right]; \quad 0 \le n \le N-1$$
$$= 0; \qquad \text{otherwise}$$

Where, N is the total number of samples.

D. Feature Extraction

Feature vectors are extracted from the speech signal using MFCC algorithm as described in Section II A. These MFCC coefficients are then processed by fuzzy clustering method so as to group large amount of data generated into some specific number of clusters and hence helps in reducing computational cost and time for real time identification

E. Classifier

After the clusters are created by the fuzzy c-mean clustering method, they are arranged in proper format to feed into the artificial neural network for recognition. In the training stage the weights of the feed forward neural network was assigned by some random value and is then adjusted for optimal during the learning process by using back propagation algorithm.

In the testing stage, the neural network is tested against various test samples of speech, to check whether the obtained system properly classifies the speech into male voice and female voice.

F. GUI for Implemented System

The below Fig.3 represents the snapshot of GUI (Graphical User Interface) created for the implemented system in order to display the response of the system to the end users in more professional and intellectual way. MATLAB 8 Software was used as a platform to create the front end display. As shown in the GUI, "Select File" button allows user to either select the clean speech or the noisy speech at SNRs of 0dB, 5dB, 10dB and 15dB listed under "Make a DataBase Selection". Once the speech is selected, user can hear the speech by pressing "Play" button. User is provided with the option to identify the speaker's gender without using the noise elimination technique by pressing "Speaker's Gender" button and at the same time with using noise elimination technique by pressing "Advanced Gender Identification" button, thus can compare the results from the two methodologies effortlessly. "Advanced Gender Identification" button demonstrates the implementation of the proposed system for text independent gender identification in noisy environmental conditions.

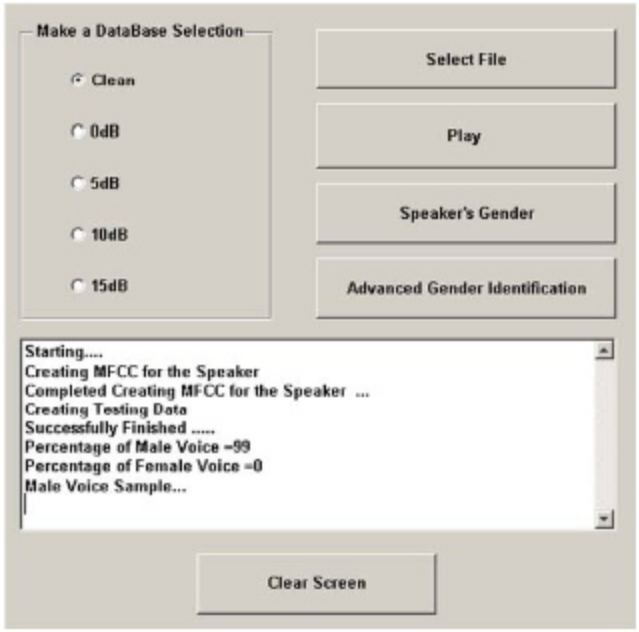

Fig.3. Snapshot of the GUI displaying results

IV. Experiments & Results

A system with 6 fuzzy clusters and 10 hidden neurons gives an optimal solution for speech based gender identification [3]. Therefore, further experiments are conducted based on this model. MATLAB 8 Software was used as a platform to develop the proposed system.

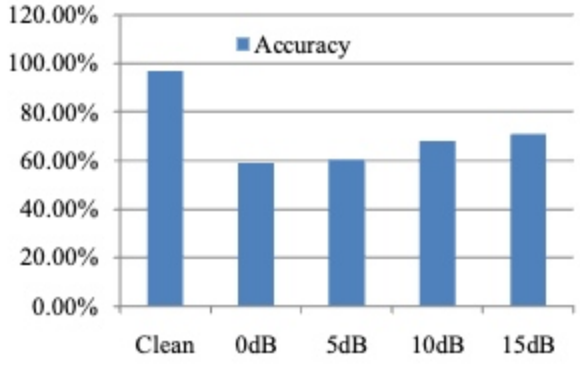

Fig.4. System Accuracy before applying SSM on input speech signal at different SNRs

The Fig 4, above shows the accuracy resulted from the system when noise is not removed from the input speech using the noise elimination technique. Observe that in case of clean speech, the accuracy is higher compare to the noisy speech where the noise is added at different level of SNRs. Similarly, the Fig.5 below shows system accuracy after applying spectral subtraction method for input speech signals.

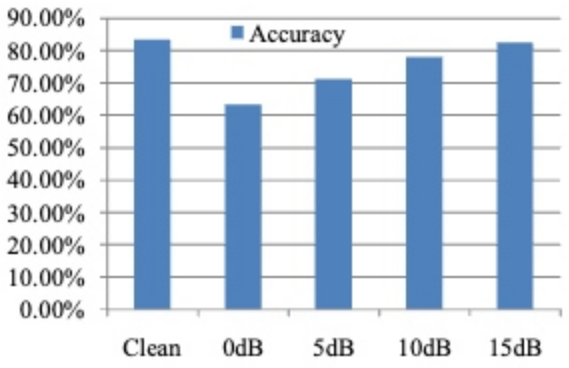

Fig.5. System Accuracy after applying SSM on input speech signal at different SNRs.

V. CONCLUSION

The purposed system for text independent gender identification in noisy environmental conditions is implemented and experiments have been conducted to check its efficiency in terms of accuracy. From the experimental result, it can be seen that the accuracy of the system, after applying the spectral subtraction method, has increased compare to the accuracy of system before applying the noise elimination technique. The highest accuracy achieved for the noisy speech signal in identification of gender is 83.3%. This outcome is also a consequence of applying the most robust algorithms i.e. MFCC for feature extraction and feed forward neural network with back propagation logarithm in learning the input patterns for classification. Fuzzy c means clustering reduces and fixes the input data set to neural network, which also plays an important role in system outcome.

REFERENCES

[1] Diemili R, Bourouba, H. and Korba," A speech signal based gender identification system using four classifiers", Multimedia Computing and Systems (ICMCS), 2012 International Conference , IEEE

[2] L. Rabiner, B. H. Juang, "Fundamentals of Speech Recognition", Pearson Education, 2009.

[3] Seema Khanum and Marpe Sora, "Speech Based Gender Identification Using Feed Forward Neural Networks", International Journal of Computer Applications (0975 –8887) :National Conference on Recent Trends in Information Technology (NCIT 2015)

[4] Ma, J., Hu, Y. and Loizou, P. (2009). "Objective measures for predicting speech intelligibility in noisy conditions based on new band-importance functions", Journal of the Acoustical Society of America, 125(5), 3387-3405

[5] IEEE Subcommittee (1969). IEEE Recommended Practice for Speech Quality Measurements. IEEE Trans. Audio and Electroacoustics, AU-17(3), 225-246

[6] H. Hirsch, and D. Pearce (2000). "The Aurora Experimental Framework for the Performance Evaluation of Speech Recognition Systems under Noisy Conditions.", ISCA ITRW ASR2000, Paris, France, September 18-20.

A Novel Speaker Identification System using FeedForward Neural Networks

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***Abstract*—This paper proposes a novel speaker identification system which uses Mel Frequency Cepstral Coefficients (MFCC) and Feed Forward Neural Networks (FFNN) for feature extraction and speaker classification respectively. Fuzzy C Mean Clustering (FCM) method is also used against the extracted features from the speech, which facilitates in grouping large amount of data. The efficiency of the system is enhanced furthermore by identifying the gender of the speaker, before the actual speaker identification process, using another FFNN. As a result, the system shows better performance in terms of computational cost and real time identification.**

Keywords— Speaker Identification; MFCC; FFNN; FCM

I. INTRODUCTION

The main objective of the speaker identification system is to identify the voice of the speaker based on his/her previously stored voice samples. The designed system will work on text-independent speech as well as the speech samples containing background environmental noise. Literature survey shows that the gender identification plays a crucial role in carrying out efficiently other speech processing tasks such as speaker recognition, language identification, speech compression, and so on [1]. Thus, in the proposed system, the task of identifying gender prior to the speaker identification is accomplished to assist in achieving better performance and accuracy. The proposed speaker identification system has a wide range of applications such as forensic tests, remote access to computers, security control for confidential information, telephone shopping, banking over telephone network and so on.

The rest of this paper is organized as follows. Section II, describes about the methodology used in the proposed speaker identification system. Section III, describes about feature extraction from the input speech data. The classification technique used in the system is briefed in Section IV. Section V, shows the experiments and results obtained from the implemented system. Finally, Section VI concludes the paper.

II. METHODOLOGY

The speaker identification is carried out mainly by performing the tasks: speech database preparation, feature extraction and feature classification.

To conduct experiments and evaluate performance of the proposed system, a sample speech database is used. It contains around 25 sentences uttered by both male and female speakers. Recording was accomplished using high quality sound card, sound recording software and close talking microphone in a sound proof laboratory. The speech was recorded at a sampling frequency of 8 kHz and coded in 8 bits PCM. These recorded sentences are then corrupted by real world noises at different SNR levels.

The MFCC is one of the best feature extraction techniques exists particularly in case of speech processing. There exist many other feature extraction techniques such as LPC (Linear Prediction Cepstrum) and PLP (Perceptual Linear Prediction).

Classification is generally required at this stage to classify and match the speaker's speech models using classifier. These models are created from the extracted features of the speaker's utterance. To accomplished the task of classification the proposed system uses feed forward neural networks as a classifier.

III. MEL FREQUENCY CEPSTRAL COEFFICIENTS

The Extraction and selection of the best features from speech signal is very essential in speaker identification process as it directly affects the system performance. In such a scenario, MFCCs are proved to be more efficient [2]. The computation of the MFCCs includes the following steps.

1) Digitized speech at 16kHz is pre-emphasized using first order digital filter

$$H(z) = 1 - 0.9z^{-1}$$

2) The speech is then divided into frames of 20ms. Windowing is done using hamming window of window length 20ms.

3) The Fast Fourier Transform (FFT) transforms the windowed speech into frequency domain and short term power spectrum *P (f)* is calculated.

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4) Obtained $P(f)$ is then bent along its frequency axis f into the Mel frequency axis M as $P(M)$ using the following equation as mention in [3],

$$M(f) = 2595 \log_{10}(1 + \frac{f}{700})$$

5) Obtained P (M) is then convolved with the triangular band pass filter into $\theta(M)$.

$$\theta(M_K) = \sum_M P(M - M_k)\Psi(M), \quad k = 1..K$$

Where, $\Psi(M)$ is the critical masking curve.

6) Then K outputs are obtained using the following equation.

$$X(k) = \ln\big(\theta(M_k)\big), \quad k = 1 \ldots K$$

7) The MFCC is calculated using the following equation

$$MFCC(d) = \sum_{k=1}^{K} X_k \cos\left[d(k - 0.5)\frac{\pi}{K}\right], \quad d = 1..D$$

Following Fig.1 shows the different stages involved in typical working of MFCC algorithm.

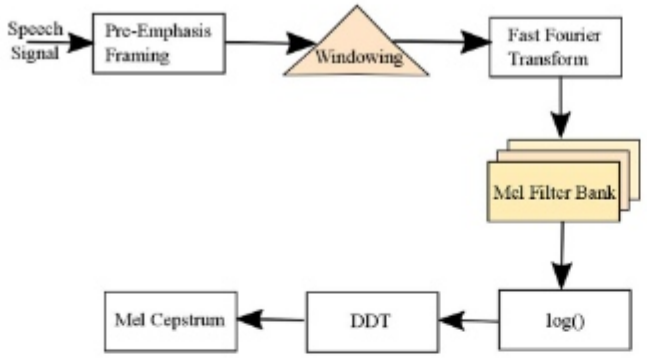

Fig.1 MFCC algorithm

IV. FEED FORWARD NEWRAL NETWORK

For classification, FFNN is used with only one hidden layer. The extracted MFCC features after going through FCM procedure, creates an output matrix of fixed size, which is then fed to the neurons of the input layer. The hidden layer can contain any number of hidden neurons, provided the resultant system performs better. Different trials can be conducted to fix the number of neurons in the hidden layer to achieve maximum accuracy. The general structure of layers present in feed forward neural networks is shown in the following Fig. 2.

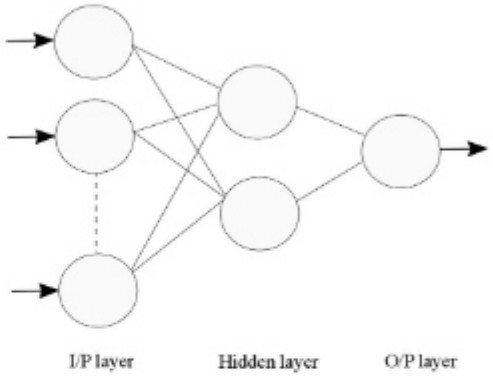

Fig.2. Layers in feed forward neural networks

For training neural network, a back propagation training algorithm called trainscg (Scaled Conjugate Gradient) is used, working of which is shown in the Fig.3. The derivative of the SEF (Squared Error Function) is calculated with respect to the weights of the network. The general equation to calculate SEF as mention in [4], uses the actual output of the output neuron y and target output of the training sample t,

$$E = \frac{1}{2}(t - y)^2$$

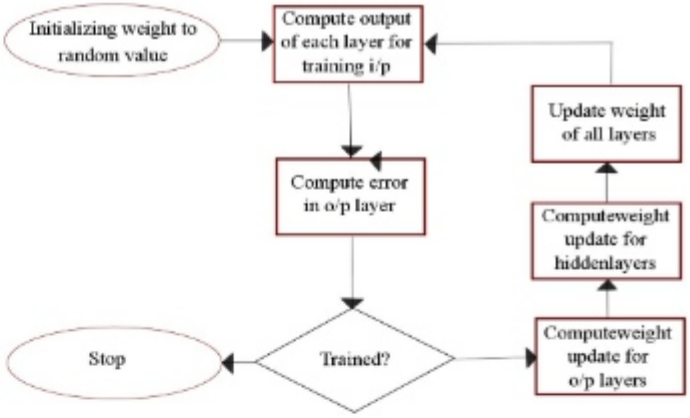

Fig.3. Back propagation training algorithm

V. EXPERIMENTS & RESULTS

The proposed system was developed using MATLAB 8 software. Experiments were conducted on the database created as mentioned in the earlier Section II. The following Fig. 4 shows the system accuracy obtained when taking different number of speakers. In each group of speakers, experiments were conducted varying number of neurons in the hidden layer of the neural network to identify for the best option. From the experimental analysis as shown in Fig. 4, it can be observed that the system with 10 hidden neurons gives the better

accuracy in identifying speaker for the test cases where the no. of speakers is set to 10, 20, 30, 40 and 50.

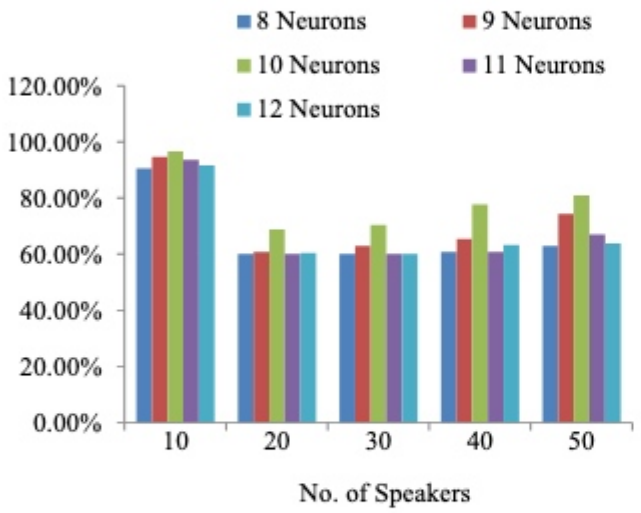

Fig.4. System accuracy for different number of speakers tested against different number of neurons in the hidden layer

VI. CONCLUSION

The purposed system for a novel speaker identification system using feed forward neural networks is implemented and experiments have been conducted to ensure its accuracy. From the experimental result, it can be seen that the accuracy of the system, considering different number of speakers for a particular instance with varying number of hidden neurons in the hidden layer, provides better accuracy compare to the other old techniques. The highest accuracy achieved in identification of speaker is 81.7%. Thus, it can be concluded that, MFCC in combination with artificial neural network can achieve better efficiency in terms of cost and time in voice based speaker identification.

REFERENCES

[1] Seema Khanum and Firos A, "Text Independent Gender Identification in Noisy Environmental Conditions", International Conference on Computing, Communication and Automation (ICCCA2017) , ISBN: 978-1-5090-6471-7/17/$31.00 ©2017 IEEE

[2] Davis, S.B. and Mermelstein, P. (1980), "Comparison of parametric representation for monosyllabic word recognition in continuously spoken sentences," IEEE Trans. on ASSP, Aug. 1980.

[3] Picone, J.W. (1993), "Signal modeling techniques in speech recognition," Proceedings of the IEEE, 1993, 81(9): 1215-1247

[4] Palit A. K, Popovic D, Computational Intelligence in Time Forecasting Theory and Engineering Applications, 2006, XXII, 372 p., Hardcover, ISBN: 978-1-85233-948-7

Perspectives on Geographical Marginality

Raghubir Chand
Etienne Nel
Stanko Pelc *Editors*

Societies, Social Inequalities and Marginalization

Marginal Regions in the 21st Century

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Chapter 10
Changing Identity, Livelihood and Biodiversity of Indigenous Communities in the Eastern Himalaya with Special Reference to Aka Tribe

Gibji Nimasow and R.C. Joshi

10.1 Introduction

Arunachal Pradesh lies in the Eastern Himalayas that spreads over a geographical area of 83,743 km^2 which shares international border with Bhutan, Tibet, China and Burma and state boundaries with Assam and Nagaland. It is a mountainous state and is situated at the northeast tip of India in between the latitudes of 26°28′ N and 29°20′ N and longitudes of 90°30′ E and 97°30″ E. The territory of the state lies in the catchments area of the Brahmaputra and its tributaries—the Kameng, Subansiri, Siang, Lohit and Tirap rivers. The mountains raise steeply northwards, some peaks even rising up to 7000 m above mean sea level. The Eastern Himalaya is divided into four physiographic divisions i.e. the Himalaya, Mishmi Hills, Purvanchal Hills and Foot hill plains (Joshi 2006). Geologically this area is covered by the Siwaliks (Outer Himalaya) and Lesser Himalaya. The main rock types found in this area are sandstone, conglomerate, shale, quartzite, dolomite, gneiss and schist. This area is crossed by Himalayan Frontal Fault (HFF), Tipi Thrust (TT) and Main Boundary Thrust (MBT) from east to west (Geology and Mineral Resources of Arunachal Pradesh 2010). The average slope calculated for the area ranges from level to 42°. The climate varies from hot and humid in the foothills to very cold in the north. As one moves northwards to higher altitudes it becomes progressively colder. In the interior parts of the state, rain practically falls all the year round specially from mid-April to mid-August when sun can hardly seen with clouds

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Volume Four, Part Two

The Languages of Arunachal Pradesh

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7

Hrusso-Aka

Gibji Nimasow

Introduction

Akas are settled in both West and East Kameng districts of Arunachal Pradesh. However, major part of the Hrusso-Aka populated area falls under West Kameng district.

The area is located in between 27° 0′ N to 27° 30′ N latitudes and 92° 30′ E to 92° 55′ E longitudes. It shares a state boundary of about 27.65 kilometres with Assam towards the south. The total geographical area is about 1262.21 square kilometres, which comprises of thirty-eight villages—Balefu, Bana, Bhalukpong, Buragaon, Chijang, Dijungania, Elephant, Giziri, Gohaithan, Husigaon, Husugo, Jamiri, Janapam, Kadeya, Karangania, Kararamu, Khamsiri, Khuppi, Kichang, Morkha, New Kaspi, Palatari, Palizi, Pichang, Pochong, Prizin, Ramdagania, Sakrin, Saljipam, Sopung, Subu, Tania, Thissa, Thrizino, Thuluhui, Tippi, Yangsey and Yayong. Out of the total 38 settlements, the Hrusso people are inhabited in 29 villages (665 households) under West Kameng District. The Koro, a sub-tribe is inhabited in the remaining 9 villages (197 households) of East Kameng District (Nimasow 2011). The Aka villages are situated on the hilltops as well as in the plains of the river valleys. Site selection for the settlement is always guided by the availability of water and land for jhum cultivation. The area starts from Bhalukpong on the south to Buragaon on the north, Bichom on the west and Kitchang on the east. The Aka territory is bounded by the Mijis on the north, Sonitpur district of Assam on the south, the Nyishis on the east, and the Buguns, Sherdukpens and Monpas on the west and north-western part.

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Vocal Tract Length Normalization and Sub-Band Spectral Subtraction Based Robust Assamese Vowel Recognition System

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***Abstract* -In this paper, vocal tract length normalization (VTLN) and sub-band spectral subtraction (SSS) have been used for speaker adaptation and noise reduction to develop an Assamese vowel recognition system which is robust to the speaker and environment variabilities. In the present work VTLN has been implemented to reduce the effects of inter speaker variabilities and sub-band spectral subtraction has been used to reduce the effects of environmental variabilities. The effectiveness of VTLN in noisy and noise-free environment has been evaluated for Assamese vowel recognition system. The Assamese vowel recognition system has been implemented using Hidden Markov Model (HMM). Mel Frequency Cepstral Coefficient (MFCC) has been used as feature vector. Experimented result shows that the performance of the system improved considerably after applying VTLN technique in noise-free and some of the noisy conditions.**

Keywords - Automatic Speech Recognition,Vocal Tract Length Normalization, Sub-band Spectral Subtraction, Hidden Markov Model.

I. INTRODUCTION

The performance of automated speech recognition (ASR) system is degraded in case of mismatched training and testing conditions [1]. Different approaches have been investigated in past to reduce the noise from speech signals like Spectral subtraction, Wiener filtering, Kalman filtering etc [2, 3, 4, 5, 6]. Inter speaker variations is another reason for the performance degradation of ASR systems. Physiological variations among different speakers are one of the main cause of inter speaker variations [1].Different Vocal Tract Lengths (VTL) among different speakers is one of the major physiological source for the induction of inter speaker acoustic variations. In this context, it is observed that VTL can vary from approximately 13 cm for adult females to over 18 cm for adult males [7, 8]. VTLN has been found as an effective speaker normalization approach in some past research works to reduce this type of inter speaker variations from speech signals [9, 10, 11, 12].

The main objective of the present work is to investigate the improvement of recognition performance due to the implementation of VTLN in both noise free and noisy conditions in case of an Assamese vowel recognition system.

A HMM based Assamese vowel recognition system has been developed in the present work. The training and testing speech signals are recorded in approximately noise free environment. A noisy testing speech database has also been constructed by adding different noises to the noise free testing speech signals. Sub-band Spectral Subtraction approach has been used to minimize the effect of noise from the noisy speech signals. To introduce inter speaker variations, training process has been performed with only male speech signals and testing process has been performed with only female speech signals and vice versa. Finally VTLN has been implemented to reduce the inter speaker variations from training and testing speech signals.

II. SPEECH DATABASE PREPARATION

The Assamese is the main language in Assam, north-eastern state of India. In Assamese language, thirty two essential phonemes are available where total number of vowel phonemes is 8. The vowels are ই (/i /) , এ (/ɛ/) , এ' (/e /) , আ (/a/) , অ' (/ɔ/) , অ (/ɒ/) , ও(/o/) and উ (/u/) [13].

In this research work, a speech database is prepared with 10 adult male and 10 adult female speakers to perform the ASR experiments. The speakers belong to the age group from 25 years to 45 years and each speaker is recorded five times for each vowel phoneme. Recording has been done at 16 kHz sampling rate mono-channel and at 16 bits resolution. Recording has been performed in a controlled and approximately noise free acoustical environment.

From the Assamese vowel database, two sets have been prepared. The first set has been used for training and the second set has been used for testing. The training set consist of speech signal from 5 male and 5 female speakers and the testing

set consist of the speech from remaining speakers. A noisy version of the testing speech database has been prepared by adding seven different types of noises of NOISEX-92 [14] database at 10dB SNR to each speech signal of the noise free testing speech set. The noises considered in the present study are, Babble noise, Pink noise, White noise, Volvo noise, Factory noise, Destroyer noise from engine room (Destroyerengine) and destroyer noise from operations room (Destroyerops).

III. Feature Extraction

Mel-Frequency Cepstral Coefficient (MFCC) has been extracted from each speech signals. The speech signal is segmented into 25 msec frame with frame rate 100 Hz. Hamming window has been applied for smoothing the speech signal. A pre-emphasis filter $H(z)=1-0.96z^{-1}$ has been applied before framing. The pre-emphasized speech signal is segmented into frame of 20 microseconds with frame frequency 100 Hz. Each frame is multiplied by a Hamming window. From the windowed frame, FFT has been computed and the magnitude spectrum is filtered with a bank of 21 triangular filters spaced on Mel-scale and constrained into a frequency band of 300-3400 Hz. The log-compressed filter outputs are converted to cepstral coefficients by Discrete Cosine Transformation. The 0th cepstral coefficient is not used in the cepstral feature vector since it corresponds to the energy of the whole frame, and only first 13 MFCC coefficients have been used. Then to capture the dynamic property of the speech signal, the first and second order derivatives of extracted MFCC are also combined with the 13-dimensional MFCC to achieve a 39-dimensional speech feature [15, 16].

IV. Speech Enhancement Technique Applied

A. *Sub-band Spectral Subtraction (SSS)*

In this research work, a Sub-band Spectral Subtraction (SSS) technique has been applied to reduce noise from noisy speech signals. In this approach, band-pass filter has been used to separate different frequency bands of the speech signal. Noise has been estimated for each frequency band separately. Then noise is reduced from each sub-band using spectral subtraction based on minimum statistics [17]. Finally, the original speech signal has been computed from the noise reduced sub-band signals.

B. *Vocal Tract Length Normalization (VTLN):*

VTLN has been implemented in the present work by warping the frequency axis of the power spectrum. The selection of proper warping factor for each speaker has been performed by a grid search approach from a set of 13 possible warping factors (ξ) from 0.88 to 1.12 with step size 0.02[7,8,9]. A piecewise linear warping function has been applied for frequency warping (eq. (1)).

$$F_w = \xi F \quad (1)$$

Where F_w is the warped frequency and F is the input frequency.

VTLN has been implemented to normalize both the training and testing speech signals by frequency warping and in this process eq. (2) [8, 18] has been used as warping factor selection criterion that is based on maximum likelihood.

$$\hat{\alpha} = \text{argmax} P_r(T^{\alpha}|\lambda, W) \quad (2)$$

Where

- $\hat{\alpha}$: Optimal warping factor
- λ : The set of HMM models
- W : Utterance
- T^{α} : The acoustic observation vector computed with the warping factor α

V. Experiments and Results

Initially, experiments have been performed for Automatic Speech Recognition with both noise free and noisy speech signals without implementing SSS and VTLN. From these experiments it has been observed that due to presence of noise the recognition performance has been degraded. In case of noise free speech signals the average recognition rate has been observed as 83.04% (table 1).

In the second step of the experimentation, VTLN has been implemented on only noise free speech signals and in this case it has been observed that average recognition accuracy is increased by 3.57% that is 86.61% (table 1).

In the third step of experimentation SSS has been performed for noise reduction from the noisy speech signals and recognition rates in case of different noisy conditions are shown in table 2. From these results, it has been observed that recognition accuracy has been increased due to speech enhancement by SSS in case of all noisy conditions except in case of Volvo and Factory noise.

TABLE 1: ASSAMESE VOWEL RECOGNITION RATES (IN %) IN NOISE FREE CONDITION USING VTLN

Training	Testing	Without VTLN	With VTLN
Male	Female	81.35	87.6
Female	Male	84.73	85.62

TABLE 2: ASSAMESE VOWEL RECOGNITION RATES (IN %) IN DIFFERENT NOISY CONDITIONS USING SSS

Noise Type	Without Speech Enhancement	Using SSS
Babble	72.32	74.11
Pink	78.57	82.14
White	68.75	73.21
Volvo	78.57	78.57
Factory	77.68	76.79
Destroyerengine	52.68	67.86
Destroyerops	57.14	76.79

TABLE 3: ASSAMESE VOWEL RECOGNITION RATES (IN %) IN DIFFERENT NOISY CONDITIONS USING VTLN AND COMBINATION OF SSS AND VTLN

Noise Type	Using VTLN	Using SSS and VTLN
Babble	72.32	69.64
Pink	72.32	79.46
White	61.61	75.89
Volvo	79.46	83.93
Factory	75	81.25
Destroyerengine	55.36	69.64
Destroyerops	53.57	70.54

Finally, VTLN has been implemented and recognition rates in different noisy conditions are presented in table 3. From this set of results it has been observed that except in case of Volvo noise, VTLN has not been found as an effective speech enhancement approach in noisy conditions. So VTLN has been implemented on the noise reduced speech signals that are achieved by implementing SSS and recognition results are shown in table 3. From these results it has been observed that combination of SSS and VTLN is also not found to be effective approach in case of some of the noisy conditions. It has been found effective in case of White, Volvo, Factory and Destroyerengine noise.

In the present work, it has also been observed that in most of the cases, 0.88 has been come out as optimal warping factor and three other warping factors that are 0.96, 0.98 and 1.02 also observed to be optimal warping factors in remaining cases.

VI. CONCLUSION

In this research work, a robust Assamese vowel recognition system has been developed to recognize Assamese vowels in mismatched testing and training conditions. The training process has been performed with approximately noise free speech signals and the testing process has been performed with both noise free and noisy speech signals. The noisy versions have been obtained by contaminated the speech signal with seven different noises (Babble noise, Pink noise, White noise, Volvo noise, Factory noise, destroyer noise from engine room (Destroyerengine) and destroyer noise from operations room (Destroyerops)). SSS approach has been used to reduce the noise from noisy speech signals. On the other hand inter speaker variation has also been introduced by performing training process with male speech signals and testing process with female speech signals and vice versa. VTLN has been applied to reduce the effect of inter-speaker variations and to improve recognition rate. From the ASR experimented results, it has been observed that VTLN is an effective approach to reduce the effect of inter speaker variations so that the recognition accuracy can be enhanced in case of noise free speech signals. On the other hand in case of different noisy conditions it has not been able to improve the robustness of the ASR system. But combination of SSS and VTLN can be useful in case of some of the noisy conditions. In the present work, one drawback of VTLN has also been observed. VTLN require a large amount of time due to the grid search approach for the selection of proper warping factor. So in such situation if the grid search approach can be replaced by some other effective approach then VTLN will be more useful. It has also been observed that noise can be effectively reduced by SSS so that recognition accuracy can be improved.

References:

[1] L. Rabiner and B.H Juang, Fundamental of Speech Recognition, New Delhi: Dorling Kindersley (India) Pvt. Ltd, 1993.

[2] S. F. Boll, "Suppression of Acoustic Noise in Speech Using Spectral Subtraction," *IEEE Transactions on Acoustics, Speech, and Signal Processing*, vol. ASSP-27, no. 2, pp. 113–120, 1979.

[3] A. R. Fukane and L. S. Shashikant, "Different approaches of spectral subtraction method for enhancing the speech signal in noisy environments," International Journal of Scientific & Engineering Research, vol. 2, no. 5, 2011.

[4] M. Karam, H. F. Khazaal, H. Aglan and C. Cole, "Noise removal in speech processing using spectral subtraction", Journal of Signal and Information Processing, 2014.

[5] A. Agarwal and Y. M. Cheng, "Two-stage Mel-warped Wiener filter for robust speech recognition", In Proc. ASRU, vol. 99, pp. 67-70, 1999.

[6] G. R. Babu and R. Rao, "Modified Kalman Filter-based Approach in Comparison with Traditional Speech Enhancement Algorithms from Adverse Noisy Environments", International Journal on Computer Science and Engineering, vol. 3, no. 2, pp. 744-759, 2011.

[7] D. Giuliani, M. Gerosa, and F. Brugnara, "Improved automatic speech recognition through speaker normalization," Computer Speech & Language, vol. 20, no. 1, pp. 107–123, 2006.

[8] L. Lee and R. C. Rose, "Speaker normalization using efficient frequency warping procedures," in IEEE International Conference on Acoustics, Speech, and Signal Processing, IEEE, vol. 1, 1996.

[9] J. Lung et al., "Implementation of Vocal Tract Length Normalization for Phoneme Recognition on TIMIT Speech Corpus," in International Conference on Information Communication and Management, Singapore: IPCSIT, pp. 136–140, 2011.

[10] B . Widmer, "Implementation of Vocal Tract Length Normalization A Study of Methods". [Online]. Available: http : // ssli.ee.washington.edu / people / bwidmer /VTL_Talk/VTL_Talk.PDF. Accessed: 2013.

[11] S. Gogoi and U. Bhattacharjee, "Impact of Vocal Tract Length Normalization on the Speech Recognition Performance of an English Vowel Phoneme Recognizer for the Recognition of Children Voices," International Journal of Computer Trends and Technology (IJCTT), vol. 39, no. 2, pp. 105–109, 2016. [Online]. Available: http://www.ijcttjournal.org/2016/Volume39/number-2/IJCTT-V39P118.pdf. Accessed: Oct. 1, 2016.

[12] G. Garau, S. Renals, and T. Hain, "Applying Vocal Tract Length Normalization to Meeting Recordings," 2005. [Online].Available: http://www.cstr.ed.ac.uk/downloads/ publications/2005/giuliagarau_eurospeech05.pdf. Accessed: May 8, 2013.

[13] B. Kakati, Assamese, its Formation and Development, 5th ed. Guwahati: LBS Publications, 2007.

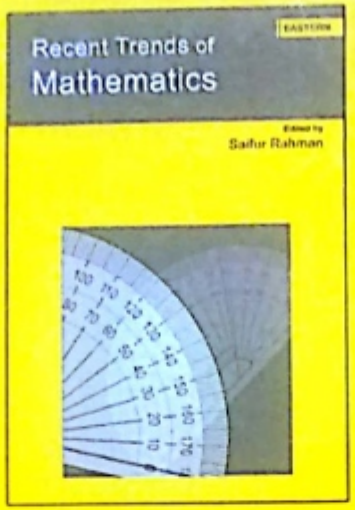
[14] "NOISEX92 noise database". [Online]. Available: http:// spib.rice.edu/spib/ select noise.html. Accessed: Dec. 20, 2013.

[15] S. Sharma, A. Shukla, and P. Mishra, "Speech and Language Recognition using MFCC and DELTA-MFCC," *International Journal of Engineering Trends and Technology (IJETT)*, vol. 12, no. 9, pp. 449–452, 2014.

[16] S. V. Arora, "Effect of Time Derivatives of MFCC Features on HMM Based Speech Recognition System," *ACEE international Journal on Signal and Image Processing*, vol. 4, no. 3, pp. 50–55, 2013.

[17] R. Martin, "Spectral subtraction based on minimum statistics," Power, vol. 6, no. 8, 1994.

[18] L. Lee and R. C. Rose, "A frequency warping approach to speaker normalization," IEEE Transactions on Speech and audio processing, vol. 6, no. 1, pp. 49–60, 1998.



The Book

This book comprises some selected research articles that are presented in the 2nd National Conference on Recent Trends of Mathematics and its Applications held in the Department of Mathematics, Rajiv Gandhi University on 6th and 7th November, 2015. The objective of the conference was to build a bridge between traditional mathematical techniques and recently developed mathematical techniques which may help the present scientific community to transfer the ideas from old to new. This book presents both traditional Mathematics and its recent trends of applications *such as in Theoretical Computer science, Mathematical physics, Neural Networking, Computational Biology etc.*

The Editor

Dr. Saifur Rahman, M. Sc., M. Tech., Ph. D. is an assistant professor in Mathematics at Rajiv Gandhi University (A Central University) who received his M. Sc. and Ph. D. degrees from the Gauhati University, and M. Tech. in computational seismology from the Tezpur University. Prior to Rajiv Gandhi University, he worked as an assistant professor in Mathematics at Arya Vidyapeeth College, Guwahati. He has awarded with joint CSIR-UGC JRF and GATE fellowship. He has more than eight years of experience in teaching and research, and published one book and several research articles in some internationally recognized journals.

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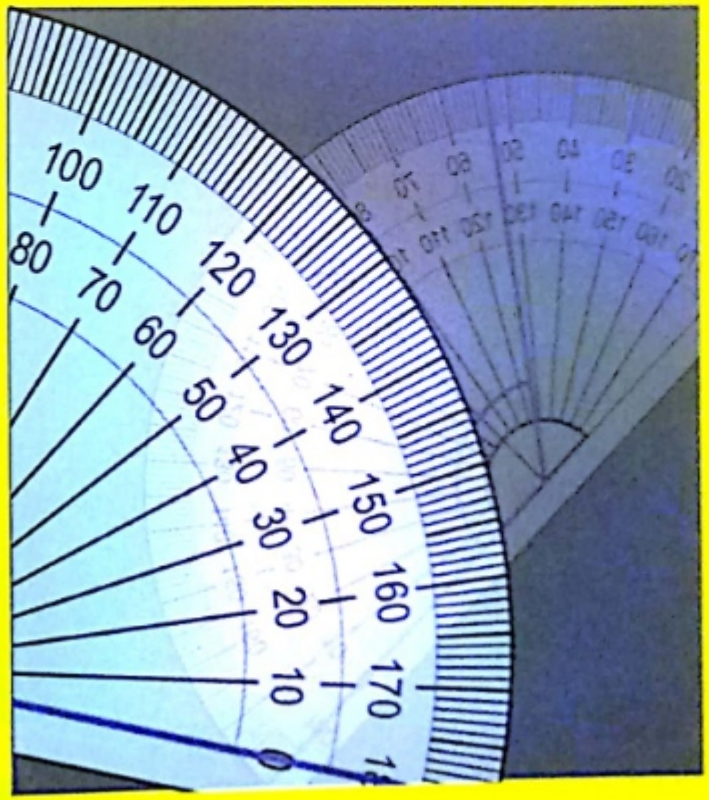

Saifur Rahman
Recent Trends of Mathematics

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FOREWORD

I am extremely glad to know that the Department of Mathematics, Rajiv Gandhi University organized the Second National Conference on '**Recent Trends of Mathematics and its Applications**' on 6-7 November 2015 (RTMA-2015) and now publishing the Conference proceedings with ISBN number.

I congratulate the esteemed colleagues of the department for organizing this sequel of national conference and bringing together mathematicians, academicians and scientists from all over the country whose contributions are going to be published in this volume. Their participation in the conference facilitates our scholars to share the results of their research and in solving some of the problems. The present century is the age of skill-development and innovations. We need to create sustainable and knowledge-based economy where the role of universities will become ever more challenging. We shall have to be competitive in to-day's world economy. The young generation with mathematical knowledge should be precise in their thoughts and approach. There should be well planned mathematics popularization and outreach programmes for young students and teachers in the interior areas of the state.

I am confident that our dynamic scholars would make significant contributions in the arena of teaching and research in mathematics and to promote overall economic development of the people of the region and the nation as a whole.

[illegible]
(Prof. Tamo Mibang)

[illegible]

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6

Roseland Approximation for Heat Generation/Absorption on Free Convective Radiating Fluid with Soret Effect

Hamida Khatun
Sahin Ahmed

Abstract

The present study deals with an unsteady magnetohydrodynamic free convective flow of viscous, incompressible, laminar, electrically conducting and heat generating/absorbing fluid past a semi-infinite vertical moving porous plate embedded in a uniform porous medium subjected to transverse magnetic field in the presence of thermal radiation effects, Soret effects (thermo-diffusion) and pressure gradient. The plate moves with constant velocity in the direction of fluid flow while the free stream velocity is assumed to follow the exponentially increasing small perturbation law. The dimensionless governing equations have been solved analytically by using perturbation technique. The physical interpretation of the velocity, temperature, concentration profiles, coefficient of skin-friction, Nusselt number, Sherwood number etc. for the effect of various flow parameters entering into the problem such as Prandtl number, Radiation parameter, Magnetic field parameter, Soret number, Grashof number, solutal Grashof number, Schmidt number have been illustrated graphically. It is observed that increasing in S_0 (Soret number) and K (porosity) leads to rise in the values of velocity. Also it is found that with the increasing value of heat generation (Q), the temperature profile tends to decrease. These results may useful in natural sciences, engineering sciences and in industry.

Keywords: *Heat generation; Soret effect; MHD; Porous medium; Roseland Approximation; exothermic or endothermic chemical reaction.*

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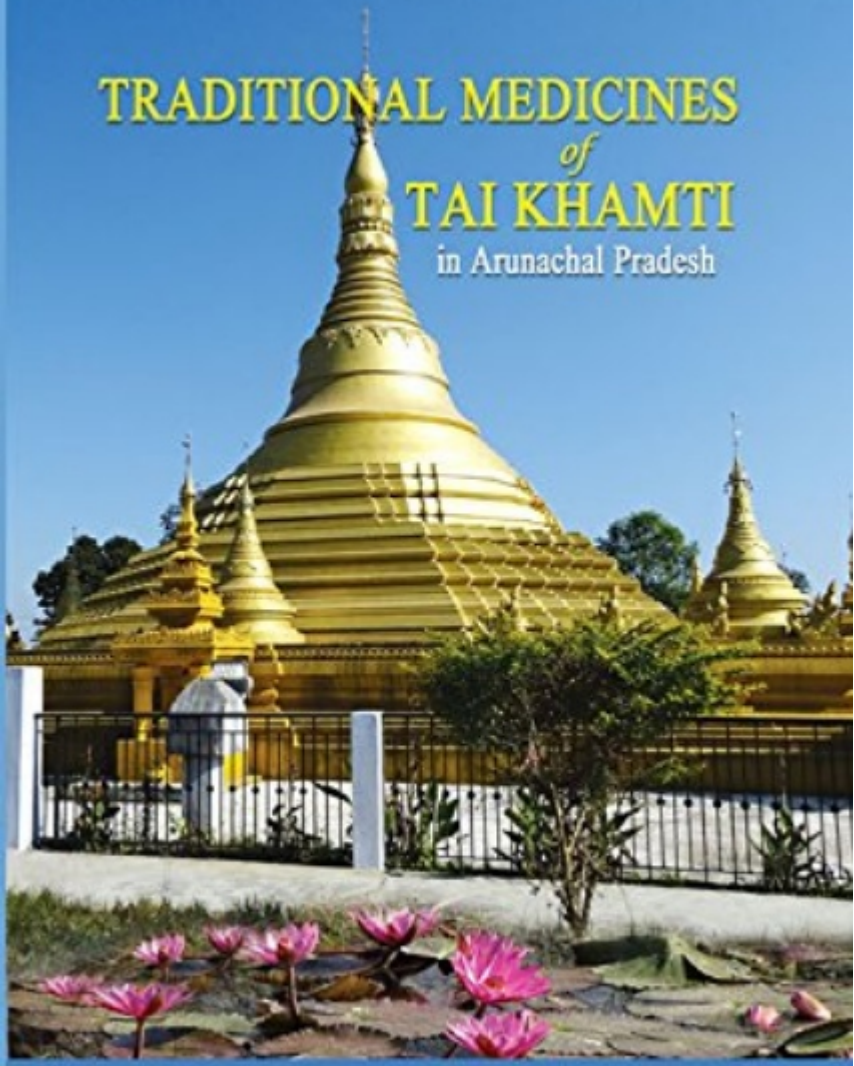

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FOOD PLANTS AS MEDICINE

Eternal panacea for human health

Hirendra Nath Sarma, Ph.D
Ajit Hazarika, Ph.D
Purbajyoti Saikia, Ph.D

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(कविता संग्रह)

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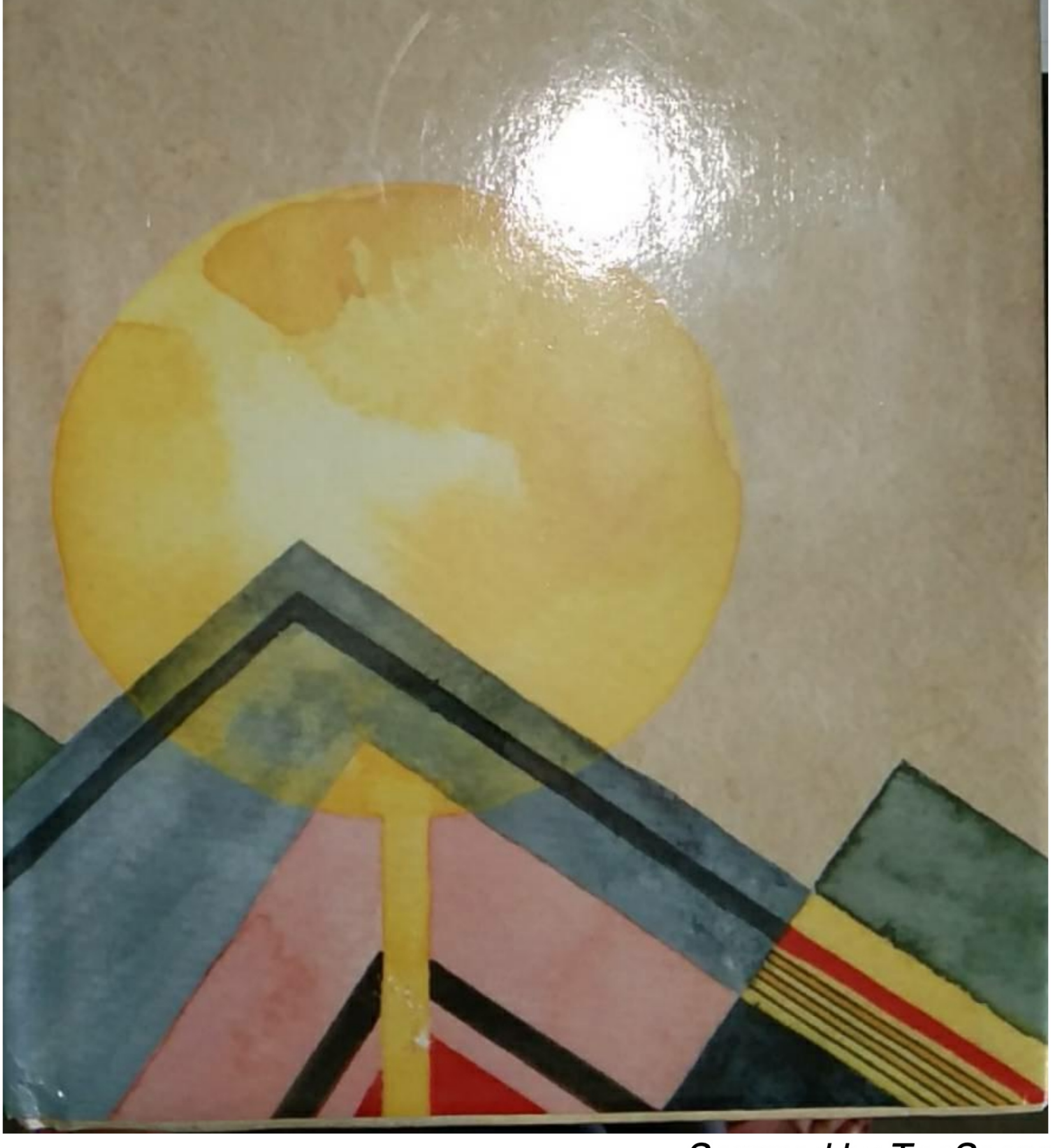

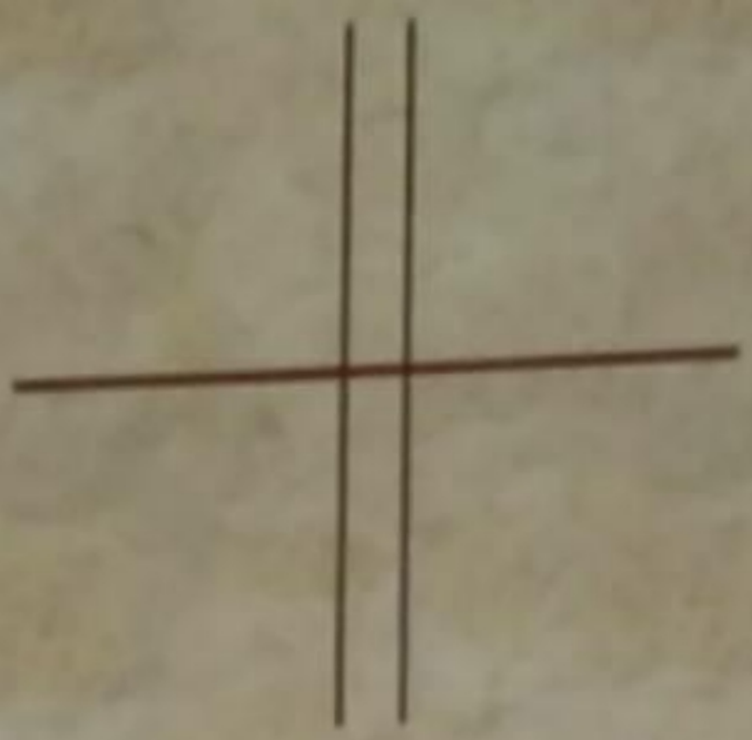

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तुम्हारा लेखन
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चंद शब्द

आखिर अपनी कविताओं का संग्रह लेकर 'फिर' पाठकों के बीच उपस्थित हो ही गई। 'फिर' क्योंकि अनेकों पत्रिका में छपी कविताओं के द्वारा मैं पाठकों के बीच पहले से ही मौजूद थी। लेकिन मेरे अनेक साहित्यिक मित्रों और आदरणीय श्री येशे दोर्जी थोंग्छी (साहित्य अकादमी से सम्मानित असमिया कथाकार एवं अरुणाचल प्रदेश लिटरेरी सोसायटी के अध्यक्ष) को यह लगता रहा कि मेरा कविता संग्रह बहुत पहले छप जाना चाहिए था।

अब लगता है जल्द न छपने के दो-एक कारण रहा जिनमें मुख्य है- मेरे लेखन में निरंतरता का अभाव। दरअसल, मेरी सृजन-प्रक्रिया बड़ी अजीबोगरीब है। कोई भाव या विचार और अनुभूति मेरे भीतर पकती रहती है, मैं उसे जीती रहती हूँ फिर एक माकूल समय देख वह अनुभूति अंततः मुझसे अपनी अभिव्यक्ति करा ही लेती है यानी मेरे लेखन में काफी अंतराल आ जाता है। और कभी-कभी होता यह है कि एकाएक कोई दृश्य या भाव मन को इतना आह्लादित करता है कि तुरंत उसे शब्दों का जामा पहनाकर कागज पर उड़ेल देने के बाद एक अद्भुत राहत महसूसती हूँ। इस तरह कभी एक दिन में ही तीन-चार कविताएँ लिखती हूँ तो कभी साल भर एक भी नहीं। मेरे लेखन में निरंतरता की सख्त कमी है। दूसरा कारण- मेरे लिए लिखना और छपना- ये दो अलग-अलग मोर्चे रहे हैं।

अब बात कविताओं की, प्राकृतिक सुषमा से भरपूर प्रदेश में जन्मी हूँ। अतः मेरी कविताओं में प्रकृति है और प्रकृति के लगभग सारे उपादान- ऊँचे पहाड़, नुकीले चट्टान, चौड़े पेड़, धूसर आसमान, जमता बर्फ, बारिश की बूँदें, बाँस का झुरमुट, गाती चिड़िया, रंगीन तितलियाँ, लहलहाते खेत,

अरुणाचल प्रदेश की [redacted] जनजाति पर केन्द्रित उपन्यास

लंगलांग फूलेल

अरुणाचल प्रदेश में 26 मुख्य जनजातीय (Tribal) समाज हैं जिनमें से निशी एक प्रमुख जनजाति है। निशी समाज में प्रचलित लोक कथाओं में एक प्रसिद्ध पुरखे तानी (पिता) को अनेक पत्नियां रखने वाले, प्रेमविहीन, बलात्कारी और आवारा व्यक्ति के रूप में चित्रित किया गया है जो अपनी असाधारण बल-बुद्धि का इस्तेमाल भी सिर्फ औरतें हासिल करने के लिए करता है। लेखिका ने तानी की इस छवि पर सवाल उठाया है। न सिर्फ सवाल उठाया है बल्कि उसकी मूल छवि और उससे जुड़े अन्य मिथकीय प्रसंगों को अपनी कल्पना से फिर से निर्मित करने का बीड़ा उठाया है। इसी का सुफल है यह उपन्यास - *जंगली फूल*।

भारत के जनजातीय समाजों में एक छोटे से शिक्षित बौद्धिक वर्ग द्वारा लिखे जा रहे आधुनिक साहित्य में *जंगली फूल* एक असाधारण कृति है। यह कृति न सिर्फ निशी जनजाति की ऐतिहासिक जीवन यात्रा और उसकी संस्कृति तथा समाज का एक प्रामाणिक अन्दरूनी चित्र प्रस्तुत करती है बल्कि पूर्वोत्तर की जनजातियों में प्रचलित कुछ अंधविश्वासों, विवेकहीन परम्पराओं, परस्पर युद्धों तथा स्त्रियों पर अत्याचार करने वाली प्रथाओं के खिलाफ संघर्ष करते हुए सुख-शांति से जीने वाले एक नए समाज का चित्र भी साकार करती है। लेखिका के प्रगतिशील मानवतावादी दृष्टिकोण ने इस उपन्यास के माध्यम से जनजातीय समाजों में एक नवजागरण लाने का प्रयास किया है।

प्रेम की महिमा का गुणगान करने वाले इस उपन्यास में कई शक्तिशाली स्त्री चरित्र हैं जिनकी नैसर्गिकता से प्रभावित हुए बिना हम नहीं रह सकते। स्त्री-पुरुष के बीच मित्रता के संबंध को अपना आदर्श घोषित करने वाली यह साहसिक कृति अपनी खूबसूरत और चमत्कारिक भाषा के कारण बेहद पठनीय बन गई है।

खुद एक निशी लेखिका द्वारा अपने निशी समाज का प्रामाणिक चित्रण और उसके सामाजिक रूपांतरण का क्रांतिकारी आह्वान जनजातियों में लिखे जा रहे साहित्य में इसे एक दुर्लभ कृति बनाता है।

— वीर भारत तलवार

जंगली फूल

जोराम यालाम

अनुज्ञा

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मुद्रक
अर्पित प्रिंटोग्राफर्स, दिल्ली-32

JANGLI PHOOL
A Novel based on Nishi Tribe of Arunachal Pradesh by Joram Yalam

प्रस्तावना

सुना है कभी तानी नाम का कोई फूल कहीं पर खिला था। लोगों की जुबान पर वह सिर्फ एक फूल है–रंगोंवाला फूल–रंगीन फूल–मानो उसमें कोई खुशबू ही नहीं थी। वह बहुत ही बदनाम फूल रहा! यहाँ तक कि उसे बलात्कारी तक कहा गया! कहते हैं, सम्भोग के लिए वह कुछ भी कर सकता था! अनगिनत पत्नियाँ रखीं उसने! प्रेम किसी से भी नहीं किया! वह गृहस्थी के लिए बना ही नहीं था! आवारा-सा कोई पैदा हुआ था! उसकी शक्ति और बुद्धि के चर्चे भी खूब रहे। उसने उसका इस्तेमाल भी औरतों के शरीरों को हासिल करने के लिए ही किया था! वह सिर्फ और सिर्फ अपना वंश बढ़ाना चाहता था!

सोचती हूँ कि क्या सच में वह इतना कायर, नीच, स्वार्थी और डरपोक था? अपने को बचाने के लिए वह इस हद तक जा सकता था? क्या वंश बढ़ा लेने मात्र से ही कोई अमर हो जाता है? कोई तो वजह रही होगी जिसके कारण आज तक लोग उसके नाम को भूल नहीं पाए हैं! कोई तो ऐसी वजह रही होगी जिसके चलते लोगों ने उसे 'पिता' कहा होगा। वरना उससे भी बड़े-बड़े भोगी आज भी हैं और हमेशा रहेंगे! वे कीड़े-मकोड़ों की तरह पैदा होते हैं और मर जाते हैं! भोग को उसने किस रूप में देखा होगा!! क्या उसने उसमें प्रेम को ढूँढ़ा होगा! क्या उसने प्रेम को सिर्फ और सिर्फ स्त्री-शरीर के ही रूप में जाना होगा?

मैंने उस फूल को अपनी दृष्टि से देखने की कोशिश की है! मेरी आँखें उसके सौन्दर्य को देखना चाहती थीं। उसकी खुशबू को ढूँढ़ना चाहती थीं! महसूस करना चाहती थीं। वह रंग जो आँखों में ही ठहरकर रह न जाए ... उसमें खुशबू थी! वह मुझमें उतरकर मुझको भी झूमने पर मजबूर कर दे! ऐसा हुआ भी। मैंने यहाँ कल्पनाओं की उड़ान भरने की कोशिश की है। मेरी कल्पनाएँ जहाँ तक पहुँच सकीं–वहाँ वह मुझसे मिले!

हमारी संस्कृति में गाँववाले आज भी गाकर अपने भावों की अभिव्यक्ति करते हैं। यह तब होता है, जब बातों अथवा वाक्यों से कहा न जाए। भावों के अतिरेक ही गीत बनकर फूट पड़ते हैं! मैंने भी इस कहानी में कई स्थानों पर उसी तरह के भावों का अनुभव किया है। वाक्यों से अभिव्यक्ति उस तरह नहीं हो पाती थी, जिस तरह मैं चाहती थी! यही वजह है कि कविता की काबिलियत न रखते हुए भी कविता की है। वे अपने-आप स्वतः फूट पड़ते थे। कविता के मर्मज्ञ मुझे प्रेम

सहित क्षमा करें! मैंने कहानी को कुछ इस ढंग से लिखा है–मानो पाठक पढ़ नहीं रहे, बल्कि मैं उनके सामने बैठकर स्वयं उनको कहानी सुना रही हूँ!

"जंगली" होने का अर्थ मेरे लिए इस प्रकार है–प्रकृति से जुड़ना। उनके साथ स्वयं को अभिन्न अंग जानकर चलना। फूलों के साथ जो मुस्कुरा सके। नदी की बहती लहरों का गान सुन सके। हृदय के अन्तरतम समुद्र से जो सूक्ष्म पुकार आती है–उसे सुन सके। सूरज की स्वर्णिम किरणों-सा बिखर सके। एक हाथ तारों को छूए और दूसरा ज़मीन को। पथरीले शिखरों पर बिखरी चुटकी-भर मिट्टी में भी उग-उग आना। क्षण भर खिलकर मर जाना। चाँद न छिटकाए चाँदनी, सूरज काली चादर ओढ़े सो जाए, जंगली फूल फिर भी खिलता और महकता रहता है। उन स्थानों पर भी खिलता है जिसकी कल्पना तक हम नहीं कर सकते। यह एक सतत यात्रा होती है। बिल्कुल नदी की तरह। नवीनतम चाल से चलने का साहस। भय का सामना करने का साहस। यही जंगलीपन है।

जंगल पक्षपाती नहीं होता। उसमें जो जीवन है, वह तटस्थ है! वहाँ खिलने वाले फूलों की अपनी ही मर्जी और मौज होती है! न मोह, न आसक्ति और न त्याग! सभी तरह के बन्धनों से मुक्त स्वतन्त्रता का नाम जंगल है! वह स्वतन्त्रता, जो परम अनुशासन से उत्पन्न होती है! मौत कदम से कदम मिलाकर चलती रहती है। सतर्कता का नाम जंगल है। चुनौती का नाम जंगल है। जो भटके हुए से लगते हैं, वही रास्ता ढूँढ़ सकते हैं। जंगल भटका सकता है लेकिन वही जिन्दा भी करता है। बचने का आनन्द भी उसी में है। तानी जंगली फूल था! तभी तो वह पिता कहलाया! तभी तो उसने प्रेम को जीया! कोई रुकावट, कोई नियम, कोई डर उसे रोक नहीं पाया। वह उग-उग आता था– हर परिस्थिति में। उगकर खिल जाना ही उसकी परम गति थी। उसके खिलने में जीवन था!

कहानी काल्पनिक है, लेकिन कुछ घटनाएँ और कुछ पात्रों के नाम उन कहानियों से हुबहू लिये हैं, जैसे प्रचलित 'तानी कहानियों' में मिलते हैं। यह उपन्यास मेरे खुराफाती मन की उपज है! सहृदय पाठक मुझे स्नेह सहित अवश्य क्षमा कर पाएँगे, यदि उन्होंने कोई कमी मेरे लेखन में देख ली होगी! ऐसा मुझे भरोसा है!

मैंने कुछ कहानियाँ लिखी हैं। याद नहीं पड़ता कि कभी कोई प्रेम कहानी लिखी हो, हालाँकि हर रचनात्मक चीज गहरे में प्रेम की ही अभिव्यक्ति है! एक लम्बी कहानी लिखना चाहती थी मैं–वह भी प्रेम की। मेरा वह चाहना मेरे खुद के लिए, खुद के प्रति एक वादा-सा बन गया! इसे प्रेम-कहानी कहना चाहिए या नहीं–मैं नहीं जानती। लेकिन अब चैन की साँस ले सकती हूँ! मैंने अपना वादा निभाया है!

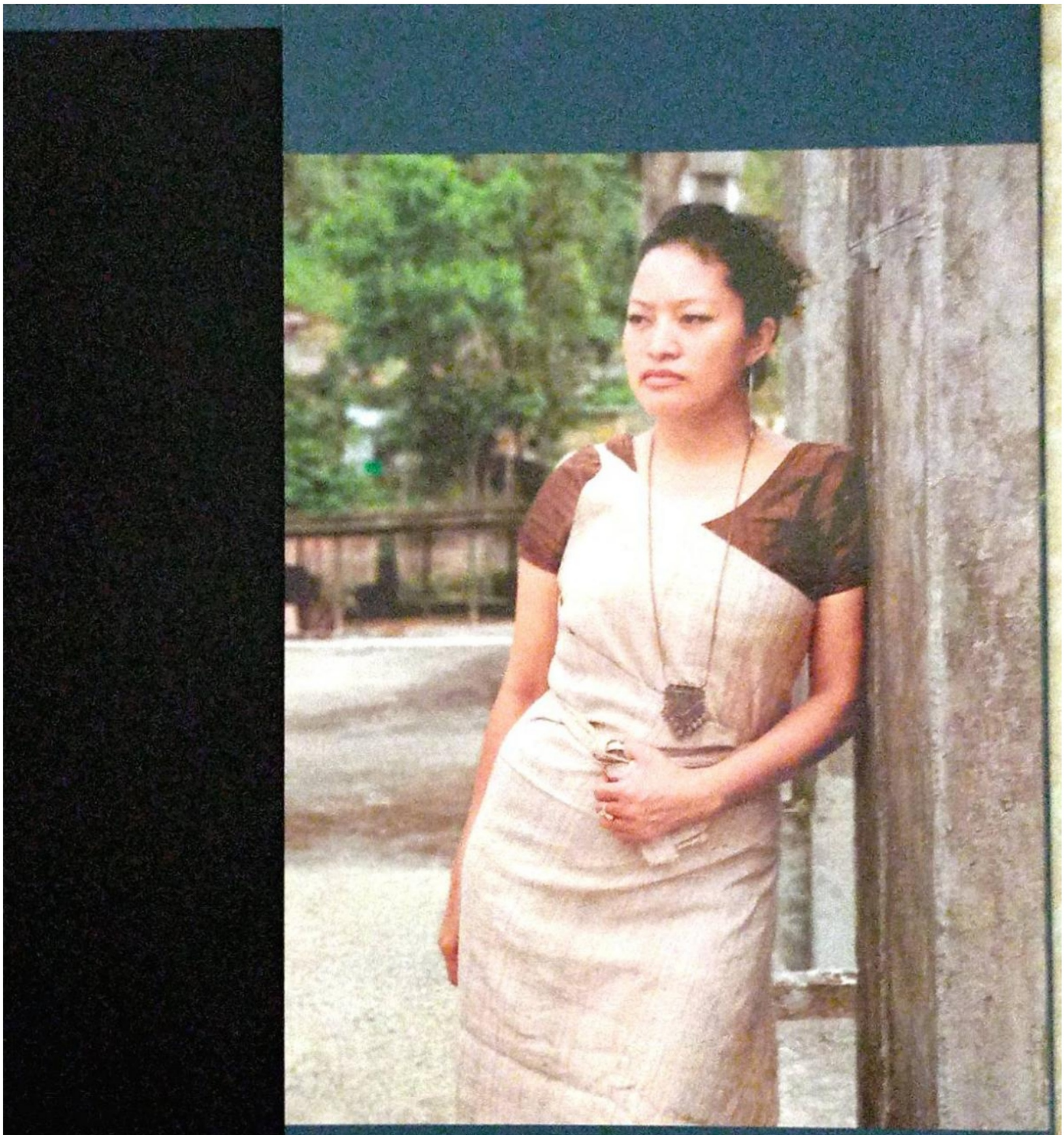
जो खुले हैं, खाली हैं आकाश की भाँति! किसी भी तरह के निर्णयात्मक

विचारों, पूर्वाग्रहों और अनुमान से परे हैं! जो प्रेम के प्रेमी हैं–वे बाँहें फैलाए इस कहानी का स्वागत करेंगे! आओ मिलते हैं वहाँ, उस झील के किनारे! देखते हैं अपनी ही आँखों से उन्हें ...रंगों की टोली बना-बनाकर तितलियाँ नाचती हैं यहाँ!

तारों भरी रातों में। कभी अमावस्या की रातों में। कभी बारिश में। कभी गर्मियों की उमस भरी दोपहर में। इन अक्षरों को मैंने तिनका-तिनका जोड़ा है!

मैं इन्द्रधनुष बुनूँ, तुम आकाश तैयार रखना
रंगों की ओट लिये आऊँ, तुम बाँहें खोले रखना
लो वादा निभाया मैंने, तुम हृदय खोले रखना
बारिश को चुना था मैंने, और वसन्त तुम रख लेना
मुड़-मुड़ कर देखना मुझको, दिल लोहे का न ले आना
सीने से लगाकर मुझको, तुम धड़कन अपनी सुनाना।

यालाम



अरुणाचल प्रदेश की लोवर-सुबानसिरी जिले के जोराम गाँव में, पाँच मार्च को जन्मी। वर्तमान में राजीव गांधी विश्वविद्यालय के हिंदी विभाग में सहायक प्रोफेसर के तौर पर कार्यरत है। पीएच. डी. की उपाधि भी इसी विश्वविद्यालय से प्राप्त की। 2012 में ''साक्षी है पीपल'' नामक कहानी संग्रह आया जिसमें 9 लम्बी कहानियाँ हैं। 2014 में एक और कहानी संग्रह ''तानी मोमेन'' (लोक कथाएँ) आया। अब पहली बार उपन्यास लेखन में उतरी हैं। ''जंगली फूल'' यालाम का पहला उपन्यास है।

"जंगली" होने का अर्थ मेरे लिए इस प्रकार है—प्रकृति से जुड़ना। उनके साथ स्वयं को अभिन्न अंग जानकर चलना। फूलों के साथ जो मुस्कुरा सके। नदी की बहती लहरों का गान सुन सके। हृदय के अन्तरतम समन्दर से जो सूक्ष्म पुकार आती है—उसे सुन सके। सूरज की स्वर्णिम किरणों-सा बिखर सके। एक हाथ तारों को छूए और दूसरा ज़मीन को। पथरीले शिखरों पर बिखरी चुटकी भर मिट्टी में भी उग-उग आना। क्षण भर खिलकर मर जाना। चाँद न छिटकाए चांदनी, सूरज काली चादर ओढ़े सो जाए, जंगली फूल फिर भी खिलता और महकता रहता है। उन स्थानों पर भी खिलता है जिसकी कल्पना तक हम नहीं कर सकते। यह एक सतत यात्रा होती है। बिल्कुल नदी की तरह। नवीनतम चाल से चलने का साहस। भय का सामना करने का साहस। यही जंगलीपन है।

जंगल पक्षपाती नहीं होता। उसमें जो जीवन है, वह तटस्थ है! वहाँ खिलने वाले फूलों की अपनी ही मर्जी और मौज होती है! न मोह, न आसक्ति और न त्याग! सभी तरह के बन्धनों से मुक्त स्वतन्त्रता का नाम जंगल है! वह स्वतन्त्रता, जो परम अनुशासन से उत्पन्न होती है! मौत कदम से कदम मिलाकर चलती रहती है। सतर्कता का नाम जंगल है। चुनौती का नाम जंगल है। जो भटके हुए से लगते हैं, वही रास्ता ढूँढ सकते हैं। जंगल भटका सकता है। लेकिन वही जिंदा भी करता है। बचने का आनंद भी उसी में है। तानी जंगली फूल था! तभी तो वह पिता कहलाया! तभी तो उसने प्रेम को जीया! कोई रुकावट, कोई नियम, कोई डर उसे रोक नहीं पाया। वह उग-उग आता था— हर परिस्थिति में। उग कर खिल जाना ही उसकी परम गति थी। उसके खिलने में जीवन था!

इसी पुस्तक से...

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Babujyoti Ghosh
Maila Lama

Introduction

Tourism is generally defined as traveling for leisure, enjoyment and recreation. Tourism development in any destination depends on attractions, availability of facilities such as provision of accommodation, transportation and entertainment. Sustainable tourism includes optimum use of resources, including biological diversity; minimization of ecological, cultural and social impacts; and maximization of benefits for conservation and local communities. It also refers to the management structures that are needed for tourism (Salvo and Giulieo, 2003). There are basically three pillars of sustainable tourism-environmental sustainability, socio-cultural sustainability and economical sustainability. Environmental sustainability is the preservation of natural resources and environment for future generation. The socio-cultural sustainability indicates the minimisation of negative socio-cultural impact of tourist arrival on the host area. Economic sustainability indicates the economic benefits of local community from the tourism sector. Sustainable tourism can be attained by involving the local people in the tourism sector. As economic benefits tourism creates additional employment opportunities ranging from low wage-jobs to high-wage jobs in various management and technical fields like food service, accommodation, entertainment, transportation and travel arrangers etc. which consequently generate income and increase the standard of living of the people.

Top of ForBottom of ForTop of ForBottom of FormAssam which is the gateway to North East India is highly rich in tourism attractions. The State is having fascinating natural beauty with green tea gardens, pilgrimage places, diverse tribes and ethnic groups with varied culture and festivals, place of various historical monuments etc. During 2013-14 the growth rate of foreign tourist arrival to Assam was 22.11% and growth rate of domestic tourist arrival was 3.03%. The revenue earned during 2006-07 was 81.30 lakhs which increase to 184.49 lakhs during 2011-12. The number of both domestic and foreign tourists stays in tourist lodges increased from 20878 in 2006-07 to 27135 in 2011-12. The number of both domestic and foreign tourists stays in other

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AGRICULTURAL PRODUCTIVITY AND FARM EFFICIENCY IN THE HILLS OF NORTH EAST INDIA: A CASE STUDY OF ARUNACHAL PRADESH

Maila Lama[a]

Abstract: *North Eastern Region of India is predominantly an agricultural based economy. Agriculture is the main stay of vast majority of people of the region. However, agricultural productivity is relatively low in the region. Arunachal Pradesh, one of the eight States of the region, is dominant in agricultural activities. In this State, agriculture is the main source of livelihood of majority of its people. Though the contribution of agriculture in GSDP has declined to less the 20 per cent, it still accounts for around 60 per cent of employment. The State is having very limited arable land owing to hilly and mountainous topography. Hence, there is a need to improve productivity to raise income of farmers and promote rural development. In this background, the paper attempts to assess the trend and growth of production and productivity of different crops as well as to analyse the farm efficiency in production of crops in hill agriculture. The analysis of secondary data revealed that in 2009-10*

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Quantification of H_2, CH_4 and CO using neural network and micor gas sensors

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Abstract— Neural network based pattern recognition is used for the evaluation of gas sensor responses. Six Zinc Oxide (ZnO) nanorods and ZnO-SnO_2 based sensors was fabricated by simple solvent method. The sensors are exposed with controlled concentration of methane (CH_4) and hydrogen (H_2) and carbon mono-oxide (CO) gas and sensor data are collected using *I-V* measurements. Feed forward back propagation neural network was then used for the classification of the gas at critical concentrations. Network optimization considering performance, architecture and iteration time etc. were performed.

Keywords—Back Propagation Neural Network ; ZnO Sensor, ZnO-SnO_2 sensor; Pattern recognition

I. INTRODUCTION

Qualitative and quantitative detection of flammable and toxic gases like hydrogen, methane and carbon mono-oxide in coal mines, petroleum industries and gas storage plants are of great importance for the safely of workers, health hazards and to avoid risk of accidental explosion. H_2 is a colorless, odorless and highly explosive gas having flammability in the range (4-75)% in air[1]. In coal mines presence of methane is always expected, which has caused loss of life the most than any other gas. Methane in the range (5–14)% in air is flammable[1]. CO is also a colorless and tasteless gas which is believed to be the most dangerous gas in mine. CO in the range (12.5–74)% is flammable & explosive [1].

The oxide based semiconductor sensors have been widely used for detection of toxic, hazardous and combustible gases because of the possible advantages like high sensitivity to small concentration of gases, low fabrication cost, long term stability and potential to provide extremely small and low power consuming sensor. Both ZnO and SnO_2 is n-type wide band semiconductor which have attracted remarkable attention as highly sensitive sensor material. These material were exposed to be superior material for sensing gases like H_2 [2-3], CO [4-5], and CH_4 [5-6]. In spite of the high response, metal oxide based sensor presents lake of selectivity which hinders their commercial application. In addition to this metal oxide sensors fails when they are used to discriminate a mixture of gas.

Many authors have suggested various ways to overcome the problem of cross-sensitivity to achieve selective sensor which may include, a) addition of noble catalytic metal to promote the reaction to specific gas [7], b) operating the sensor in dynamic mode [8], c) surface modification [9]and d) use of multi-compositional sensing film [10-11]. However, extremely selective sensors are very expansive and operating the sensor in dynamic mode makes the measurement system complex. A potentially more cost effective way to perform such measurement is to use a sensor array coupled with a pattern classification system [12-14].

Various pattern analysis methods like Principle component analysis (PCA) [15], partial least square analysis (PLS) [16], and artificial neural network (ANN) [17] etc with gas sensor array can be used for the classification problem. However, when quantification or multi-component mixture classifications have to be performed artificial neural networks are reported to provide superior performance compared to other recognition methods [18]. Multilayer perceptron (MLP) and radial basis function (RBF) are the two commonly used neural network algorithms used for pattern recognition. However, the neuron connectivity in RBF is comparatively lower than MPL. This is the reason why the mean square error of a RBF network is less compared to a MLP one having the same number of neurons. Therefore the parameters for tuning the network are higher in MLP. Many authors have reported the successful utilization of ANN in many applications including pattern classification, identification, decision making etc. Multilayer perceptron (MLP) neural network have been used by S. Joo et. al. in to identify breast nodule malignancy using sonographic images [19]. P. Lv et al.

reported the about the detection of low concentration of formaldehyde in binary gas mixtures using micro gas sensor array and a neural network [20]. D. Lee et al reported about a combustible gas recognition system including sensor array and neural network based pattern recognition [21].

Accordingly, in the current work highly sensitive sensors consisting of two different types of sensing films (ZnO and ZnO-SnO2) was fabricated. The sensors were then used to recognize gases like hydrogen, methane and carbon mono-oxide in different concentration ranges based on multilayer neural network with back propagation learning algorithm.

II. EXPERIMENTAL DETAILS

A. Sensor fabrication

Sensors used for the gas recognition system were fabricated on silicon substrate using a simple chemical method. Summary of the sensor type and their operating conditions is given in table I. For the preparation of pure ZnO and composite ZnO-SnO_2 based sensors, separate sols are prepared with polyvinyl (PVA) as capping agent. Sol for pure ZnO is prepared by mixing 0.6 g of zinc acetate dihydrate [$Zn(CH_3COO)_2.2H_2O$] with aqueous solution of PVA under constant stirring. The 1.0

TABLE I: SENSOR TYPE AND OPERATING TEMPERATURE

Sensor	Sensing material	Operating Temperature (°C)
S1	ZnO	150
S2		200
S3		250
S4	ZnO-SnO_2	150
S5		200
S6		250

molar NaOH solutions was then mixed drop wise to the above solution until a pH value reached 7-8. The solution was then stirred at 80°*C* for 1 h. Sol for ZnO-SnO_2 sensor is prepared by mixing appropriate amount of Acetate Dehydrate ($Zn(CH_3COO)_2.\ 2H_2O$) and stannic chloride ($SnCl_4.5H_2O$) with polyvinyl alcohol (PVA). 1 Molar sodium hydroxide (NaOH) solution was used as reducing agent until pH of the solution becomes neutral. The final solution was stirred at 110-120 °C for one hour. Finally, the resulting precursors were spin-casted on the cleaned <100> oriented Si/SiO_2 substrates followed by annealing at 700°*C* for 30min in a tube furnace. Detailed study on the morphology and sensing behavior of the sensor is reported elsewhere [22].

B. Measurement Technique

The sensor is designed to operate in a resistive mode and figure 1(a) shows a model of the sensor measuring circuit. The resistance variation of the sensor is converted in to voltage output by the measurement circuit. A schematic of the custom made sensor measurement setup is shown in figure 1(b). Measurements were done by varying the test gas (H_2, CH_4 & CO) concentration and operating conditions, as well. The sensor was placed inside an enclosed test chamber with heating arrangement that would maintain a uniform temperature environment (with an accuracy of ± 3°C) inside the chamber. A known amount of ultra high pure test gas diluted with dry air is fed to the sensor through Alicat® mass flow controllers (MFC). An electrometer (Agilent U1253B) was used to monitor the variation of sensor resistance.

III. PATTERN RECOGNITION

Artificial neural network approaches are classified among artificial intelligence systems, because of their ability to learn and generalize information. Multi layer percentron (MLP) is the most popular architecture for practical applications of neural network. MPL with nonlinear transfer function, like sigmoid function, allow the network to learn any input –output relationships adjusting the weights and bias in the network by a gradient descent technique known as back propagation of errors. At each stage in the training process, the MLP processes all of its inputs in a feed-forward fashion, compares the resulting outputs with the desired ones and back-propagates these errors to adjust each weight in the network according to its contribution to the overall error.

The MLP neural network was applied to process the data arising from the sensors to study the feasibility of recognizing

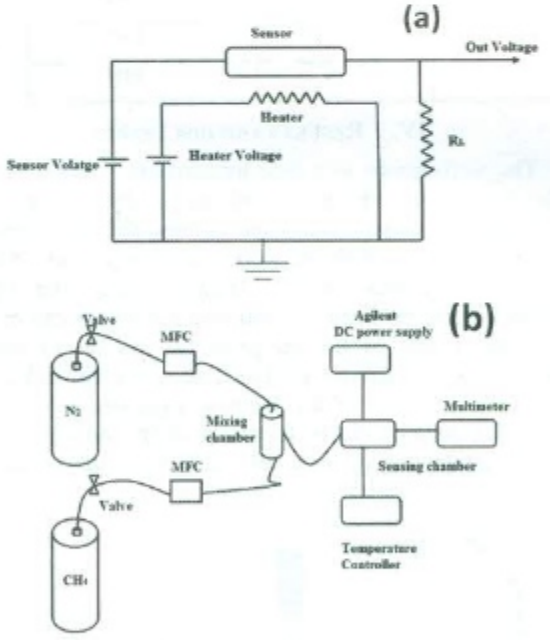

Figure 1: Schematic of the a) model circuit diagram b) sensor setup

and quantifying a particular gas. The network had six input node equal to the number of sensors, 2 hidden layers with 10 and 11 neurons in the hidden layer 1 and 2 respectively and 4 output nodes corresponding to a specific concentration of a specific gas as shown in Table II. Sigmoid function is used as the activation function for the hidden and the output neurons. The network is initialized with random weights and bias and the network training is performed using supervised back

propagation learning algorithm. During training the weights and biases of the network are iteratively adjusted to minimize the network performance function. The default performance function for feed-forward networks is mean square error (mse), the average squared error between the network outputs and the target outputs and is defined as,

$$MSE = \frac{1}{N}\sum_{i=1}^{N}(Ti - Yi)^2$$

Where T is the target and Y is the network output.

TABLE II: TEST GAS AND SENSOR'S DESIGNATED OUTPUT

Test gas	Concentration (%)	Designated output
H_2	0.1	0000
	0.3	0001
	0.5	0010
	1	0011
CH_4	0.1	0100
	0.3	0101
	0.5	0110
	1	0111
CO	0.1	1000
	0.3	1001
	0.5	1010
	1	1011

IV. RESULTS AND DISCUSSION

The performance of a feed forward MLP neural network depends on various factors like the complexity of the problem, the number of data points in the training set, the number of weights and biases in the network, the error goal etc. So it is very difficult to decide the best training function for a given problem. However, Feed forward neural network can provide reasonable output if trained property. Several of training algorithms is available for feed forward neural network and an appropriate selection of the training algorithm is important. Figure 2 compares the performance of the network trained with eleven training style, namely, BFG, Conjugate Gradient

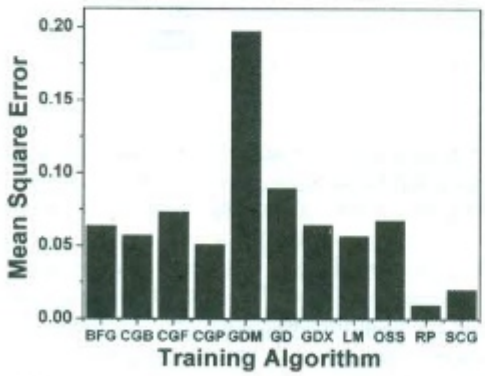

Figure 2: Training algorithm versus MSE

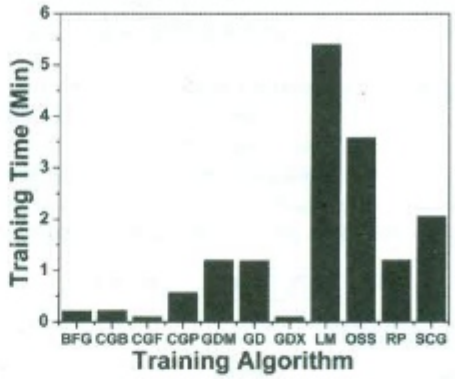

Figure 3: comparision of training time

with Powell/Beale Restarts (CGB), Fletcher-Powell Conjugate Gradient (CGF), Polak-Ribiére Conjugate Gradient (CGP), Gradient Descent with Momentum (GDM), Gradient Descent (GD), Gradient descent w/momentum & adaptive (GDX), Levenberg-Marquardt (LM), One Step Secant (OSS), Resilient Backpropagation (RP) and Scaled Conjugate Gradient (SCG). As seen from the comparison chart the mean square error for Resilient Backpropagation training algorithm is the minimum. A comparison of the training time of different algorithm is shown in figure 3.

Optimization of the number of nodes in the two hidden layers in order to achieve best network performance is performed using RP training function. Figure 4 plots the mean square error of the network with varied number of nodes in the hidden layer 1 and 2 respectively. Minimum MSE of 0.005 is achieved for the network with 10 and 11 nodes in the hidden layer 1 and 2 respectively.

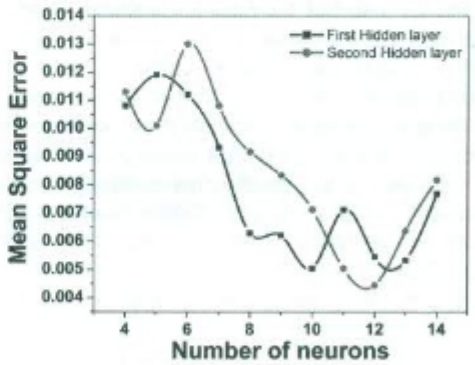

Figure 4:Optimization of hidden neuron

V. CONCLUSION

Using the array of six, moderately selective, ZnO and SnO_2 based sensors, the employed pattern recognition methods allow us to construct the simple pattern classifier, which is able to recognize and classify hydrogen, methane and carbon

oxide gas samples. Multi layer perceptron is used for gas recognition architecture. The result shows that multilayer neural network is very efficient in quantitative recognition of gas pattern. Optimum achievable MSE with the designed network was 0.005.

REFERENCES

[1] http://www.mathesongas.com/pdfs/products/Lower-%28LEL%29-&-Upper-%28UEL%29-Explosive- Limits-.pdf

[2] O. Lupan, V.V. Ursaki, G. Chai, L. Chow, G.A. Emelchenko, I.M. Tiginyanu, A.N. Gruzintsev, A.N. Redkin "Selective hydrogen gas nanosensor using individual ZnO nanowire with fast response at room temperature", Sensors and Actuators B 144 Issue 1(2010) 56–66

[3] Salim F. Bamsaoud, S.B. Rane, R.N. Karekar, R.C. Aiyer, "Nano particulate SnO_2 based resistive films as a hydrogen and acetone vapour sensor", Sensors and Actuators B 153 (2011) 382–391

[4] Shoou-Jinn Chang, Ting-Jen Hsueh, I-Cherng Chen, Bohr-Ran Huang," Highly sensitive ZnO nanowire CO sensors with the adsorption of Au nanoparticles ", Nanotechnology 19 (2008) 175502

[5] Mark A. Andio, Paul N. Browning, Patricia A. Morris, Sheikh A. Akbar, "Comparision of Gas sensor performance of SnO_2 nano-structures on microhotplate platform", Sensors and Actuators B 165 (2012) 13-18

[6] P. Bhattacharyya, P.K. Basu, B. Mondal, H. Saha, A low power MEMS gas sensor based on nanocrystalline ZnO thin films for sensing methane, Microelectronics Reliability 48 (2008) 1772–1779

[7] Wantae Lim, J. S. Wright, B. P. Gila, S. J. Pearton, F. Ren, Wei-Ta Lai, Li-Chyong Chen, Ming-Shien Hu, KueiHsien Chen, "" Selective-hydrogen sensing at room temperature with Pt-caoted InN nanobelts", Applied Physics Letters, 93, 202109, 2008

[8] W Maziarz and T Pisarkiewicz "Gas sensors in a dynamic operation mode" Meas. Sci. Technol. 19 (2008) 05520.

[9] P.K. Basu, S.K. Jana, H. Saha, S. Basu, Low temperature methane sensing by electrochemically grown and surface modified ZnO thin films, Sens. Actuators B 135 (2008) 81-88.

[10] Xiaofeng Song, Zhaojie Wang, Yongben Liu, CeWang, Lijuan Li, "A highly sensitive ethanol sensor based on mesoporous ZnO–SnO2 nanofibers", Nanotechnology 20 (2009) 075501

[11] Hyung-Sik Woo, Chan Woong Na, Il-Doo Kim, Jong-Heun Lee, "Highly sensitive and selective trimethylamine sensor using one-dimensional ZnO–Cr2O3 hetero-nanostructures", Nanotechnology 23 (2012) 245501

[12] V. Di Lecce, A. Amato, R. Dario and C. Martines, "Air quality control for health care centres. The application of an Intelligent Distributed System", 2009 IEEE Workshop on Environmental, Energy, and Structural Monitoring Systems. EESMS 2009 Crema (Italy). pp. 27-30.

[13] Concina et al., "Early detection of microbial contamination in processed tomatoes by electronic nose", Food Control, Vol. 20, Issue 10, pp. 873-880, October 2009.

[14] R. F. Machado et al. "Detection of Lung Cancer by Sensor Array Analyses of Exhaled Breath", American Journal of Respiratory and Critical Care Medicine Vol 171. pp. 1286- 1291, 2005.

[15] Julian W.GARDNER, "Detection of Vapours and Odours from a Multisensor Array Using Pattern Recognition Part Principal Component and Cluster Analysis", *Sensors and Actuators B, 4 (1991)* 109-115.

[16] Matthew Barker and William Rayens, "Partial least squares for discrimination", *J. Chemometrics* 2003;17:166-173.

[17] Dae-Sik Lee, Sang-Woo Ban, Minho Lee, and Duk-Dong Lee, " Micro Gas Sensor Array With Neural Network for Recognizing Combustible Leakage Gases", IEEE nSENSOR JOURNAL, VOL. 5, NO. 3, JUNE 2005.

[18] I Sayago, M del C Horrillo, S Baluk, M Aleixandre, M Jesus Fernández, L Arés, M García, J P Santos, and J Gutiérrez, Detection of Toxic Gases by a Tin Oxide Multisensor, IEEE Sensors Journal, Vol. 2, No. 5, October 2005.

[19] S. Joo, W. K. Moon, and H. C. Kim, "Computer-aidied diagnosis of solid breast nodules on ultrasound with digital image processing and artificial neural network," in Proceedings of the 26th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC '04), pp. 1397–1400, September 2004.

[20] Pin Lv, Zhennan Tang, Guangfen Wei, Jun Yu, Zhenhxing Huang, "Recognizing indoor formaldehyde in binary gas mixtures with a micro gas sensor array and a neural network", Meas. Sci. Technol. 18 (2007) 1997-3004.

[21] Dae-Sik Lee, Sang-Woo Minho Lee, Duk-Dong Lee, "Micor Gas Sensor Array With Neural Network for Recognizing Combustible Leakage Gases", IEEE Sensors Journal Vol 5, No. 3, June 2005.

[22] B. Mondal, C. Roychaudhury, J. Das, H. Saha, "Enhanced hydrogen sensitivity and selectivity of ZnO-SnO_2 based sensor", Communicated to INDICON 2013, 13-15 December , IIT Bombay, Mumbai, India.

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ATUL SARMA

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'Crisis' in the Tea Sector: A Study of Assam Tea Gardens*

I. Introduction

The tea industry in India is said to be facing a severe crisis, particularly after the disintegration of the Soviet Union, the largest importer of Indian tea. However, over the past decade, domestic consumption of tea has increased at a faster rate than production—at a steady rate of around 15 to 20 million kgs annually. The steady increase in domestic demand and the inability of the tea sector to enhance production has resulted in a decline in tea exports. India's share in global export of tea has declined drastically in the recent period. The decision of the government to allow cheaper tea imports from Bangladesh and Sri Lanka, according to tea producers, has only deepened the crisis (Bhowmik, 2002). However, the fall in the price of tea was observed in India as well as in other tea producing countries (Kumar et al., 2008).

Several recent studies and reports have reported the growing labour unrest and worsening living conditions of labourers in the tea gardens (Misra, 2002; Khawas, 2006). While low labour productivity is frequently cited as the main reason behind the crisis faced by the sector[1], other variables such as inability to expand the area under cultivation, ageing of the tea-bushes[2], inadequate replanting of bushes, inadequate investments in plant modernization and labour welfare measures[3], and traditional, cost-ineffective management practices have also contributed towards the near-stagnation of production (Sivaram, 2000; Bhowmik, 2002).

This chapter attempts to analyse the trends in production and employment in the tea sector in India at a disaggregated level. The

* Jointly with Deepak K. Mishra, Vandana Upadhyay. Published in the *Indian Economic Journal*, Vol. 56(3), October-December, 2008.

focus is on Assam, one of the significant producers of tea in India.[4] While much of the discussion on the impact of globalization on tea sector revolves around trends in tea auction prices and exports, the present study looks at the post-reform changes in production and labour use in the tea-producing districts of Assam. In Section II the trends of tea production in India and in Assam has been discussed. The growth performance of the tea sector in terms of growth of area, production, and yield has been discussed at a disaggregated level. In the following section the trends in labour-use and employment has been discussed. Trends in the growth of labour productivity and employment elasticity in different districts have also been discussed in this section. Summary of findings and concluding remarks have been placed in the final section.

II. Growth of Tea Production in India and Assam

There has been a phenomenal growth of tea gardens in India, particularly since the 1990s, mainly due to increase in the number of small tea growers in various states such as Assam, Himachal Pradesh, Tamil Nadu and Kerala.[5] Tea production in India, which started during the colonial period, expanded rapidly since 1870. The British East India Company and later the colonial government supported the expansion of the tea plantations in Assam and elsewhere through a series of legislative and institutional support (Behal and Mohapatra, 1992; Dasgupta, 1992; Siddique, 1995). During this period, there was a steady growth in area under tea plantation; there were many improvements in the technology of tea production; significant gains in productivity were also achieved, although there were periods of crises because of war and political instability (Karmakar and Banerjee, 2005).

During the post-independence decades, area, production and yield of tea have registered a steady increase. Taking a three-yearly moving average, it is found that production and yield have suffered a serious setback since 1998, although the area under tea has expanded due to increase in small tea gardens (Figure 1). The growth performance of tea in India comes out in clearer terms, when the variations in growth performance among decades are taken into account. While for the entire period of 1950-2004, growth rate of production has been close to 2.4 per cent, area has expanded at a rate of less than one per cent per annum. Thus, the major contribution to growth in production has come from rise in productivity. It is important to note that the highest increase in

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The role of Digital Library in the field of Music Education: challenges and prospects

Ashok Barman

Introduction

Hindustani classical music has possesses a glorious history throughout the ages. Our music education system came through a various changes from Gurushiya Parampara to Asramik education, Asramik to Gharana system, Gharana to an Institutional and now Institution to Digital or online education system. With the changing of time the nature of music education system is change thus in the modern age the online education system make a prime role with digital library. Now the world came to under an umbrella with online teaching and learning. The prime aim of online classes is to reach the maximum section of society across the globe to save time and money from going to schools situated far way places. It also maintains time flexibility in time schedule for both the teachers and the students.

Over the course of years digital media has had a huge impact on Indian classical music in general and on classical music education in particular. Digital media may be describing as digitized content that can be transmitted over the internet or computer network. This can include text audio Video and Graphics. With the arrival of internet, the spectrum of digital media has taken a huge leap forward. This has lead to the birth of various online portals, audio books Website blogs etc., that have in depth description of various Indian scales and compositions. One can now appreciate and learn by watching various performances and clips of past legends with just click on the computer screen.

It is now possible to have a lesson with your teacher, even if you

are in different states or even countries. This kind of scaling of distance has only become possible with the help of Internet and digital technology. The aspects of creation/performance, preservation and propagation of music have a new meaning in the realm of digital technology, which offers yet another possibility that was hitherto unheard of that is the ability to create a virtual space in which music can be heard, exchange, learned and thought.

In music education system with the digital library is different from the other subjects of education. Music education caring practical and theoretical contents. Theoretical contends avail with the books, journals, manuscripts, theses and magazines etc. and Practical contend stand with audio CD, DVD Cassettes of performances by the eminent artist.

The importance of library with CD and DVD helps the students to understand a form with different angle and with a perspective such as if we take a raga from verity of musical maestros like: Raga Yaman sung by ustad Badegulam ali Khanshav, Pandit Bhimshen Joshiji, Pandit Jasraj ji. Ustad Rashid Khan ,Pandit Ajoy Chakrabarty etc. all rendering the same raga with same notes but the imagination, test, the colour and the beauty of the raga is totally different with each other. Hindustani classical music is not a lesson thorough the recitation or composition of a songs; this is a lesson only taken through the oral tradition from a proper Guru or Guide. The Digital library with CD DVD will helpful for the research scholar's students and Music lovers in this regards.

Now our Indian education society emphasise upon the research on Music and performing arts because these are the subjects which are the only medium to identify and protect our culture and National Identity. In this regard we must appreciate Sodh ganga and Sodh Gangotri where we can easily download and upload Theses and research proposals of various Universities with in a click.

All India Radio Archive are also plays an important role for Digital music education. The legendary maestro's recordings can be easily available through the archive in different field of Music i.e. Karnatic, Hindustani, Percussion, String Instrument etc.

In Guwahati University website there is a sincere effort for digitally preserving the lyrics of Dr. Bhupen Hazarika's songs in UNICODE format.356 (Three hundred and fifty six) Lyrics have been collected and digitally formatted in UNICODE format. The lyrics have been collected from different sources including Books, Magazines, Write-ups, Newspapers, and Internet etc.Thus we can protect and Preserve Dr. Bhupen Hazarikas compositions and songs, which is not possible by making Samadhisetras.

Conclusion:

The number of music lovers and learners has been increasing with the time. However today the time and distance are the main challenges for the music aspirants in attending the music schools. Information and communication Technology has suggested a solution of offering music education on distance mode .Several private institution have come up with their own models. Ali Akbar College of Music, Sankar Mahadevan Academy and Srutinandan by Pandit Ajoy Chakraborty are the Known Examples, There are YouTube channels and Websites dedicated to teaching learning music. There is a need to evaluate such individual's effort and come up with a uniform framework in order to standardize on line music coaching

Music

* http://www.itcsra.org/Performance-Research
* www.hrithik.net
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* www.indiagaana.com
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References:

1. http://bhupenhazarikadigitalarchive.org/songs-with-A-lyricso%20aami%20tejaal%20gawaliya.htm
2. http://www.itcsra.org/Performance-Research
3. http://allindiaradio.gov.in/Information/ListenersCorner/Pages/default.aspx
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The Mode of Examination at Higher Education to UG Level in the Field of Music Education-Challenges and Prospects

Ashok Barman

Introduction:

Music is the best art form among all the Fine Arts. It is protected culture and identity of our Nation. With Changing of time the nature of Talim (education) is changed to Gurushya Parampara to institution. After Independence music education is being introduced in school, college nd universities for its upliftment. In the field of Music teaching, learning and examination process is traditional way i.e Sina ba Sina (Face to face) though it came to institution from Gurushya parampara. Our Music education and its examination system was first introduced by the inception of Pandit V N Bhatkhandey and V D Palushkar in 19th century.

Music Education and Examination Reforms:

Education is the only media which helps a man to make a complete human being. The old traditional music system of India was Ashram Centric which laid by the instruction of one teacher (Guru) which is called Guru shisya Parampara (traditional education). The present system of education is institutional but the goal of both systems is same, to build up a complete human being and music has made a prime role regarding this matter.

Music subject bearing Practical and Theoretical aspects for Examination which has an equal value. In Practical field of examination, students used to demonstrate any composition or Raga with a viva for its technical aspects. Through this practical demonstration mode of examination students not only obey the technical rules but also express their talents and emotions of their respective Arts. In theoretical examination the students have to write down the theoretical perspective to their specific field of Art. The Under Graduate level is the very important

Periodisation of History

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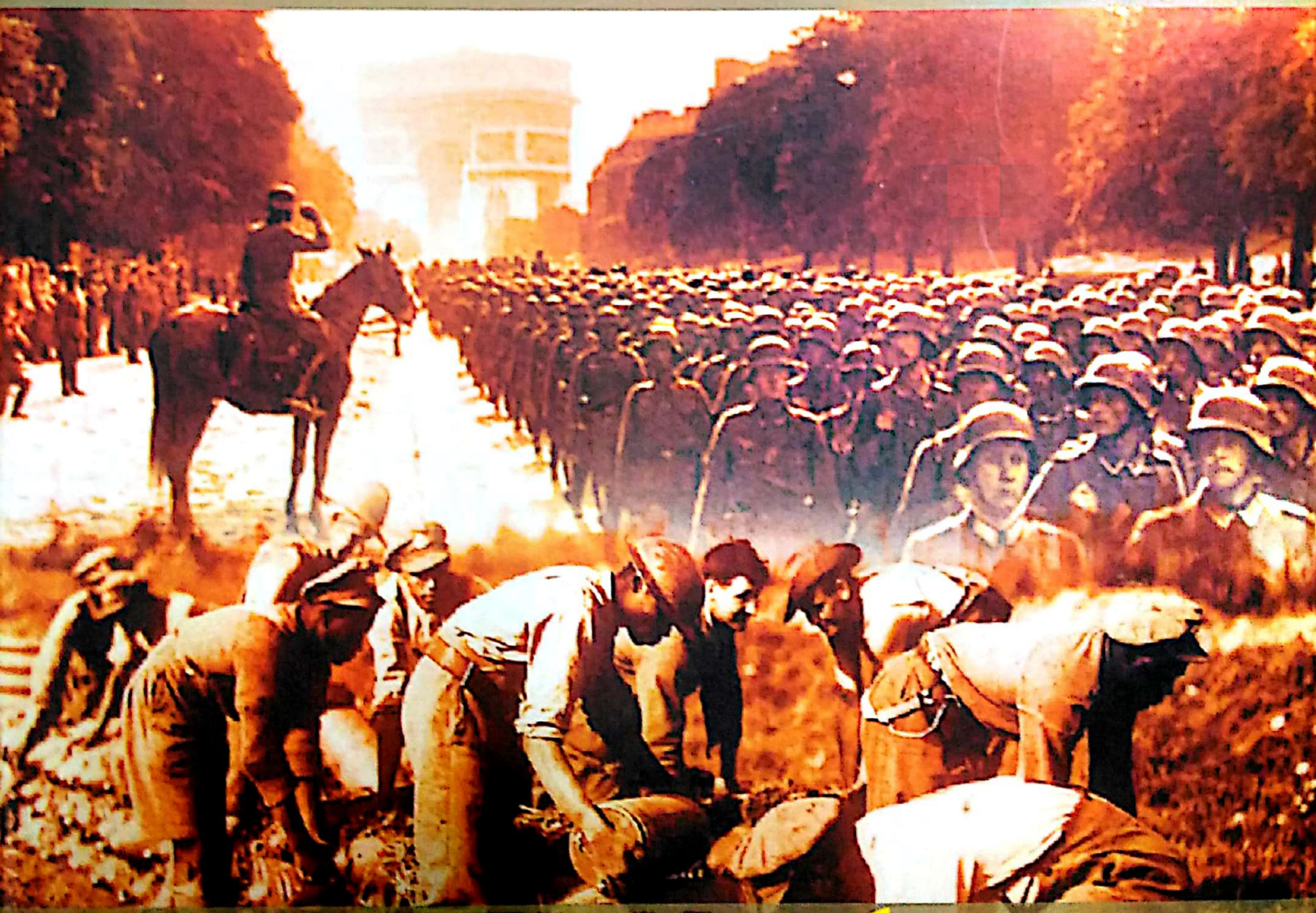

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STRING OF THOUGHTS ON NORTH EAST INDIA

An Economist's Perspectives

ATUL SARMA

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Atul Sarma

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Growth Experiences of the North Eastern States: Post-Reform Period*

Introduction

The economic reform process that had begun since 1991 and the Government of India's North East policy that followed gave rise to the following paradox. In the year 1993-94, three states of the North Eastern region[1], namely Arunachal Pradesh, Nagaland and Mizoram had real per capita income above the all-India average. In 2005-06, none of the North Eastern states had real per capita income above the national average (Table 2). However, the gap is narrowing in the states of Arunachal, Manipur, Nagaland and, Tripura, while widening in Meghalaya, Mizoram and Assam in recent times.Thus, over time the region is diverging away from the national average in terms of share innational income as the largest state of the region, Assam with a population share of 70 per cent of the region was experiencing a low growth rate in real per capita income of 0.22 per cent in 1993-99 and 3.74 per cent in 1999-2006, in contrast to the national growth of 4.58 and 5.44 per cent in the respective periods.

Paradoxically, during the same period, the North Eastern region received special economic packages.[2] In October 1996 H.D. Deve Gowda, the then Prime Minister announced an economic package of Rs. 6,100 crore for specific projects in North Eastern states. He also introduced the North East sub plans in all central ministries for which 10 per cent of their budgets would be earmarked. Mr. I.K. Gujaral who followed him as Prime Minister

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* Jointly with Sushanta Nayak, Professor of Economics, Rajiv Gandhi University.

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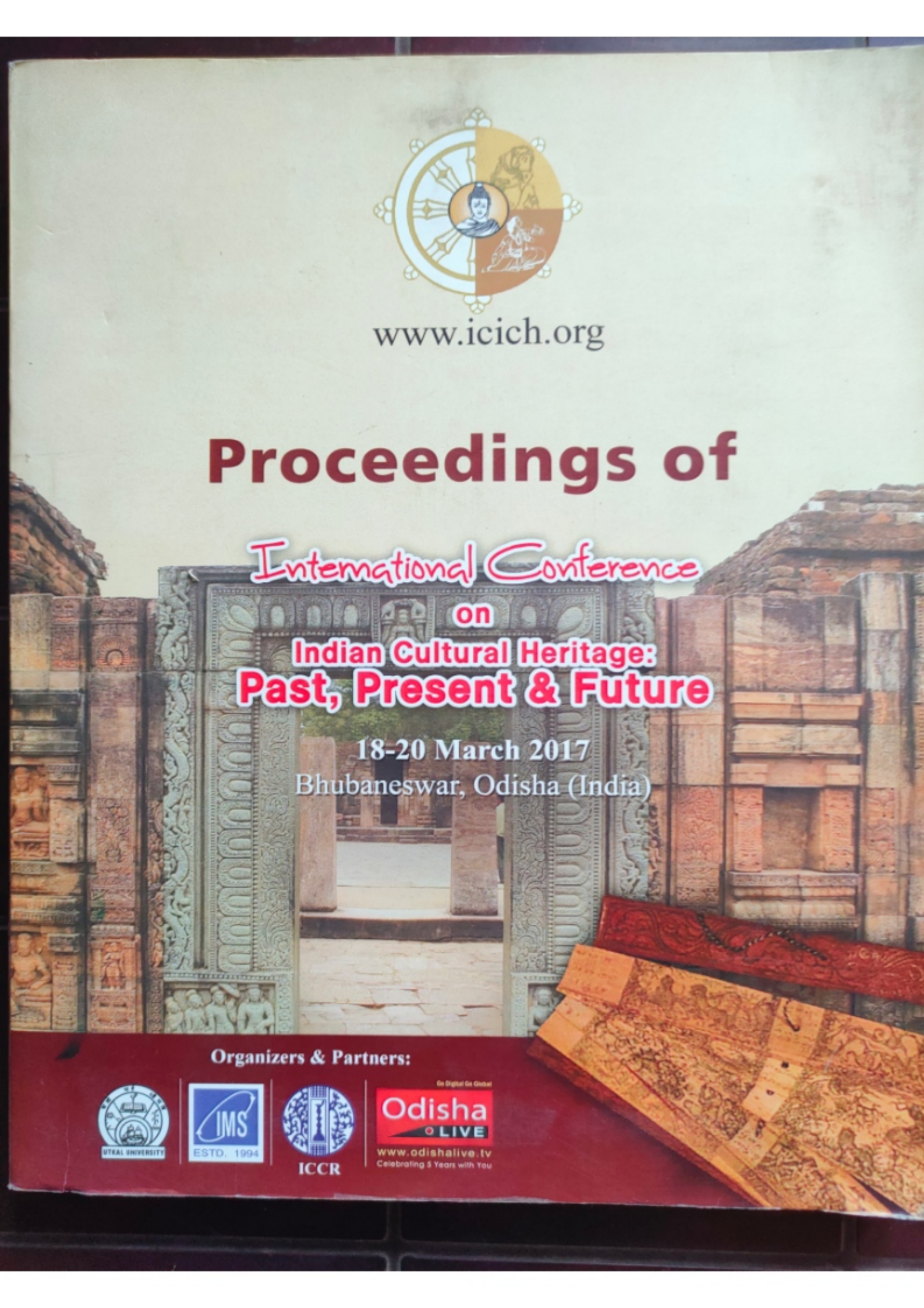

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Globalisation and Acculturation: Arunachal Pradesh at the Crossroad

Dr. Prasanta Kumar Nayak

Associate Professor, Department of History, Indira Gandhi Government College, TEZU, Arunachal Pradesh

Abstract : Globalisation has overpowered other essentials in the mainstream-life of every individual across the world. Temporal compressions, spatial transformation, assaults on older industrial units, a vast media renaissance making their headway deeper into the cultural homogeneity of nations have compelled the globe to undergo the process of acculturation. States as inclusive-units of the nation go diasporic to elite engagements with claims of 'globalisation and acculturation'. Indigeneity reels into macro-social homogenization. Culture gets syncretized which leads to neoculturation **(Ortiz 1995: 102-103)**. Reluctance, resistance, revulsion, restraint and dissent are assimilated under its spell. Contexts themselves go more global through their interconnection with world. Plural construction of international concepts replaces the global mosaic of different distinct practices **(Mosquera 2010: 47-48)**.

Cultural appropriation passes through exchange, dominance, exploitation, and transculturation. It posits culture as a relational phenomenon constituted by acts of appropriation, not an entity that merely participates in appropriation **(Rogers 2006: 474-503)**. Acculturation encourages transition from one culture to another. It signifies the natural tendency of people to resolve conflicts rather than exacerbating them. Often, history shows, the process of co-existence begins with hostilities and soon a resolution takes off within the same ethnic community. Where acculturation impacts ethnicity and ethnic issues, the term "ethnoconvergence" goes vocal to render it globality. 'Liquid Modernity' (**Bauman 2000: 113**) hence takes a deeper inroad. David Li (cited in **Baral 2006: 3**) argues 'globalisation' as 'commodification and consumption that either universalises desires or particularises traditions leaving an individual to defend for himself through inevitable mediation of multiple agencies and issues'. The ethnicity, tribal indigenous identities and cultural homogeneity are marginalised under the concept of a 'global village' ensuring a 'mainstream presencing' (**Barthakur 2006: 8**).

Lehman's inference on Homogenization and Cosmopolitanism (cited in **Boro 2006: 14**) on 'global go' vs local culture holds relevant here. 'Global go' either eliminates local elements or incorporates them without acknowledging them, setting the go for acculturation. Here a situation arises where the global and the local overlap and the discursive articulation of difference between the self and the other becomes ultimately an article of transculturation. And so far as the tribes of Northeast are concerned, globalisation has made a deeper encroachment on their traditional culture and life style that have so far been consolidated mostly on the premise of ethnic insularity. Arunachal Pradesh stands no exception to it. It is against such a backdrop that this paper has come up examining the dialectics of globalisation and acculturation and how Arunachal Pradesh has to deal itself between.

II. Arunachal Pradesh as Backdrop

Portraying a unique indigenous cultural mosaic of its own with 64.2 percent tribes abreast consisting of around 25 major tribes and a number of sub-tribes scattered over 5258 villages (**2011 Census**), Arunachal Pradesh has greatly borne the threat of globalisation. Racially, linguistically and ethnically, the tribes sport differences and alienation in terms of Inner Line towards the outer world. Different communities are to different lore, legends, myths and culture. Diversity protrudes through their costumes, rituals, religious practices, fairs, festivals, dances and political institutions even within the same geopolitical area. From pre-modern to modern to postmodern to global spectrum their societies have undergone seismic changes. And hence there has been an increasing trend of cultural fusion affecting the core societal fabrics.

More the fusion merrier is the chance of acculturalisation. In the absence of commonalities there can be no assimilation and hence no process of acculturalisation too. If it becomes, it then becomes an issue of subordination of lesser by the stronger force being inexorably pulled towards globalisation stripped

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Developing Corporate Image Through Increased Transparency and Trust: Financial Disclosure in Indian SMEs

Tenzing Norbu, Arindam Chakrabarty** & Manmohan Mall****

Abstract

*The landscape of business throughout the globe, be it large or small, essentially depends on the trust, confidence and loyalty of its customer. The trust deficit acts as an auto immune syndrome that swallows its product, image and reputation. In the knowledge driven economy, transparency has become one of the most favorable instruments for growth and customer retention (**Jacobson,** 2018). In the long run, the trusted customer would to be associated with the firm in letters and spirits. It is difficult for the firm to hide information on long-term perspective since the era is dominated by database management system. So, the firm whether it is small or medium enterprise need to reinforce on increased financial disclosure so that the loyal customer and other stakeholder become an integral part of both success and failure episodes in the continuum of firm's existence. This paper would attempt to understand the gravity of financial disclosure in Indian SMEs and to what extent it helps to grow, consolidate and retain its loyal customer base. This paper would also trigger on the efficacy and reliability of the firm with improved culture of financial disclosure particularly in Indian context. Besides, the paper would also address the burning issues of financial scams, spongy firms and chip fund issues recently sabotaged in Indian economy. The outcome of this paper would figure to ascertain the impetus of financial disclosure to develop corporate image and sustainability of the firm.*

Keywords: *Financial Disclosure, Transparency, SMEs, Corporate Image and Sustainability.*

Introduction

Any economic activity is always full of risk and uncertainty (Alchian, 1950; Knight; 2012; Greenspan, 2004). The investors, be it large or small, shareholders and other stakeholders essentially repose trust and confidence so that it succeeds. If the organization or business entity appears to be highly transparent before all the stakeholders, it essentially multiplies the extent of trust and confidence towards the firm (Tapscott & Ticoll, 2003). Everyone associated with the firm or business activity feels privileged and honoured to be part and parcel of such entity irrespective of it ventures profit or loss. Otherwise, so long the firm generates high return, people invest in the portfolios for higher

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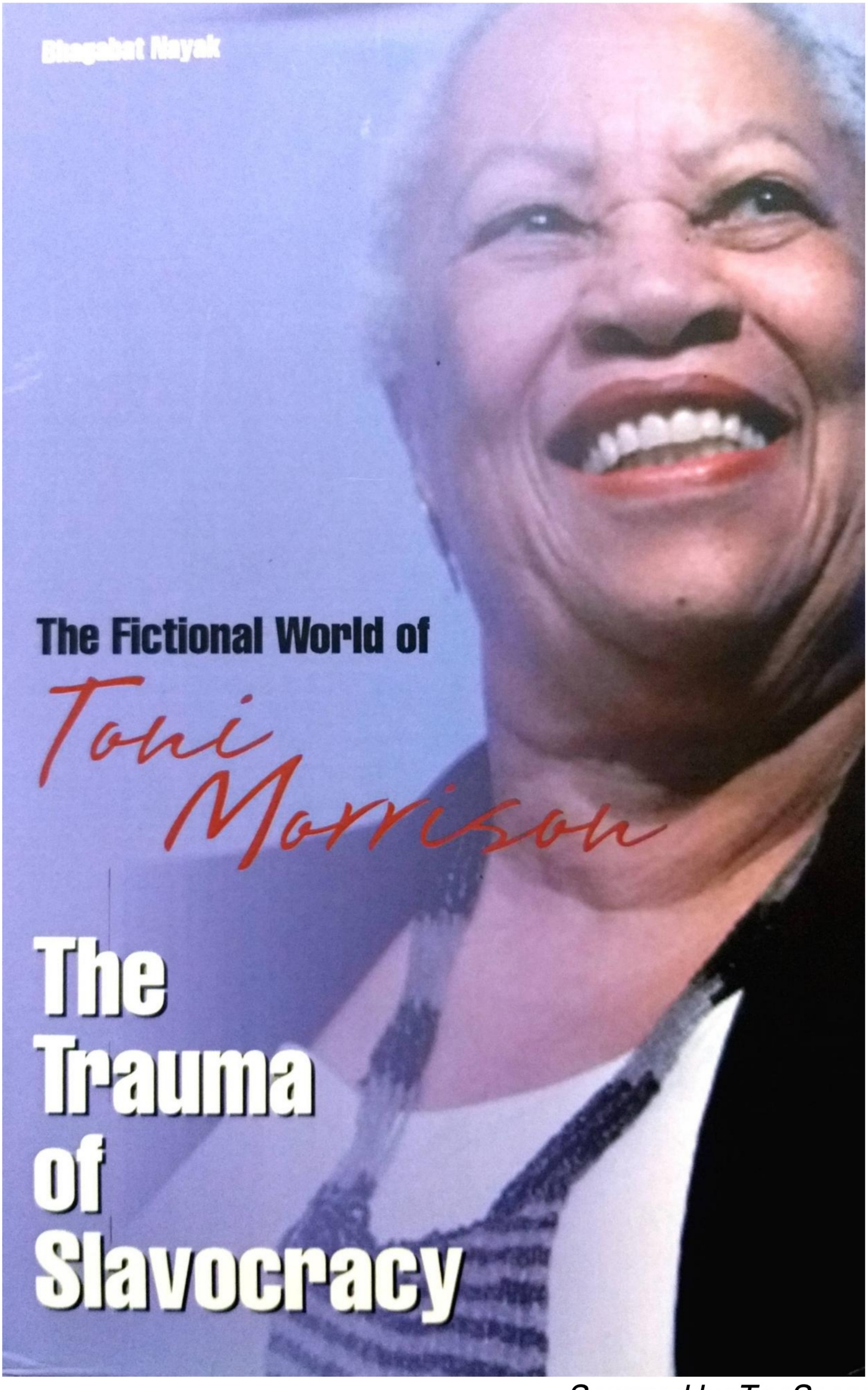

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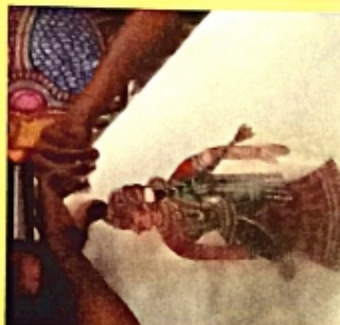

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Tagin

Ashan Riddi and Kepor Mara

Introduction

Tagin is one of the major tribes of Arunachal Pradesh, which is a member of the larger designation of the Tani Tribes. Majority of the Tagin population is concentrated in Upper Subansiri district and some in the adjoining parts of West Siang and Tibet. According to some available literature in books and articles, the name *Tagin* seem to have first given by the Tibetan traders. However, the term is used by the Tagin people to refer to themselves.

Geographical Demography

The region inhabited by the Tagins has a diverse terrain, extending from an altitude of 1,000 feet to 18,000 feet above sea level. The Tagin inhabited area is approximately 15,000 square kilometres bordering with Nyishi and Galo inhabited areas in the west and the east respectively. In the north, it is bounded by Tibet. The area lies approximately between 27.45´N and 28´N latitudes and 93.13´E and 96.36´E longitudes. The temperature varies with altitudes. High altitude places like Taksing experience very cold weather during winter with snowfalls and low altitude places like Daporijo witness high temperature during summer. The entire area is intersected by river Singit (Subansiri) and its tributaries. The region is rich in flora and fauna and mineral resources, such as limestone and dolomite.

The Tagin Society

The Clan System

The main element of the Tagin society is the *Abu* ('clan') organisation. The Tagin society consists of a number of the clans like Leyu, Tamin, Tani-Tator, Tamu Tadu, Tacha-Tagia, Romching, etc. Each clan traces its descent from one common ancestor after few generations from Abu-Tani. During social occasions or gatherings and religious functions, the Tagins identify themselves by the name of the clan and introduce themselves as such and the priest addresses the individual and family by the clan name.

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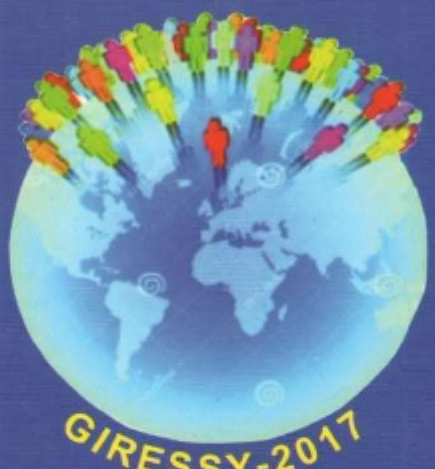

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YOUTH SPORT: STRESS AND ANXIETY, COACH-PARENT RELATIONSHIPS

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Rajiv Gandhi University, Arunachal Pradesh

ABSTRACT

This paper examines the "youth sports: stress and anxiety, coach –parent relationship". When people think of applied sport psychology, they usually think of elite athletes and how to improve athletic performance. This is certainly the focus of sport psychology, however, when you consider that there are millions of children between the ages of six and eighteen, you see the tremendous potential for human enrichment and development. Studies show that the number one reason children give for participating in youth sports is "to have fun." Competition gives the youth sport participants an opportunity to put all of their training and hard work to the test. A parent comes to define his own sense of self-worth in terms of the success and failure of his son or daughter. When this happens, the parent becomes a "winner" or a "loser" through his young athlete. The guiding principle for a coach-parent relationship is good communication, and that it is two way street.

Keywords: *Anxiety, Stress, College students.*

INTRODUCTION

Youth Sport

When people think of applied sport psychology, they usually think of elite athletes and how to improve athletic performance. This is certainly the focus of sport psychology, however, when you consider that there are millions of children between the ages of six and eighteen, you see the tremendous potential for human enrichment and development. If every child who participated in sport emerged within creased self-confidence, greater perceived ability, increased intrinsic motivation, and greater self-esteem, the world and society would certainly be better for it. Unfortunately, many youth who would like to participate in organized sport programs are unable to do so because of limited resources. This lecture is dedicated to the important topic of youth sport. We will be looking at the benefits of youth sports, reasons children participate or withdraw from sports, potential

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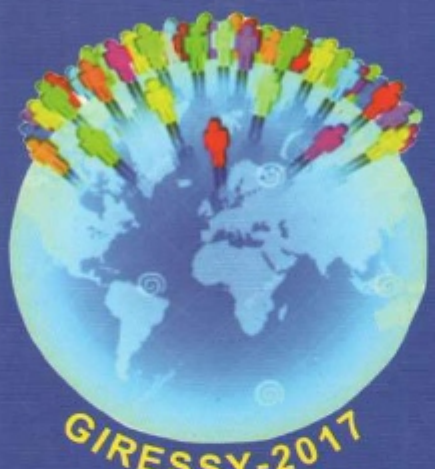

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THE RELATIONSHIP BETWEEN ANXIETY AND PERFORMANCE: A COGNITIVE-BEHAVIORAL PERSPECTIVE

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Assistant Professor
Dept. of Physical Education
Rajiv Gandhi University, Arunachal Pradesh

ABSTRACT

This paper examines the relationship between anxiety and performance from a cognitive behavioral perspective. Previous research in the field has suggested that the majority of consultations conducted by sport psychologists are related to anxiety. Included is a discussion on the theoretical underpinnings of anxiety and how it relates to performance. Research conducted on the relationship between anxiety and performance is also discussed. A review of the cognitive-behavioral treatments that have been used for anxiety reduction and performance enhancement within the field of athletics is included. Suggestions for future research and practical considerations are listed in the conclusion.

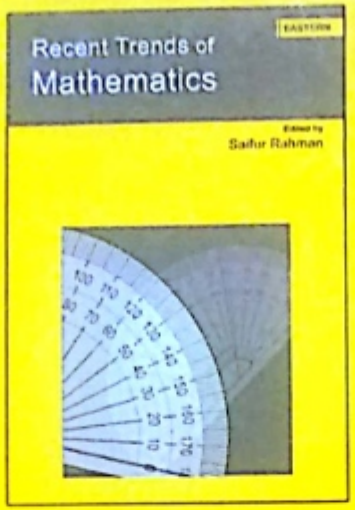
Keywords: *Anxiety, Depression, Stress, college students, preventive measures.*

INTRODUCTION

Student represents the society's investment for future. Their mental health and wellbeing are important not only in its own right but also as a factor contributing to the larger society's wellbeing. College students frequently have more complex problems today than they did over decade ago common stressors in college include greater academic demands, being on your own in a new environment, changes in family relations, changes in social life, exposure to new people ideas and temptations.

Some of the salient problems specific to college students are, time pressure, fear of failure, struggle to establish identity, pressure of academic excellence and tough competence. Emotional problems such as Feel inferior to others, not able to think properly, worrying too much, feel life is not worth living. Feel anxious without any apparent reason

Meaning of Stressful to Under Graduates



The Book

This book comprises some selected research articles that are presented in the 2nd National Conference on Recent Trends of Mathematics and its Applications held in the Department of Mathematics, Rajiv Gandhi University on 6th and 7th November, 2015. The objective of the conference was to build a bridge between traditional mathematical techniques and recently developed mathematical techniques which may help the present scientific community to transfer the ideas from old to new. This book presents both traditional Mathematics and its recent trends of applications *such as in Theoretical Computer science, Mathematical physics, Neural Networking, Computational Biology etc.*

The Editor

Dr. Saifur Rahman, M. Sc., M. Tech., Ph. D. is an assistant professor in Mathematics at Rajiv Gandhi University (A Central University) who received his M. Sc. and Ph. D. degrees from the Gauhati University, and M. Tech. in computational seismology from the Tezpur University. Prior to Rajiv Gandhi University, he worked as an assistant professor in Mathematics at Arya Vidyapeeth College, Guwahati. He has awarded with joint CSIR-UGC JRF and GATE fellowship. He has more than eight years of experience in teaching and research, and published one book and several research articles in some internationally recognized journals.

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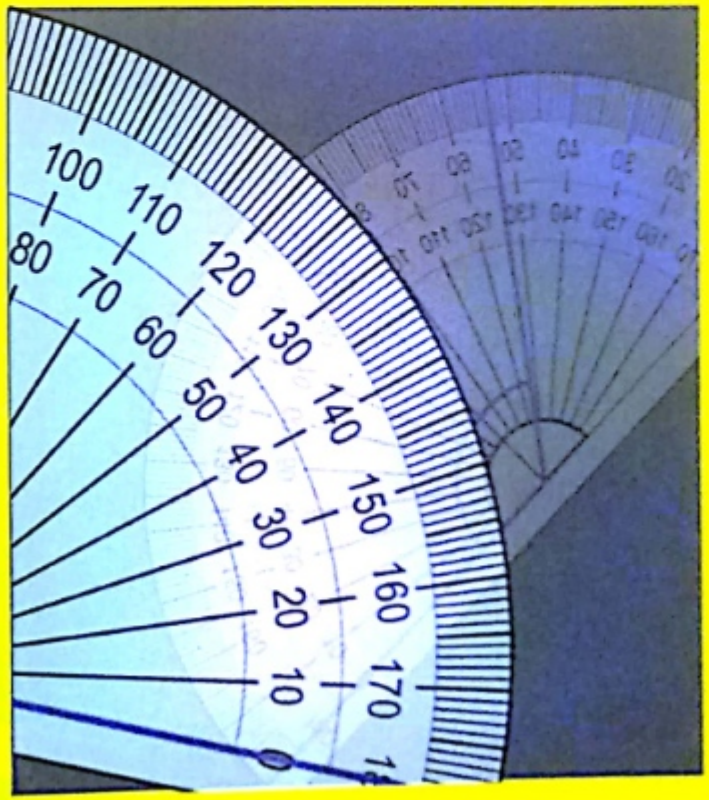

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Arunachal Pradesh, India

FOREWORD

I am extremely glad to know that the Department of Mathematics, Rajiv Gandhi University organized the Second National Conference on '**Recent Trends of Mathematics and its Applications**' on 6-7 November 2015 (RTMA-2015) and now publishing the Conference proceedings with ISBN number.

I congratulate the esteemed colleagues of the department for organizing this sequel of national conference and bringing together mathematicians, academicians and scientists from all over the country whose contributions are going to be published in this volume. Their participation in the conference facilitated our scholars to share the results of their research and in solving some of the problems. The present century is the age of skill-development and innovations. We need to create sustainable and knowledge-based economy where the role of universities will become ever more challenging. We shall have to be competitive in to-day's world economy. The young generation with mathematical knowledge should be precise in their thoughts and approach. There should be well planned mathematics popularization and outreach programmes for young students and teachers in the interior areas of the state.

I am confident that our dynamic scholars would make significant contributions in the arena of teaching and research in mathematics and to promote overall economic development of the people of the region and the nation as a whole.

(Prof. Tamo Mibang)

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3

Some Aspects of Intuitionistic Fuzzy Ideals of Fully Idempotent and Weakly Regular Semirings

Apil Uddin Ahmed
Saifur Rahman

Abstract

In this paper, we define intuitionistic fuzzy idempotent, prime and strongly irreducible ideals on a semiring, and investigate some properties of such ideals. We show that all intuitionistic fuzzy ideals are idempotent in a fully idempotent semirings, and right weakly regular semirings. We also establish that for a fully idempotent semirings an intuitionistic fuzzy ideals is prime if and only if it is strongly irreducible.

Keywords: *Intuitionistic fuzzy idempotent ideals; Intuitionistic fuzzy prime ideals, Intuitionistic fuzzy strongly irreducible ideals; fully idempotent semirings, weakly regular semirings.*

Introduction

There are many concepts of algebras generalizing an associative ring$(R, +, .)$, some of them, in particular, the several kinds of semiring have been found useful for solving problems in different areas of mathematical sciences. Since the structure of a semiring provides an algebraic framework for modeling, and studying the key factors in these areas. They play an important role in studying graph theory, fuzzy computation, automata and formal language theory, analysis of computer program, coding theory and so on. The notion of semiring was first introduced by Vandiver [26] in the year 1935. In the year 1950, Brown and Mc

coy [9] introduced the weakly regular semiring. Ahsan and khan [6] introduced the fully idempotent semiring, Javed Ashan [7] introduced the fully idempotent semirings. Later Ramamurthy [20], Camillo and Xiao [10] investigate these rings. These studies motivate us to further on these types of structures on fuzzy setting.

Fuzzy set theory which has the tolerant of imprecision, uncertainty, partial truth, and approximation was introduced by Zadeh in the year 1965. After the introduction of fuzzy sets [27], its immense applications in various fields like algebra, analysis, computer science, optimization and decision making, neural networking, coding theory etc. are remarkable. Later, in the year 1983[2], Atanassov introduced the intuitionistic fuzzy set which has more tolerance of imprecision, uncertainty, partial truth, and approximation over fuzzy sets. While fuzzy set deals with the degree of membership of an element in a given set, intuitionistic fuzzy sets give both degree of membership and degree of non-membership. In the year 1994, Dutta and Biswas [11] introduced the fuzzy prime ideals, and fuzzy k-ideals of semiring. Kuroki [16] was given some properties of fuzzy ideals, and Ghosh [13] introduced the fuzzy k-ideals of semiring. Wang-Jin Lice introduced, and developed basic properties concerning the notions of fuzzy sub-ring as well as fuzzy ideals of a ring. The properties of fuzzy ideals and fuzzy prime ideals of a semiring have been studied by many researchers Mukherjee and Sen [18], Swamy and Swamy [24], Malik and Mordeso [17]. Ahsan khan and Saifulla [8] initiated the study of fuzzy semiring and fuzzy semi-modules. In the year 1989, R Biswas introduced the intuitionistic fuzzy subgroups, Dheena and Mohanaaj [19] introduced the intuitionistic fuzzy k-ideals of a semiring. Rahman and Saikia [23] was introduced some special types of intuitionistic fuzzy submodules, and established some interesting properties. The intuitionistic fuzzy bi-ideals of a semi group are introduced in [15]. Akram and Dudek [3] introduced the notion of intuitionistic fuzzy left k-ideals in semiring, and so on.

In this paper we apply the concept of intuitionistic fuzzy set to semirings .We introduced the notion of intuitionistic fuzzy prime ideal, intuitionistic fuzzy irreducible ideal, idempotent intuitionistic fuzzy ideals in a fully idempotent semiring and right weakly semirings, and investigate some properties of such ideals.

Basic Definitions and Notations

A semiring is a non-empty set R together with two binary operations additions $(+)$ and multiplication $(.)$ such that $(R, .)$ is a commutative semigroup and $(R, .)$ is a semigroup, where both algebraic structures are connected by the two distributive laws, $a(b + c) = ab + bc$ and $(a + b)c = ac + bc$. A subset S of R is called subsemiring if $(S, +, .)$ is a semiring. A non-empty subset I of a semiring R is said to be a left (resp. right) ideal of R if $(I, +)$ is a subsemigroup

Tribal Life in Northeast India

Ethno-cultural Practices and Reproductive Health Issues

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Kh. Narendra Singh
Sarit K Chaudhuri

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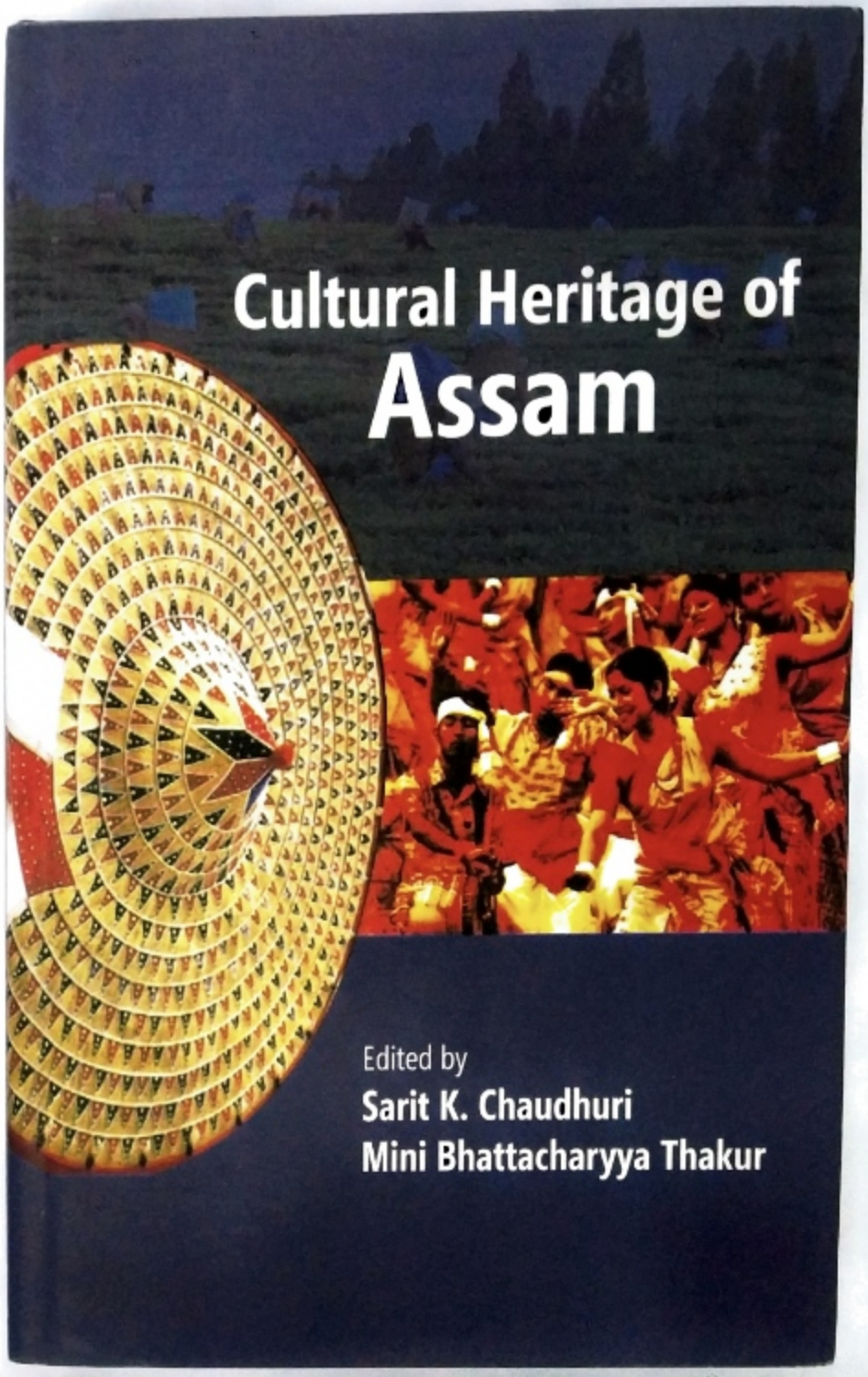
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Plants used against Gastrointestinal Disorder : An Ethnopharmacological Study among the Wancho Tribe of Arunachal Pradesh, India

Tonlong Wangpan*, Athai Wangpan and Sumpam Tangjang

Abstract

The study deals with the ethno-medicinal study focusing on the documentation of the indigenous knowledge and practice of using plants against gastrointestinal disease among the Wancho tribe of Arunachal Pradesh, Northeast India. Ethno-medicinal data was generated from 80 informants using semi-structured questionnaires. A total of 22 plant species belonging to 20 taxonomic families were recorded. Maximum contribution was reported from the herbs (55%). Among the different plant parts used, the leaves (44%) were most frequently used plant parts in the preparation of herbal formulation. The decoction (33%) was the most common mode of use for preparation of crude drug. The study also revealed the potential of medicinal

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plants in treating about 9 different types of Gastrointestinal (GI) disorders. The indigenous tribal community of this region has remarkable knowledge on the medicinal plants used against GI disorders, which if not preserved may get lost in the debris of modernization.

Keywords: medicinal plants, ethnicity, Wancho, Gastrointestinal.

Introduction

The gastrointestinal (GI) tract of human body is vulnerable to a great diversity of diseases (Kasper *et al.*, 2005). Gastrointestinal disorders are very frequent and have a high occurrence in human societies and most people are susceptible to GI related ailments. Such ailments may be caused by infections caused by various kinds of bacteria, viruses, and parasitic organisms (Mathabe *et al.*, 2006).

Plants are an important resource of conventional medicines used against different ailments. People from rural areas have century's old traditional knowledge transferred from generation to generation and still rely on plant-based resources. These herbal medicines are still the mainstay in the developing countries because of their better cultural acceptability and lesser side effects (Kamraj, 2000). According to earlier records, medicinal plants were found very effective in treating various GI disorders ranging from simple to more complex problems such as peptic ulcer (Rajbhandari *et al.*, 2001).

In Arunachal Pradesh, there is a record of more than 500 species of vital medicinal plants (Sarmah *et al.*, 2000). However, due to inaccessibility of the location, these communities lead a more or less isolated life, eventually preserving their culture and traditions (Haridasan, 2001). Thus, traditional medicine is the only alternative source of health care in remote hills. Furthermore, there is an urgent need of documenting these medicinal plants before it is lost under the debris of modernization. Considering this, the present study deals with the traditional knowledge of the Wancho ethnic community on using the medicinal plants against GI disorders.

Materials and Methods

Study area and Ethnic community

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Materials and Methods

Study area and Ethnic community

The district Longding comprises of rugged mountainous terrain with beautiful green valleys drained by rivulets and rivers cascading down from upper elevation (Fig. 1). Due to the constant gorge wind it is extremely cold in this area and a blanket of heavy mist envelops the valleys floors between almost vertical mountain walls. The district is inhibited by the Wancho tribe. They are ethnically related to the Konyak of the Mon district, Nagaland. Their dialect belongs to the Tibeto-Burman family. Their main festival is Oriah, which revolves around the agriculture. The Wancho society is governed by a council of chieftains or Wangham.

Fig. 1: Map of Longding District, Arunachal Pradesh

Field study and data collection

Field studies were conducted following standard ethnobotanical

techniques (Martin, 1995). The survey covers four Wancho-inhabited villages namely, Niaunu, Niausa, Zedua and Senua. Ethno-medicinal data were collected through Participatory Rural Appraisal (PRA), based on personal interaction with the indigenous population and practical observation in the field survey. Semi-structured questionnaires were designed to obtain the information, mainly focusing on the uses of plants in treatment of GI diseases, local names of the plants, growth forms, parts used, preparation and administration of the herbal medicines, etc.

A total of 80 informants were interviewed based on their knowledge, skills and practices on folk medicines. About 40-50 years old aged informants, particularly the traditional herbal healers, were selected as a focus group. Nature of ailments was identified with the help of the local herbal practitioner.

Identification of these medicinal plants was done by referring Botanical Survey of India (BSI) Herbaria, Itanagar and through consultation of taxonomic literature and Floras. The specimens' names were corrected according to 'The Plant List', and the voucher specimens were deposited in the Plant Systematic and Ethnobotany division, Rajiv Gandhi University, Rono Hills, Arunachal Pradesh.

Results and Discussion

Taxonomic evaluation

The medicinal plant based traditional knowledge is not only useful for conservation of the traditions, but also plays a significant role in development of alternative community health care system. In present study, a total of 22 medicinal plant species belonging to 20 families were collected and recorded to be used by the Wancho ethnic communities. Family Lamiaceae and Rutaceae have 2 plant species each, while the rest have only single plant species each (Fig. 2). There are total four different habit, of which the herbs are dominant (55%), followed by shrubs (27%), trees (14%) and climbers (4%) (Fig. 3).

Fig. 1: Plant families of medicinal plants used in gastrointestinal disorders among the Wancho tribe of Longding district of Arunachal Pradesh

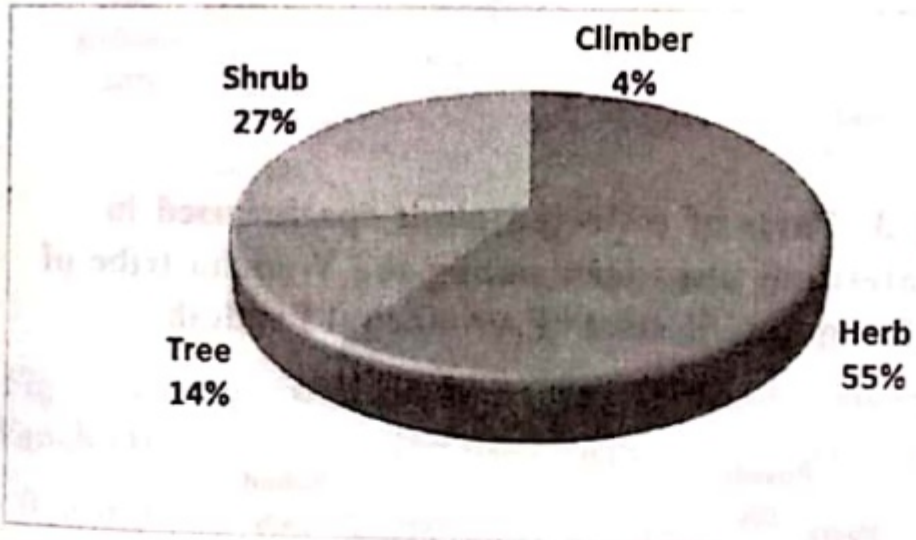

Fig. 2: Habit of medicinal plants used in gastrointestinal disorders among the Wancho tribe of Longding district of Arunachal Pradesh

Ethno pharmacological evaluation

The tribes of this region have been good knowledge of preparation of herbal formulation. Herbal formulation used in anti-gastrointestinal dysfunction in the present study varied among the plant species. Leaves, fruits, latex, stems, seeds, roots, whole plant, tender shoots are the major plant parts that are found to be used in preparation of

herbal formulation. Of which, the leaves are the most frequently used parts, while seeds, latex, stem and tender shoots are the least (Fig. 4). Of the total 6 different types of crud drug preparation (i.e. juice, powder, paste, raw, boiled and decoction), decoction is the most common mode of preparation of crud drug (Fig. 5).

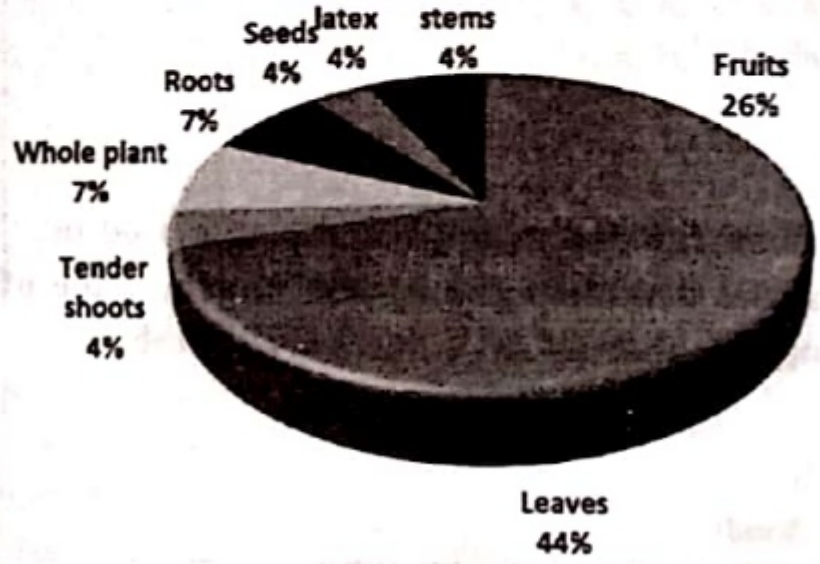

Fig. 3: Parts of collected plant species used in gastrointestinal disorders among the Wancho tribe of Longding district of Arunachal Pradesh

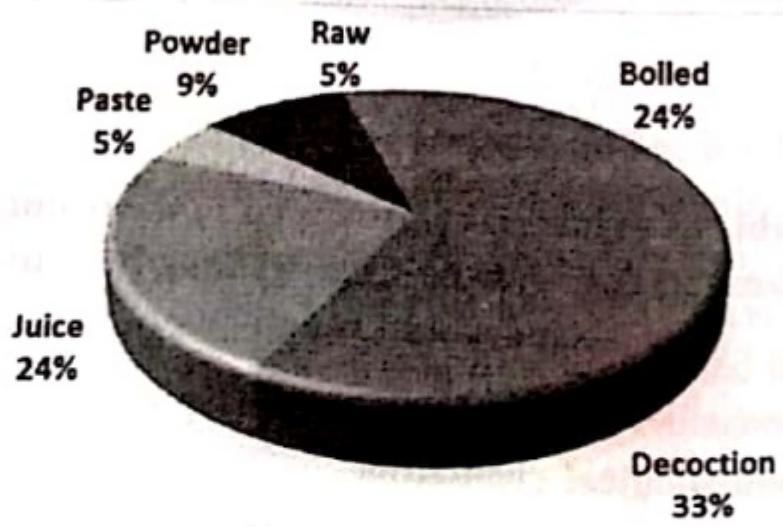

Fig. 4: Mode of utilization of the medicinal plants used in gastrointestinal disorders among the Wancho tribe of Longding district of Arunachal Pradesh

GI disorders cause illness and can lead to mortality, especially in the developing world where sanitation is a primary concern. However, the present study also revealed that the medicinal plants of this region can cure 9 different GI related diseases such as vomiting, blood dysentery, constipation, stomach-ache, liver problem, gastric problem, diarrhoea, stomach worms and dysentery (Fig. 6). However, dysentery (24%) was found to be the most common ailments which were cured using plants as drug.

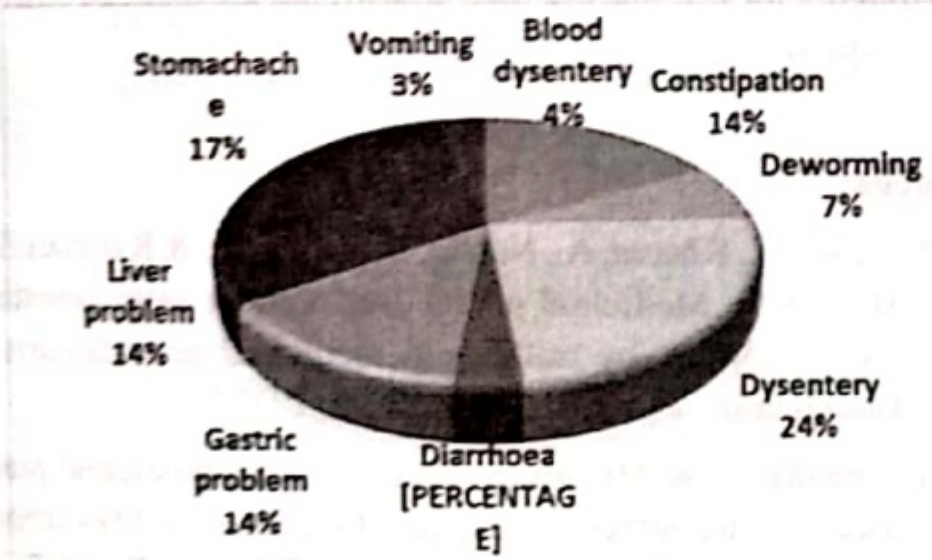

Fig. 5: Gastrointestinal disorders common among the Wancho tribe of Longding district of Arunachal Pradesh.

It was also observed that to ensure conservation of forest resources the villagers used to collect their forest resources like fuel wood, from localities far away from village. The study revealed that some of the species could be cultivated on a large scale for economic development of villagers like *Carica papaya* L. *Solanum spirale*, *S. nigrum* etc. have multiple uses among the local people and used festival and rituals. Present findings were also corroborated to an extent with the studies conducted by Mollik *et al.* (2009) and Rout *et al.* (2009).

Conclusion

The native of Longding District has displayed good knowledge of medicinal plants used in the management of GI disorders. There is a dire need to protect, improve and document the information on

herbal remedies of gastrointestinal disorders with scientific proofs. It is recommended to screen all mentioned plant species to confirm their toxicity risks in order to justify their traditional usage. Besides, the factors which threatening the knowledge and diversity of medicinal flora in this region include overharvesting and fading of traditional knowledge with time.

Acknowledgement

The authors would like to thank all the traditional healers as well as villagers for the sharing their traditional knowledge with the scientific community.

References:

Mollik, A., Islam, T., Khatun, A., Nasrin, D., Jahan, R., & Rahmatullah, M. (2009). Medicinal plants used against gastrointestinal tract disorders by traditional medicinal practitioners of Bangladesh. *Planta Medica*, 75-9: PD57

Rout, S.D., Panda, T., & Mishra, N. (2009). Ethno-medicinal plants used to cure different diseases by tribals of Mayurbhanj district of north Orissa. *Studies on Ethnomedicine*, 3 (1): 27-32.

Mathabe, M.C., Nikolova, R.V., Lall, N., & Nyazema, N.Z. (2006). Antibacterial activities of medicinal plants used for the treatment of diarrhoea in Limpopo Province, South Africa. *Journal of Ethnopharmacology*, 105: 286–293.

Kasper D. L., Braunwald, E., Hauser, S., Longo, D., Jameson, J.L., & Fauci, A.S. (2005). *Harrison's principles of internal medicine*. New York: McGraw - Hill medical publishing division.

Kamraj, V.P. (2000). Herbal medicine. *Current Science*, 78 (1): 35-39.

Sarmah, A., Haridasan, K., & Bisht, N.S. (2000). Development of medicinal plants and economic venture in Arunachal Pradesh: Prospects and Constraints. *Arunachal Forest News, 18 (1&2)*: 85-90.

Haridasan, K. (2001). *Ethnobotanical Studies in Arunachal Pradesh - A Status Report*, In: *Ethnomedicine of North East India, Proc Natl Seminar Traditional Knowledge base on Herbal Medicine and Plant Resources of North-East India: Protection, Utilization and Conservation* (154-167. 11). New Delhi: NISCAIR.

Martin, G. (1995). *Ethnobotany - A manual of methods.* London: Earthscan Publishers Limited.

Rajbhandari, M., Wegner, U., Jülich, M., Schöpke, T., & Mentel, R. (2001). Screening of Nepalese medicinal plants for antiviral activity. *Journal of Ethnopharmacology*, 74(3): 251-255.

Table 1: Medicinal plants used to treat gastrointestinal disorders (GI) by Wancho community of Eastern Himalayas.

Sl. No.	Botanical Name	Family	Life Form	Vernacular name	parts used	Mode of Utilization	Use in GI disorder
1	*Acmella oleracea* (L.) R.K. Jansen	Compositae	Herb	Hingbu	lv., st	Boiled	Stomachache, Constipation
2	*Amaranthus viridis*	Amaranthaceae	Herb	Bazza	lv, rt	Powder	Stomachache, Constipation
3	*Begonia* sp.	Begoniaceae	Herb	Soisu	ts, lv	Decoction	Dysentery
4	*Bryophyllum adelae* (Hamet) A.Berger	Crassulaceae	Herb	Vanphuak Hing	lv	Boiled	Dysentery
5	*Cannabis indica* L.	Cannabeeea	Shrub	Bhang	lv	Decoction	Dysentery/ Diarrhea
6	*Citrus limonum* (L.) Osbeck	Rutaceae	Shrub	Makgam	fr	Boiled	Liver problem
7	*Clerodendrum colebrookianum* Walp.	Lamiaceae	Shrub	Mangmik	lv	Boiled/juice	Constipation
8	Dillenia indica L.	Dilleniaceae	Tree	Otan	fr	Decoction	Liver problem
9	*Drymaria cordata* (L.) Willd. ex Schult.	Caryophyllaceae	Herb	Pusip kuaksip	lv	Paste	Vomiting
10	*Eryngium foetidum* L.	Apiaceae	Herb	Soingan	lv	Paste	Dysentery
11	*Ficus cordata* (Thunb.)	Moraceae	Tree	Phupnu	fr, rt	Raw fruit, root paste	Dysentery
12	*Gonostegia hirta* (Blume ex Hassk.) Miq.	Urticaceae	Herb	Zucham Hing	lv	Paste/Decoction	Gastric problem, Constipation
13	*Houttuynia cordata* (Thunb.)	Saururaceae	Herb	Zanthuhing	wp	Paste	Deworming
14	*Musa sapientum* L.	Musaceae	Herb	Ngo	fr	Boiled	Dysentery
15	*Ocimum tenuiflorum* L.	Lamiaceae	Shrub	Bezah	lv	Decoction	Gastric problem
16	*Oxalis debilis* Kunth	Oxalidaceae	Herb	Masi	wp	Juice	Gastric problem
17	*Papaver nanniflorum* L.	Papaveraceae	Herb	Kanyi	sd, lt	Powder/Decoction	Blood dysentery, deworming, stomachache
18	*Piper peepuloides* Roxb.	Piperaceae	Climber	Chilip	fr	Paste	Stomachache, Dysentery
19	*Rhus chinensis* Mill.	Anacardiaceae	Tree	Hahpain	fr	Juice	Liver problem
20	*Solanum nigrum* Sw.	Solanaceae	Shrub	Kamkhah	fr	Juice	Stomachache
21	*Zanthoxylum rhetsa* DC	Rutaceae	Shrub	Zah-ru	lv	Decoction	Gastric problem
22	*Zingiber officinale* Roscoe	Zingiberaceae	Herb	Chi	lv	Juice	Liver problem

Note: sd- seed, lv- leaf, fr- fruit, wp- whole plant, rt- root, ts- tender shoots, st- stem, lt- latex

Image plate 1. Some Medicinal plants used against gastrointestinal disorders among the Wancho ethnic tribe of Arunachal Pradesh:

(a) *Houttuynia cordata,* **(b)** *Ocimum tenuiflorum,* **(c)** *Drimaria cordata,* **(d)** *Oxalis debilis,* **(e)** *Gonostagia hirta,* **(f)** *Begonia sp.,* **(g)** *Amaranthus viridis,* **(h)** Ficus sp., **(i)** *Rhus chinensis,* **(j)** *Zanthoxylem rhetsa,* **(k)** *Acmella olaracea,* **(l)** *Papaver somniferum.*

A dual band omni-directional antenna for WAVE and Wi-Fi

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***Abstract*—Vehicles of today are increasingly being networked via various available networking technologies. IEEE 802.11p advocates Vehicle-to-Vehicle and Vehicle-to-Infrastructure communication via Wireless Access in Vehicular Environments (WAVE) between vehicles in the frequency range of 5.9 GHz. Also, IEEE 802.11j proposes the usage of 4.9 GHz frequency range for Wi-Fi. This paper proposes a dual band antenna that is capable of operating in both the WAVE and Wi-Fi bands. This proposed antenna is expected to be simple, easy-to-produce and inexpensive; it can be a cost-effective alternative to use of multiple directional antennas for vehicles. The choice of microstrip patch antenna technology with defected ground structure (DGS) was driven by cost considerations and ease of bulk manufacturing. This omni-directional antenna is expected to be fitted in a central location in the vehicle to avoid requirement of two or more directional antennas. The proposed antenna is characterized by popular antenna design software Ansoft HFSS.**

***Index Terms*—Antenna, Wi-Fi, Microstrip antenna, Defected Ground Structures, DGS, Dedicated Short Range Communication System, WAVE, VANET, V2V, V2I**

I. Introduction

Modern vehicles are expected to be smart and connected via Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) using networking technologies like Wi-Fi or WAVE. However, to enable low-end vehicles to join this network of vehicles, inexpensive and small antennas are required to cater to various reasonable needs of vehicular communication. A small car fitted with an omni-directional antenna with sufficient power will obviate the need for two or more directional antennas. The cost of antenna system to be fitted to inexpensive vehicles is another obvious constraint. The antenna also needs to be easily mountable and mechanically robust on rigid surfaces like roof or body of a vehicle.

As vehicles with extensive communication are expected to be deployed in near future, the area of antenna design for vehicles is a growing research area [1]. Many of the microstrip antennas are designed by modifying the basic rectangular, hexagonal or circular microstrip antennas [1][2].

To meet the requirements of low-cost and miniaturized antenna, microstrip patch antenna is a good fit. A microstrip antenna is simple and inexpensive as it can be mass produced using printed circuit technology. This type of antenna is lightweight, mechanically robust and can support multiple resonant frequencies [3].

In this paper, a microstrip line fed patch antenna have been proposed and designed using Ansoft HFSS software and characterized by evaluating relevant antenna parameters. The simulation was done by taking FR-4 substrate with the dimensions $(25 \times 38 \times 1.6)$ mm^3. The antenna parameters being investigated include reflection coefficient, VSWR, peak gain and radiation pattern. The proposed microstrip line fed patch antenna resonates at frequencies of 4.91 GHz and 5.9 GHz. Thus, this antenna will enable communication at multiple bands — the standard WAVE frequency band of 5.9 GHz and Wi-Fi range of 4.91 GHz.

So, the proposed dual-band antenna enables V2V and V2I communication using WAVE, in addition to enabling communication using the Wi-Fi band. This antenna can be mass produced easily, is inexpensive, lightweight and also easily mountable and mechanically robust.

The remainder of this paper is organized as follows: Section II contains a brief review of some of the related work. Section III describes the design of the proposed antenna. Section IV describes the performance of the antenna in detail. Section V endeavors to identify the future directions. Finally, Section VI concludes this paper.

II. Related Work

Microstrip antennas has been an active area of research for years [4][5][6]. In particular, Mono band microstrip antennas with very good parametric values can be routinely achieved – theoretical and practical design guidelines are lucidly explained in [3][6] and others.

To improve the performance of microstrip antennas, many techniques like photonic bandgap structures (PBG) [7] and compact microstrip resonant cell (CMRC) techniques have been proposed [8].

Many recent works have focused on the technique of Defected Ground Structures (DGS) for the purpose of harmonic suppression and reduction of antenna sizes [9][10][11]. DGS is a simple or a complicated shape etched on the ground-plane of an antenna – thus, a defect is introduced causing changes in current distribution the ground plane. Using this 'defect', harmonic suppression of unwanted harmonics or size reduction can be achieved. Various kinds of shapes have been used in DGS – from simple shapes like square or circular to cross-shaped or hairpin [11].

DGS is a periodic structure similar to PBG – but PBG suffers from some issues. Realizing PBG for a sufficiently thin substrate is problematic; also, it is difficult to realize

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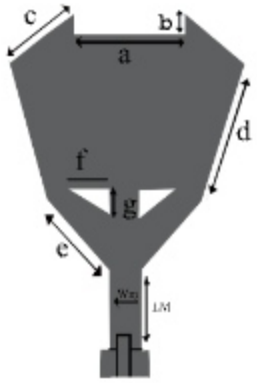

Fig. 1. Top View: Radiating Patch

many holes in the substrate [10]. In contrast, DGS is far easier to realize – etching some shapes in ground plane provides performance that is comparable to PBS. Thus, DGS has become a well-accepted technique to improve performance of an antenna. In this paper, DGS was chosen for ground plane design.

III. Antenna Design

A. Materials Used

FR-4 substrate material with dielectric constant (ϵ_r) 4.4 and loss tangent of 0.02 was chosen – its dielectric constant is in the lower end of the prescribed range $2.2 \leq \epsilon_r \leq 12$ [3]. This substrate enjoys good efficiency and a comparatively larger bandwidth.

The patch and the ground plane, made of copper, is to be photo-etched to the FR-4 substrate.

The feeding-method chosen is microstrip feed line, primarily due to its simplicity. The cladding material used for the feed line is ULTRALAM® 2000. The feeding port is a 50Ω coaxial SMA connector.

B. Antenna Geometry

The FR-4 substrate has the dimensions ($L \times W \times H$)= $38 \times 25 \times 1.6$ mm^3.

The feed line of the proposed antenna is $L_m = 13$ mm by $W_m = 2.4$ mm in size with the coaxial feed connector. This feed line connects to the octagonal radiating patch which has the dimensions as described below.

1) Radiating Patch Design: The radiating patch is a modified octagonal shaped antenna which is fed by the microstrip line feed as shown in Fig. 1.

The patch was designed by initially considering a basic octagonal shape. After multiple iterations, the final parameters of the radiating patch were determined. The final parameters of the patch are shown in the table I.

2) Ground Plane Design: The ground plane is a simple structure. The overall dimensions are the same as the substrate i.e. 25mm × 38mm.

TABLE I
Radiating Patch Parameters

Patch Parameter	Specification
L_m	13 mm
W_m	2.4 mm
a	7 mm
b	2 mm
c	10 mm
d	12 mm
e	8.5 mm
f	4 mm
g	2 mm

TABLE II
DGS based Ground Plane

Ground Plane Parameter	Specification
Dimension ($L \times W$)	38×25mm^2
p	11 mm
q	5 mm
r	2 mm
s	2 mm
g	6 mm
w	9 mm

Initially, a classic ground plane was assumed in the design. Then, using a number of iterations, 'defects' in the form of slots are introduced in the ground plane. The primary purpose of these defects i.e. Defected Ground Structures (DGS) is for harmonic suppression and to reduce the antenna sizes.

Since DGS are physical defects that are introduced in the ground plane, a large number of simulation iterations were needed to identify the efficacy of the defects so introduced.

After satisfactory results were obtained, the final dimensions for the slotted ground plane is given in Table II.

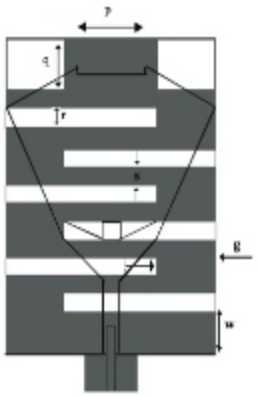

Fig. 2. Bottom View: Ground Plane with DGS

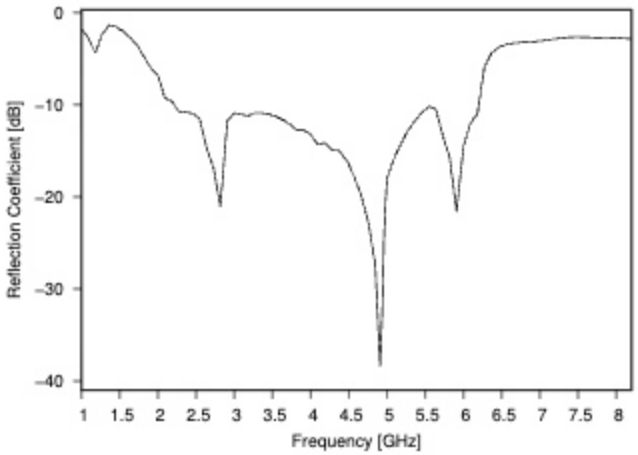

Fig. 3. Reflection coefficient S11 of Patch Antenna

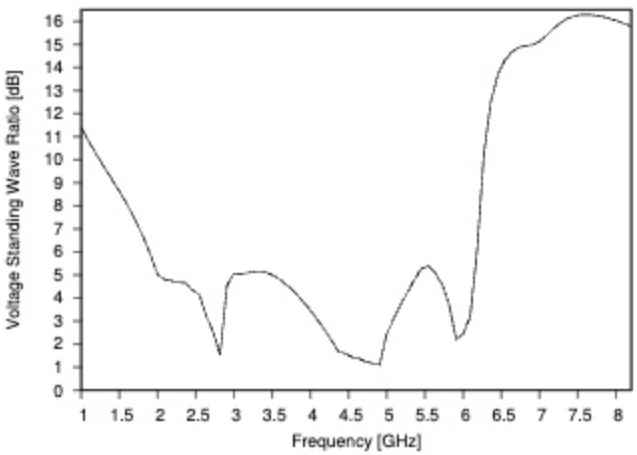

Fig. 4. VSWR of Patch Antenna

TABLE III
SIMULATED PEAK GAIN AT DIFFERENT RESONANT FREQUENCIES

Resonant Frequency	Simulated Peak Gain
2.81 GHz	0.6 dBi
4.91 GHz	3.4 dBi
5.9 GHz	4.26 dBi

IV. RESULTS

In this section, the simulation results obtained for the proposed antenna with respect to relevant parameters are discussed.

A. Reflection Coefficient

The S11 simulated reflection coefficient for the proposed antenna is shown in the Fig. 3.

At resonant frequencies, the return loss has been observed to be -38.36 dB for 4.91 GHz and -21.56 dB for 5.9 GHz.

It is also observed that there is another resonant frequency 2.81 GHz with a return loss of -20.90 dB. However, this frequency band is ignored since the corresponding peak gain is too low.

The corresponding Peak Gains for different resonant frequencies are given in the table III.

B. VSWR

Usually, the Voltage Standing Wave Ratio should be in the range 1.0 – 2.0.

The VSWR was computed using the well-known equation (1) where Γ represents the reflection coefficient.

$$\text{VSWR} = \frac{(1 + |\Gamma|)}{1 - |\Gamma|} \tag{1}$$

The VSWR so obtained is plotted in Fig. 4. It is clearly seen that at resonant frequencies, the values of VSWR are in the acceptable range.

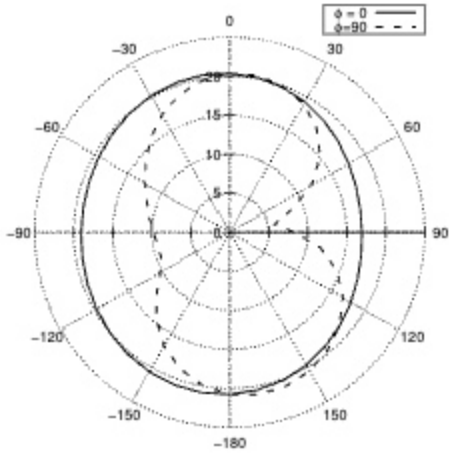

Fig. 5. Radiation Patterns at 4.91 GHz

C. Radiation Patterns

The radiation patterns for the resonant frequency 4.91 GHz is computed for two planes i.e. $\phi = 0^\circ$ and $\phi = 90^\circ$ as can be seen in Fig. 5. The radiation patterns at 4.91 GHz clearly show the non-directional pattern in both the planes.

Then the radiation patterns for the resonant frequency range of 5.9 GHz were obtained for the $\phi = 0^\circ$ and $\phi = 90^\circ$ planes as seen in Fig. 6. These radiation patterns also clearly illustrate the essentially omni-directional nature of the antenna at 5.9 GHz resonant frequency.

V. FUTURE DIRECTIONS

Although the performance of the proposed antenna has been confirmed to be acceptable, the proposed antenna suffers from the following limitations:

1) *Extra resonant Frequency*: The design could not erase the extra resonant frequency at 2.8 GHz range as can be seen in Fig. 3 and Fig. 4.
2) *Imprecise Dual band operation*: From Fig. 3, it can be observed that the return loss does not increase above -10 dB clearly beyond the first resonant frequency of 4.91

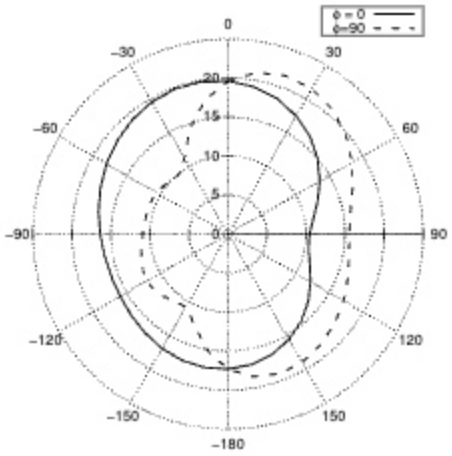

Fig. 6. Radiation Patterns at 5.9 GHz

GHz and then drop below -10 dB at the second resonant frequency as ideally expected of an antenna operating precisely in dual bands.

3) *Slightly High VSWR at 5.9 GHz*: From Fig. 4, we can observe that the VSWR is slightly higher than the required 2.0. Also, the radiation is slightly asymmetrical at 5.9 GHz.

The above limitations mean that other techniques should be investigated for further refinement of the proposed antenna.

VI. Conclusion

This paper describes the design of a simple microstrip line fed patch antenna. Various relevant parameters for this antenna were evaluated like reflection loss, VSWR, Peak Gain and radiation patterns.

The antenna resonates at the frequencies of Wi-Fi band (4.91 GHz) and WAVE (5.9 GHz) as intended and has satisfactory performance in terms of gain and low reflection losses. Thus, the proposed antenna has been found to be suitable for use as omni-directional antenna for the purpose of vehicular communications.

References

[1] R. Leelaratne and R. Langley, "Multiband pifa vehicle telematics antennas," *IEEE Transactions on Vehicular Technology*, vol. 54, no. 2, pp. 477–485, March 2005.

[2] B. Mazumdar, U. Chakraborty, A. Bhowmik, and S. Chowdhury, "Design of compact printed antenna for wimax & wlan applications," in *2nd International Conference on Computer, Communication, Control and Information Technology (C3IT-2012)*, vol. 4, February 2012, pp. 87–91.

[3] C. A. Balanis, *Antenna Theory: Analysis and Design*. Wiley-Interscience, 2005.

[4] K. Carver and J. Mink, "Microstrip antenna technology," *IEEE Transactions on Antennas and Propagation*, vol. 29, no. 1, pp. 2–24, Jan 1981.

[5] N. P. Agrawall, G. Kumar, and K. P. Ray, "Wide-band planar monopole antennas," *IEEE Transactions on Antennas and Propagation*, vol. 46, no. 2, pp. 294–295, Feb 1998.

[6] J. James, P. S. Hall, and C. Wood, *Microstrip Antenna Theory and Design*. Institution of Engineering and Technology, 1981.

[7] F. Yang and Y. Samii, *Electromagnetic Band Gap Structures in Antenna Engineering*. Cambridge University Press, 2008.

[8] Y. J. Sung and Y. S. Kim, "An improved design of microstrip patch antennas using photonic bandgap structure," *IEEE Transactions on Antennas and Propagation*, vol. 53, no. 5, pp. 1799–1804, May 2005.

[9] J.-S. Lim, J.-S. Park, Y.-T. Lee, D. Ahn, and S. Nam, "Application of defected ground structure in reducing the size of amplifiers," *IEEE Microwave and Wireless Components Letters*, vol. 12, no. 7, pp. 261–263, July 2002.

[10] L. H. Weng, Y.-C. Guo, X.-W. Shi, and X.-Q. Chen, "An overview on defected ground structure," *Progress In Electromagnetics Research B*, vol. 7, pp. 173–189, 2008.

[11] A. K. Arya, M. Kartikeyan, and A. Patnaik, "Defected ground structure in the perspective of microstrip antennas: a review," *Frequenz*, vol. 64, no. 5-6, pp. 79–84, 2010.

Development of Nations:

AN INTERPLAY OF ECONOMICS, POLITICS & SOCIETY

Editors:
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EXTRACTION OF IMPORTANT MEDICINAL PLANTS AND THE NEED FOR CONSERVATION STRATEGIES IN EASTERN HIMALAYAN REGION

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Itanagar, Arunachal Pradesh, India

ABSTRACT

The Eastern Himalayan belt is rich in high value medicinal and aromatic plants as well as endemic and endangered species. High rate of extraction of medicinal plants have been reported from the eastern Bhutan and western Arunachal Pradesh (India). These plants are being exported as raw materials for medicinal factories or direct application for medicinal purposes. The present paper is based on information collected from different publications, reports, newspaper articles, unpublished works. Further, interview has been conducted with local people who were associated with the exploitation and business of the medicinal plants. This paper focuses on the assessment of exploitation of medicinal plants, especially endemic and endangered species from the region. The important medicinal plants extracted from the region include Aconitum ferox, Coptis teeta, Panax pseudoginseng, Illicium griffithii, Taxus baccata, Paris polyphylla. The research work reveals large scale exploitation of medicinal plants like Taxus baccata, Illicium griffithii, Paris polyphylla, etc. Since, medicinal plants is one of the major source of income for rural communities, this paper suggests people centric strategies which would help in conservation and regeneration of the plants as well as help in generating high income for rural communities.

Keywords: *extraction, medicinal plants, Illicium griffithii, Taxus baccata, Paris polyphylla, Eastern Himalaya, conservation.*

INTRODUCTION

There are number of species listed in IUCN Red Lists in The Eastern Himalayan Region. The wide variance of altitudinal and climatic conditions has given rise to different forest types which create corresponding natural shelter, food, etc., to varieties of wildlife. Almost 80% of world population relies upon plant based traditional medicines for primary health care (Gopal, et al., 2014). Besides, the medicinal plants are also used in modern drug discoveries across the world. The forests of Trashiyangtse, Trashigang and Samdrup Jongkhar areas of Bhutan and West Kameng and Tawang districts of Arunachal Pradesh, India that falls under this region has one the richest biodiversity with high medicinal and aromatic plants. Despite tremendous progress in human medicines, infectious diseases caused by bacteria, fungi, viruses and parasites are still a major threat to public health (Arya, et al., 2010). Due to over – exploitation coupled with poor regeneration and pressure from adverse factors, certain medicinal plants have become endangered (Hussain and Hore, 2008). The local inhabitants use these plants as herbal medicines, which are highly effective against some diseases and health problems (Hussain & Hore, 2008 andDorji, et al., 2017). In Bhutan, medicinal plants have become an indispensable tool for treatment regimens and poverty alleviation (Ugyen, et al., 2008). The tribal communities of the study area depend largely on wild plants from rituals to medicine. Besides, the rural communities also gather substantial amount of market demanding medicinal plants to meet their cash needs. Some of the important market demanding medicinal plants collected from the region are *Taxus baccata* (Himalayan yew), *Illicium griffithii*, *Paris polyphylla*, *Aconitum ferox*, *Coptis teeta*, *Panax pseudoginseng*,*Acorus calamus*, *Rubia cordifolia*, etc..Taking into account the local as well as global importance, the paper focuses on the extraction of three important medicinal plants namely *Taxus baccata*, *Paris polyphylla* and *Illicium griffithii* and emphasizes on the need for conservation.

METHODOLOGY

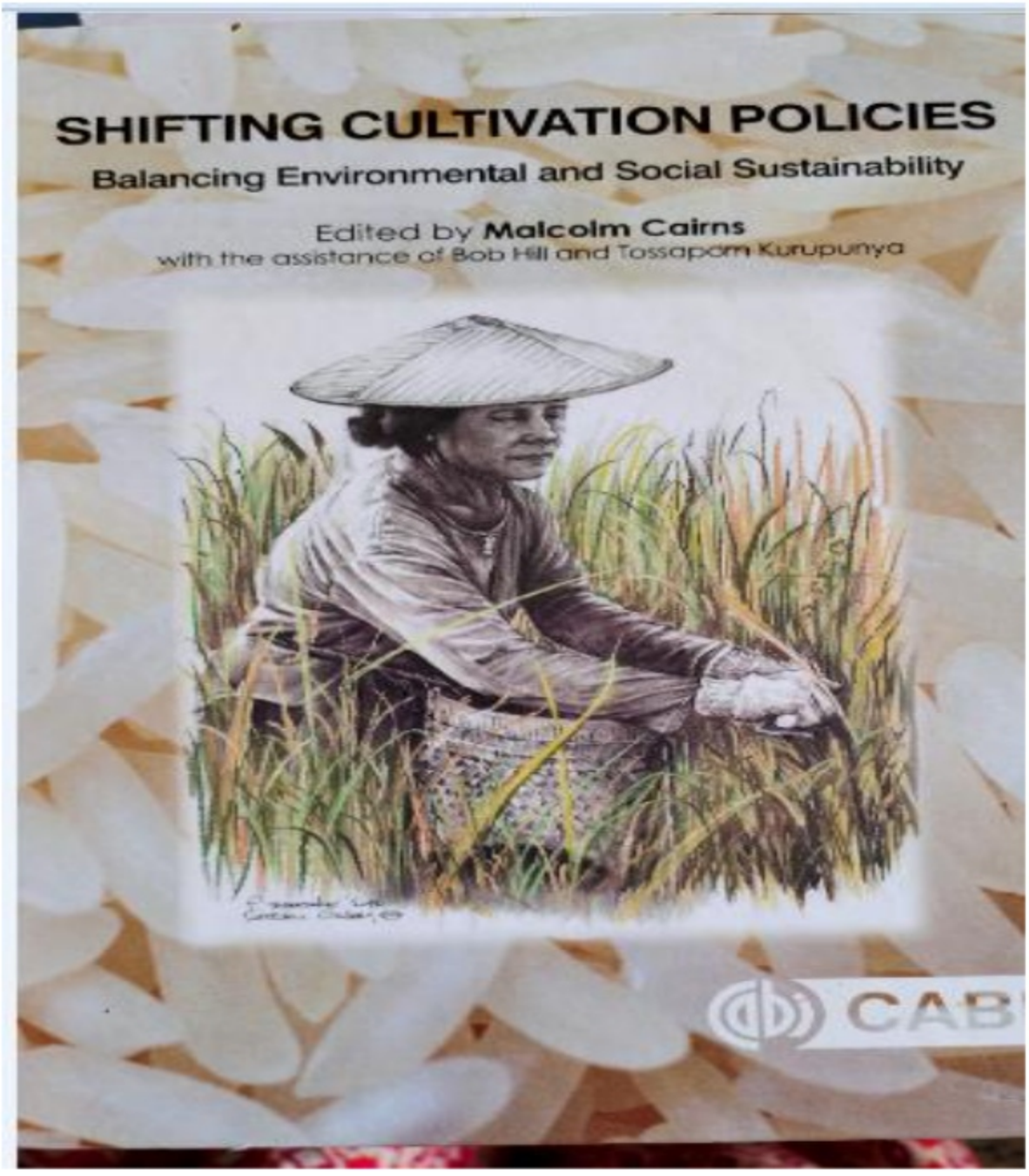
Data collection

The information on medicinal plants extraction and trade were collected through open-ended participatory discussions with local informants (Joshi and Edington, 2010) residing in the study area. The local people of Kalaktang, Balemu and Dirang circles of West Kameng district and Zemithang, Mukto and Lumla circles of Tawang districts in Arunachal Pradesh were interviewed. Few individuals from Sakteng, Merak and Diafam villages of Bhutan were also interviewed.

The study area mostly covers the border areas of Bhutan and Arunachal Pradesh (India). It comprises of the Trashigang, Trashi Yangtse and Samdrup Jongkhar districts / Dzong Khag of Bhutan and West Kameng and Tawang districts of Arunachal Pradesh, India.

RESULTS AND DISCUSSION

Taxus baccata


SHIFTING CULTIVATION POLICIES
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19

VANISHING SHIFTING CULTIVATION AND LOSS OF TRIBAL CULTURE IN ARUNACHAL PRADESH, NORTHEASTERN INDIA

*Tomo Riba**

Introduction

The state of Arunachal Pradesh is located in the northeasternmost corner of India, and is inhabited by 26 major tribal groups with more than 100 subtribes, all speaking Tibeto-Burman languages (Nyori, 1993). All of these groups practise shifting cultivation on the southward-facing slopes of Eastern Himalaya. Being located in the easternmost part of India, this mountainous state receives the first sunshine in the country. Due to southward-facing slopes with no higher ground between them and the Bay of Bengal, Arunachal Pradesh receives abundant sunshine and heavy rainfall, favouring the growth of luxuriant mixed tropical evergreen forests. The state has international borders with China in the north, Myanmar in the east and Bhutan in the west, with the Brahmaputra river in the plains of India's Assam state to the south (Figure 19-1). Entry to the state by outsiders is restricted to those who obtain an Inner Line Permit from the Indian authorities. Outsiders are also not allowed to settle permanently in Arunachal Pradesh. Thus, the state is inhabited solely by its recognized indigenous peoples.

The altitude of Arunachal Pradesh ranges from 150 metres on the Brahmaputra plains in the south to more than 7000 metres in the north. The land and people of the state are India's least known, even to most of their countrymen. The vegetation gradually merges from tropical rainforest into subtropical, to temperate and ultimately to alpine forest (Taher and Ahmed, 2001).

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* Dr Tomo Riba, Department of Geography, Faculty of Environmental Sciences, Rajiv Gandhi University, Arunachal Pradesh, India. In his own words: 'I was born in a shifting cultivator's family and I spent most of my time off school with my mother in the field, especially after the death of my father when I was 10. I still have an emotional attachment to it; the smell of freshly fallen trees of the ash just after burning a field, of weeds ripening paddy, and the call of the birds. I miss them. The area of nature is original, and much different to what we get today.'

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पूर्वोत्तर भारत : भाषाई अध्ययन
(संकटापन्न भाषाओं में, वास्तव में, कुछ बोलियाँ भी शामिल हैं)

डॉ. विश्वजीत कुमार मिश्र, असिस्टेंट प्रोफेसर, हिंदी विभाग, राजीव गाँधी विश्वविद्यालय, रोनो हिल्स, दोइमुख, अरुणाचल–प्रदेश)

पूर्वोत्तर भारत के सन्दर्भ में अत्यंत सावधानी से गहन अध्ययन करने पर पता चलता है कि पूर्वोत्तर राज्यों की भाषाएँ तीन भाषा परिवारों से संबंधित हैं – ऑस्ट्रो–एशियाटिक या आग्नेय, भारतीय आर्य और तिब्बती–बर्मी, खासी, जो मेघालय में मुख्य रूप से बोली जाती है, ऑस्ट्रो–एशियाटिक परिवार की मोन–खमेर शाखा का प्रतिनिधित्व करती है। भारतीय आर्य परिवार की भाषाएँ हैं – असमिया, बंगला, नेपाली और विष्णुप्रिया मणिपुरी। पूर्वोत्तर की शेष भाषाएँ तिब्बती–बर्मी परिवार की हैं। एक राज्यवार सूची से हम देखते हैं –

राज्य भाषाएँ/बोलियाँ

1. अरुणाचल प्रदेश : आदी, अपातानी, बाङनी, बुगुन खोवा, देउरी, हिल, मीरी, खङबा, कोरो, खामती, लीसू, मेयर, मीजी, मिशमी, मोनपा, ना, गालोङ/गालो, न्यीशी, नोकते, पुरोइक/सुलुङ, शेरडुकपेन, सिङफो/जिङफो/जिङफो, तागिन, तरम, तङसा, तुत्सा, वांचो, जाखिङ, हूसो (चकमा)
2. असम : असमिया, बांग्ला, (सिलेटी बोली), विष्णुप्रिया मणिपुरी, बोडो/बोरो, देउरी, डिमासा, गारो, हाजोङ, मार, कबुइ/कार्बी, खासी, कोच, तिवा, मिसिङ, ताई, नेपाली, चकमा, रोङमइ, राभा, जेमी।
3. मणिपुर : आइमोल, अनल, चीरु, चोथे, गाङटे, मार, इङपुइ, कबुइ, खरम, खोइबू, कोइराओ, कोइरेङ, कोम, कुकी, लामकाङ/लामगाङ, लियाङमइ, मिजो, माओ, मणिपुरी (मैतई), मराम, मारिङ, मोयोन, मोङसाङ, नेपाली, पाइते, पाओमइ, पुरुम, सिमते, सुकते, ताङखुल, तराओ, थाडो, वाइफेइ, जेमी, जउ।
4. मेघालय : हाजोङ, गारो, कार्बी, खासी, कोच, नेपाली, सिङते/प्नार, राभा।
5. मिजोरम : मार, मराध्लाखेर, मिजो (लुशाई), पाइते, लाइ/पावी (चकमा)।
6. नागालैंड : अङामी, आओ, चाकरु/चोकरी, चाङ, खेझा, खियेमुनङन, कोन्याक, कुकी, लियाङमइ,लोथा, फोम, पोचुरी, सङतम, रेङमा, सेमा/सूमी, यिमचुङरे, जेमी।
7. सिक्किम : भूटिया, गुरुङ, लेपचा, लिम्बू, मङर, मुखिया/सुनुवार, नेपाली, नेवारी, राइ, शेरपा, तमाङ।
8. त्रिपुरा : बांग्ला, विष्णुप्रिया, मणिपुरी, बोङचेर, चकमा, दारलोङ, हलाम, राङखोल, कॉकबरक,मणिपुरी (मैतई), मोग, रियाङ, जमातिया।

इस प्रकार उपरोक्त विवरण के अलावा संवैधानिक अध्ययन से पता चलता है कि भारत के संविधान की आठवीं अनुसूची में सूचीबद्ध बाईस अनुसूचित या राष्ट्रीय भाषाओं में से पाँच– असमिया, बांग्ला, बोडो/बोरो, मणिपुरी और नेपाली ही इस क्षेत्र में बोली जाती हैं। भारत की जनगणना (2001) में सिर्फ 100 गैर–अनुसूचित भाषाएँ सूचीबद्ध हैं। कारण यह है कि इस सूची में उन्हीं भाषाओं को शामिल किया गया है जो कम से कम 10,000 लोगों द्वारा बोली जाती हैं, बाकी को इस सूची से बाहर रखा गया है। भारत की जनगणना (2001) में वर्णित भाषाओं में से इकसठ भाषाएँ पूर्वोत्तर क्षेत्र में बोली जाती हैं। ये हैं – आदी, अनल, अङामी, आओ, भोटिया (भुटिया), विष्णुप्रिया, चेकसाङ, चाङ, चाकरु/चोकरी, देउरी, डिमासा, माङटे, गारो, हलाम, मार, कबुइ, कार्बी, खासी, खेझा, खियेमनुङन, कोच, कोम, कोन्याक, कुकी, कुकी, लाखेर, लालुङ (तिवा), लेपचा,

लियाङमइ, लोथा, लिम्बु, लुशाई/मिजो, मराम, मारिङ, मीरी/मिसिङ, मोग, मोनपा, न्यीशी, नोकते, पाइते, पावी, (लाइ), फोम, पोचुरी, राभा, राइ, रेङमा, सङतम, सेमा, शेरपा, सिमते, तमाङ, ताङखुल, ताङसा, थाडो, त्रिपुरी, (कॉकबरक), वाइफेइ, वांची, यिमचुङरे, जेलियाङ, जेभी, और जउ।

1–चेङसाङ वास्तव में कोई भाषा नहीं है, बल्कि चोकरी, खेझा और सङतम भाषाओं के (रोमन) आद्याक्षरों को मिलाकर तीनों मिलती–जुलती भाषाओं के समूह को यह नाम दिया गया है।

2– मणिपुर में बोली जानेवाली मराम भाषा (बोलने वालों की संख्या 10,144) तिब्बती–बर्मी परिवार की भाषा है जबकि मेघालय में बोली जानेवाली मराम खासी (ऑस्त्रबोएशियाटिक परिवार) की एक बोली है।

3– चेकसाङ की तरह जेलियाङ वास्तव में कोई भाषा नहीं है, बल्कि जेमी और लियाङमइ भाषाओं के (रोमन) आद्यक्षरों को मिलाकर दोनों मिलती–जुलती भाषाओं के समूह को यह नाम दिया गया है। माओ को (1991 की जनगणना के अनुसार बोलनेवालों की संख्या 77810) 2001 की जनगणना में शामिल नहीं किया गया था क्योंकि 2001 में मणिपुर के पाओमाटा, माओ, मराम और सेनापित जिले में जनगणना आयोजित नहीं हो पायी थीं।

यहाँ ध्यान देने की आवश्यकता है कि अनुसूची और गैर–अनुसूची भाषाओं में पूर्वोत्तर राज्यों में बोली जानेवाली करीब पचास भाषाओं को जगह नहीं मिली क्योंकि इनमें से प्रत्येक दस हजार से कम व्यक्तियों द्वारा बोली जाती हैं। इन में से कुछ हैं–खामती, मीजी/साजोलाङ, पुरोइक, शेरडुकपेन, सिङफो, चकमा, दारलोङ, राङखोल, टिडिम, तराओ, थङाल, (कोइराओ)/बियाते, ताइ, आइमोल, चीरु, चोथे, कोइरेङ, माओ, गुरुङ, मँगर, मुखिया द्य असम में असमिया, बंग्ला और सादरी, मणिपुर में मणिपुर में मणिपुरी, मिजोरम में मिजो, सिक्किम में नेपाली, त्रिपुरा में बंग्ला, नागालैंड में अंग्रेंजी और नागामीज, मेघालय में अंग्रेजी और हिंदी एवं अरुणाचल प्रदेश में हिंदी संपर्क भाषाओं के रूप में प्रयुक्त होती हैं। सादरी असम के करीब 850 चाय बागानों में बोली जाती हैं।पूर्वोत्तर की लगभग सभी भाषाओं को एकाधिक वैकल्पिक नामों से जाना जाता है। इनकी कई बोलियाँ/उपभाषाएँ हैं, जैसे– गोआलपारिया, कामरुपी और मयङ असमिया की तीन प्रसिद्ध बोलियाँ है।बांग्ला का एक दक्षिण असम में प्रयुक्त सिलेटी के रूप में जाना जाना जाता है।

महत्वपूर्ण बात यह है कि बहुभाषावाद सभी पूर्वोत्तर भारत के राज्यों में जीवन का एक हिस्सा है । द्विभाषिकता और त्रिभाषिकता का राष्ट्रीय औसत क्रमशः 19.44 और 7.26 (1991) है। लगभग दो दर्जन भाषाओं को छोड़कर पूर्वोत्तर की अन्य सभी भाषाएँ स्वदेशी/परंपरागत लेखन प्रणालियों के अभाव में संशोधन के साथ रोमन लिपि का प्रयोग करती है। मणिपुर में मणिपुरी भाषा के लिए मैतेइ मयेक लिपि का प्रयोग किया जाता है। मणिपुर की जनजातीय भाषाएँ रोमन लिपि का प्रयोग करती हैं।असम में, असमिया, बोडो और बंगला भाषाएँ क्रमशः असमिया, देवनागरी और बांग्ला लिपियों का प्रयोग करती हैं। सादरी असमिया और देवनागरी लिपियों का प्रयोग करती है। देउरी,मिसिङ, राभा और तिवा भाषाएँ शासकीय प्रयोजनों के लिए असमिया लिपि का प्रयोग करती है, लेकिन इन भाषाओं में स्कूली किताबें रोमन लिपि में लिखी जाती हैं। विष्णुप्रिया मणिपुरी और ताइ भाषाएँ क्रमशः बांग्ला और अहोमध्ताइ लिपियों का प्रयोग करती हैं। डिमासा असमिया, बांग्ला और देवनागरी लिपियों का प्रयोग करती है, लेकिन डिमासा साहित्यिक सभा के दबाव और युवा पीढी की मांग के तहत अब दिन पर दिन, रोमन का प्रयोग बढ़ रहा है। कार्बी रोमन लिपि का प्रयोग करती है।त्रिपुरा में सरकार की नीति सभी भाषाओं के लिए बंगला लिपि का प्रयोग करती है, लेकिन चकमा, हलाम–कुकी और कॉकबरक भाषाएँ बांग्ला और कुछ संशोधनों के साथ रोमन दोनो लिपियों का प्रयोग करती हैं।नागालैंड और मिजोरम में सभी भाषाएँ रोमन लिपि का प्रयोग करती हैं।

भारत केपूर्वोत्तर राज्यों में, कुल अठ्ठावन भाषाएँ माध्यमों के रुप में या अनुदेश के विषयों के रूप में इस्तेमाल हो रही है। इन भाषाओँ में अरबी, अंग्रेजी, हिंदी, फारसी और संस्कृत भी शामिल है।अंग्रेजी अरुणाचल प्रदेश, नागालैंड और सिक्किम में एक विषय और पहली भाषा (शिक्षा का माध्यम के रूप में) और अन्य 5 राज्यों में दूसरी भाषा के रूप में प्रयोग की जाती है।

भारत की राष्ट्रभाषा हिंदी त्रिपुरा के अलावा सभी पूर्वोत्तर राज्यों में शिक्षा के एक विषय के रूप में प्रयोग की जाती है। असम में यह 5–7 कक्षाओं में अनिवार्य दूसरी भाषा के रूप में और कक्षा 8 के बाद से एक वैकल्पिक विषय के रूप में पढ़ायी जाती है। अरुणाचल प्रदेश में 1–10 कक्षाओं में एक अनिवार्य भाषा के रूप में, मणिपुर में 1–12 कक्षा में दूसरी भाषा के रूप में, नागालैंड में 2–8 कक्षाओं में अनिवार्य विषय के रूप में और 9–12 कक्षाओं में वैकल्पिक विषय के रूप में पढ़ायी जाती है। हिंदी सिक्किम में कक्षा 3 से 8 तक एक विषय के रूप में पढ़ायी जाती है। मेघालय और मिजोरम में कक्षा 5 से 8 तक द्वितीय भाषा के रूप में हिंदी पढ़ायी जाती है। असम, सिक्किम (12 स्कूलों में) और त्रिपुरा में संस्कृत तृतियी भाषा के रूप में पढ़ायी जाती है। अरबी और फारसी भाषाएँ असम, मणिपुर और त्रिपुरा के मदरसा स्कूलों में पढ़ायी जाती है। अंग्रेजी अरुणाचल प्रदेश के छोड़कर जहाँ यह प्रथम भाषा के रूप में इस्तेमाल की जाती है, सभी राज्यों में द्वितीय भाषा के रूप में प्रयोग की जाती है। अरुणाचल प्रदेश में हिंदी द्वितीय भाषा के रूप में इस्तेमाल की जाती है और सभी अन्य राज्यों में तृतीय भाषा के रूप में । प्राथमिकः 21 (अंग्रेजी और हिंदी सहित) माध्यमिकः 09 (अरबी, अंग्रेजी, हिंदी, फारसी और संस्कृत को छोड़कर) प्राथमिक स्तर पर विषय के रूप में प्रयुक्त भाषाए :–

राज्य	भाषाएँ
अरुणाचल प्रदेश :	अंग्रेंजी, हिंदी, आदी, अपातानी, खामती, मोनपा, न्यीशी, गालोङ,मिशमी, सिङफो,संस्कृत।
असम :	असमिया, बांग्ला, बोडो, देउरी, डिमासा, अंग्रेजी, गारो, हिंदी, मार, कार्बी
मणिपुरी :	मिशिङ, नेपाली, ताइ, तिवा, राभा, विष्णुप्रिया,–मणिपुरी। मणिपुर असमिया, बांग्ला, अंग्रेजी, हिंदी, मार, कोम, माओ, मणिपुरी, मिजो,नेपाली,पाइते, कबुइ, जउ, ताङखुल, थाडो, वाइफेइ।
मेघालय :	असमिया, बांग्ला, गारो, हिंदी, नेपाली, खासी, अंग्रेजी।
मिजोरम :	अंग्रेजी, हिंदी, लाइ, लाखेर, (मरा) मिजो।
नागालैंड :	अङगामी, आओ, चाङ, चोकरी, अंग्रेजी, खेझा, कुकी, खियेमनुङन, कोन्याक, लियाङमइ, लोथा, फोम, पोचुरी, रेङमा, सङतम, सेमा, यिमचुङरे, जेमी, हिंदी।
सिक्किम :	भूटिया, अंग्रेजी, मुखिया/सुनुवार, हिंदी, लेपचा, लिम्बू, मँगर, नेपाली, नेवारी, राइ, शेरपा, गुरूङ, तमाङ।
त्रिपुरा :	बांग्ला, विष्णुप्रिया मणिपुरी, चकमा, अंग्रेजी, हलाम, कुकी, कॉकबरक, मणिपुरी।

यहाँ विशेष रूप से संकटापन्न भाषाओं में, वास्तव में, कुछ बोलियाँ भी शामिल हैं। जैसे, बोकर, बोरी, गाप, मिलाङ, मिनयेङ, पदम, पासी, तङम (आदी की बोलियाँ), इदू, मीजू (मिशमी की बोलियाँ), मेस (बोडो की एक उपभाषा), तुत्सा (नोकते की एक बोली), लाङरोङ (आइमोल की एक बोली), खोवा, लिमशा (शेरडुकपेन की बोलियाँ), रूगा (गारो और राभा से संबंधित बोली), बांगनी, तागिन (न्यीशी की बोलियाँ), आदि और एक ही भाषा/बोली के वैकल्पिक नाम जैसे, मिसिङ के लिए हिल मीरी और मिसिङ। कुछ (1000 से कम लोगों द्वारा बोली जाने वाली) भाषाएँ जो वास्तव में गंभीर खतरे में हैं संकटापन्न भाषाओं की सूची में शामिल नहीं हैं, जैसे चकमा, नेवारी, सुनुवार आदि। एक संकटापन्न/लुप्तप्राय भाषा विलुप्त होने की ओर बढ़ रही भाषा है। ऐसी भाषा एकभाषी

प्रयोगकर्ता विहीन होती है। जो लोग केवल एक भाषा बोलते हैं राष्ट्र में अल्पसंख्यक हो जाने के कारण कम सम्मान अर्जित कर पाते हैं और इसीलिए खुद इसे बोलने या प्रयोग करने से बचते हैं और इनके बच्चे भी वह भाषा प्रयोग करने से लड़खड़ाने लगते हैं। जब उन्हें लगने लगता है कि समाज में उनकी भाषा उपयोगी नहीं है तो बच्चे अपने माता–पिता की भाषा को त्याग करने लगते हैं। बहुमत संस्कृति में एक अल्पसंख्यक भाषा या कम प्रतिष्ठित भाषा को हतोत्साहित करना भी भाषा को खतरे में डाल देता है। ये दूसरी (प्रभावशाली, अधिक प्रतिष्ठित या उपयोगी) भाषा को अपनाने को प्रेरित होते हैं। भाषाएँ आंतरिक और बाह्य दोनों कारणों से मर जाती हैं। एक ओर बोलनेवालों के नियंत्रण से बाहर के बल सक्रिय होते हैं (दमन, भेदभाव या अन्य समूहों द्वारा शोषण और कई स्थितियों में सही तीन) तो दूसरी ओर भाषा समुदाय के खुद के नजरिए और मूल्यों में परिवर्तन, अंतर्भाषा– सामुदायिक, विवाह, बच्चों की स्थानीय भाषा को स्कूली शिक्षा में हतोत्साहित करना और मुख्य/मुख्यधारा की भाषा के प्रति निष्ठावान होना, भाषा के प्रयोग क्षेत्र का सिकुड़ना, आदि भी भाषा को मृत्यु या विलुप्ति के कगार पर ले आते हैं।

bhasha

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14

Nocte

Wanglit Mongchan

Introduction

Etymologically, the word 'Nocte' (also spelt as Nokte) comprises of two words, *Noc* meaning 'village' and *te* means 'people'; thus, the word means 'village-people' or 'villager' (Dutta 1978). The term 'Nocte' refers to both the people and the language. Earlier, the people were known by different names like Namsangia, Mohongia, Bordoria, and Panidoria as reported in Grierson's *Linguistic Survey of India* (1906: 334–40). However, these names were purely based on the existing Nocte villages at the time of the survey.

Dialect Classification

Based on the major linguistics variations found among the Noctes, Das Gupta (1971) has classified Nocte into six dialects namely, Hawa-jap, Phothung-jap, Khapa-jap, Tang-jap, Jope-jap, and Laju-jap. These dialects are supposedly mutually unintelligible. In *The Noctes* (Dutta 1978), nine dialects have been mentioned, namely, Hakhun, Khapa, Hawa, Domlak, Phothung, Jope, Sangniyak, Laju, and Dadom. Among these, dialects such as Hakhun, Hawa, Sangniyak and Dadom can be considered as one variety. Except for few lexical and tonal variations, no major differences are found among these dialects. However, since there is no detailed report on these languages at present, it is difficult to ascertain the exact number of dialects and sub-dialects of Nocte. At best it can be presumed that Nocte has five major dialects excluding Jope-jap (also known as Tutcha). Out of these five dialects, Tang-jap is related to the Wancho language in the Longding district.

The Dialect-Wise Distribution of Population

As per 2001 Census report, Nocte has 32,957 speakers. Noctes are chiefly concentrated in the Tirap district of Arunachal Pradesh. Besides Tirap district, Noctes are also found in Rajanagar in Changlang district of Arunachal Pradesh and in Joypur under the Dibrugarh district of Assam.

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