**Report of the First National Conference on**

# Recent Trends in Information Technology (NCIT 2015)

**Organized by**

**Department of Computer Science and Engineering,
Rajiv Gandhi University**

**In association with**

**NATIONAL BOARD FOR HIGHER MATHEMATICS**

**(15-16 September 2015)**

Report Date: 20/09/2015

The Department of Computer Science and Engineering, RGU organized a two-day The First National Conference on Recent Trends in Information Technology (NCIT 2015) from 15th September 2015 to 16th September 2015, in association with National Board For Higher Mathematics (A set up by the Government of India under the Department of Atomic Energy). This conference has provided a platform for researchers and academicians to share and exchange ideas on the various research topics in the fields such as Computer Networks, Data Mining and Databases, Artificial Intelligence & Cryptography, Pattern Recognition and Image Processing.

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# ORGANIZING COMMITTEE

## CHIEF PATRON
**Prof. Tomo Mibang**
Hon'ble Vice-Chancellor,RGU

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Prof.Rachob Taba

**Registrar**

**SECRETARY**

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**CONVENOR**

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**ORGANIZING COMMITTEE**

| | | |
|---|---|---|
| 1. | Mr. Ani Taggu | Associate Professor,CSE,RGU |
| 2. | Dr. Marpe Sora | Assistant Professor,CSE,RGU |
| 3. | Mrs. Bomken Kamdak Bam | Assistant Professor,CSE,RGU |
| 4. | Mr. Sikdar Md. Sultan Askari | Assistant Professor,CSE,RGU |
| 5. | Mr. Satish Kumar Das | Assistant Professor,CSE,RGU |

# ACKNOWLEDGEMENT

# EXECUTIVE SUMMARY

The Department of Computer Science and Engineering, RGU organized a two-day The First National Conference on Recent Trends in Information Technology (NCIT 2015) from 15$^{th}$ September 2015 to 16$^{th}$ September 2015, in association with National Board For Higher Mathematics (A set up by the Government of India under the Department of Atomic Energy) . This conference has provided a platform for researchers and academicians to share and exchange ideas on the various research topics in the fields such as Computer Networks, Data Mining and Databases, Artificial Intelligence & Cryptography, Pattern Recognition and Image Processing.

The conference had four sessions spread over two days with expert's key note addresses and interactive discussions. Total number of participants who has sent their willingness through mail to attend the conference was 150. Among them, 19 participants from various Universities and institution across the country have been selected to register and presented papers in the conference.

The experts and the resource persons were invited who have sound knowledge in the field of Computer Networks, Data Mining and Databases, Artificial Intelligence and Cryptography, Pattern Recognition and Image Processing are, Prof. Shivashankar B. Nair, Indian institute of technology ,Guwahati, Prof. Nityananda Sarma, Tezpur University ,Assam, Prof. Utpal Bhattacharjee, Rajiv Gandhi University, Arunachal Pradesh and Mr. Aswini Kumar Patra , North Eastern Regional Institute of Science and Technology (NERIST) has addressed with their key note addresses to the academicians and researchers during the sessions.

Thanking you.

**Mr.FIROS A**
**Convenor of conference,**
**Department of Computer Science and Engineering,**
**Rajiv Gandhi University (A Central University),**
**Rono Hills, Doimukh – 791112**
**Arunachal Pradesh, India**

# 1. PREFACE

## 1.1.     ABDOUT HOST INSTITUTION

### 1.1.1. *Rajiv Gandhi University*

Rajiv Gandhi University (formerly Arunachal University) is the premier institution for higher education in the state of Arunachal Pradesh and has completed twenty five years of its existence. RGU is ranked among top 100 Universities in India (as per NIRF ranking). Late Smt. Indira Gandhi, the then Prime Minister of India, laid the foundation stone of the university on 4th February 1984 at Rono Hills, where the present campus is located. Ever since its inception, the university has been trying to achieve excellence and fulfill the objectives as envisaged in the University Act. The University got academic recognition under section 2(f) from the University Grants Commission on 28th March, 1985 and started functioning from 1st April, 1985. It got financial recognition under section 12-B of the UGC on 25th March, 1994. Since then Rajiv Gandhi University then Arunachal University has carved a niche for itself in the educational scenario of the country following its selection as a University with potential for excellence by a high level expert committee of University Grants Commission from among universities in India. The University was converted into a Central University with effect from 9th April 2007 as per notification of Ministry of Human Resource Development, Government of India.

The Faculty members have been actively engaged in research activities with financial support from UGC and other funding agencies. Since inception, a number of proposals on research projects have been sanctioned by various funding agencies to the University. Departments have organized a number of Seminars, Workshops and Conferences. Many faculty members participated in national and international conferences and seminars held within the country and abroad. Eminent scholars and distinguished personalities have visited the University and delivered lectures on various disciplines.

The academic year 2000-2001 was a year of consolidation for the University. The switch over from annual to semester system took off smoothly and the performance of the students registered a marked improvement. Various syllabi designed by Boards of Post-Graduate Studies (BPGS) have been implemented. VSAT facility installed by the ERNET India, New Delhi under UGC-Infonet program, provides internet access.

In spite of infrastructural constraints, the University has been maintaining its academic excellence. The University has strictly adhered to the academic calendar, conducted the examinations and declared the results in time. The students from the University have found placements not only in State and Central Government Services, but also in various institutions, industries and organizations. Many students have come out successful in the National Eligibility Test (NET).Since inception; the University has made significant progress in teaching, research, innovations in curriculum development and developing infrastructure.

### 1.1.2. Department of Computer Science & Engineering

The Department of Computer Science was established in 2005, with a diploma course of one-year duration, and a three-year undergraduate course, Bachelor of Computer Applications (BCA). The first and second batch of the BCA programme has completed and the third batch has started from the session 2008-2009, starting from July, 2008. In the year 2006 the Master of Technology in Computer Science and Engineering was started in the department. The department has started the Master of Computer Application course from the session 2013-14.

## 1.2.    ABOUT THE SPONSORING AGENCY

The program is funded by NATIONAL BOARD FOR HIGHER MATHEMATICS and Rajiv Gandhi University

## 1.3.    BACKGROUND

Through this industry associated conference, we tried to build the next generation of technology developers and participants to achieve the practical knowledge from experts. This conference helped people unfamiliar with engineering science to put next gear in learning and research.

## 1.4.    SIGNIFICANCE AND OBJECTIVES OF THE CONFERENCE

1. The objectives are to provide the faculty with an understanding of R Programming Language and Statistics.
2. The learning outcomes include being able to identify research problems and environment commonly used in computing, data exploration and scientific research.
3. To bring the participants to the level of depth necessary in the subject matter to achieve the stated objectives.
4. To encourage participation in the National Agenda of  knowledge building
5. To introduce the participants with the basics of research and bring out an interest on it and also to provide resources that will support their classroom instruction as well as in their research.

## 1.5.    EXPECTED OUTCOMES

The purpose of this Conference is to enable the participants to apply the skills learned through various research papers presented and presentations of the conference. Participation in this conference will enable the participants to learn how to utilize the research infrastructure in a better and productive way.

This conference seeks to bridge the divide between what has traditionally been viewed as the sole objective of Information Technology and what CAN be the triple bottom line for forward-thinking Information Technology: its real application, ease of use, advancements and profit.

## 1.6.    THEMES AND SUB-THEMES

It was a 2 days conference which aimed at providing valuable information to rearschers of all walks of life. The main motive of this programme was to enhance the best techniques of research methods in the present day and to update the knowledge of the faculty within special focus on engineering science.

### 1.6.1. SUB-THEMES

The success of this conference is due to the peculiar themes of this program :

- **In person**. It was increasingly feasible to create and sustain virtual networks using resources such as videoconferencing and web 2.0 communications, which allowed substantial value in bringing people together to be immersed in a common experience. Personal interactions also allow for informal communication outside the defined schedule that can be valuable to the network-building process.

- **Duration**. Experience from 2 days of conference From 14 September 2015 to 15 September 2015 suggests that 2 to 3 day conference would be optimal, given the amount of new material that participants would be expected to absorb and the value of cumulative learning-by-doing.

- **Team-based**. A key element for ensuring success and enhancing sustainability in this conference is the participation of teams from institutions, including a range of junior to senior members on each team. The adopted conference model has shown added success and commitment by participants if their home institute provides at least modest resources to help implement what faculty learns.

- **Hands-on**. As the design of the planning committee meeting of Dept of CSE,RGU suggested, the conference built around extensive, direct participation. Participants have the opportunity to be both "students" and "teachers," to practice the methods they are learning, and to develop "teachable tidbits" and other materials (e.g., appropriate assessments) to help them implement their new courses or modules at their home institutions.

- **Implementation and Assessment**. An important feature of this conference's hands-on approach is the commitment to assist participants in implementing what they have learned. In addition to implementing new ideas or courses, they acquired experience and resources to plan and carry out effective assessments of whether the learning goals of their new activities are being met.

## 1.7.    BUDGET

| | |
|---|---|
| **AMOUNT SANCTIONED BY NBHM on 4.9.2015** | **RS.70000** |
| **AMOUNT SANCTIONED BY RGU** | **RS.124166** |
| **AMOUNT RECEIVED  THROGH REGISTRATION** | **RS.27100** |
| **Total Amount of Grant from  REGISTRATION + RGU+NBHM** | RS. 221266 |

Total expenditure made for the conference is Rs. 221266 (Rupees Two Lakhs Twenty One Thousand Two Hundred and Sixty Six only)

## 1.8.    MODUS OPERANDI

To encourage participation in the National Agenda of knowledge building

## 2. SESSION WISE DELIBERATIONS

### 2.1. INAUGURAL SESSION

**2 days conference on**

# Recent Trends in Information Technology (NCIT 2015)

**Organized by**
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(15-16 September 2015)

*INAUGURAL SESSION on 15 September 2015 at 10.00 AM*

| 09.20 am - 10:00 am | Participants Join the conference |
|---|---|
| 10:00 am - 10:10 am | welcome Address by Dr. Firos A, convener |
| 10:10 am - 10:20 am | Introduction of the conference by Prof. Utpal Bhattacharjee, Professor , secretary |
| 10:20 am - 10:30 am | Inaugural Address by Chief Patron, **Prof. Tomo Mibang**, Honorable Vice-Chancellor, Rajiv Gandhi university, Doimukh, Arunachal Pradesh |
| 10:30 am - 10:40 am | Vote of Thanks by Dr. Marpe Sora, co-coordinator |

On September 15, 2015, by 10.00 am ., the conference has started with the invocation. Then as every auspicious function starts with a traditional way , Light being the source of all transitions and transformations, the conference officially inaugurated by lighting of Lamp by the Chief Guest Prof. Tamo Mibang, Vice Chancellor, RGU.

Then the Vice-Chancellor has presented a bouquet to the Resource Person and Guest Prof. Shivashankar B. Nair, Indian institute of technology, Guwahati.

Prof. Shivashankar B. Nair inaugurating the conference by lighting of Lamp ,beside him seen
are Prof. Tamo Mibang, Vice-Chancellor, RGU and along with them Prof. Rachob Taba, The Registrar ,
RGU and Prof. Amitav Mitra, The Finance Officer, RGU

Then, the welcome address was given by Mr.Firos A, Convener, NCIT2015, with a
warm welcome and pleasant speech which has given a spark to the three day national
conference.

Welcome Address by Mr. Firos A , Convener, NCIT2015

Introduction of Seminar Theme was presented by by Prof. Utpal Bhattacharjee , secretary , NCIT2015 was followed by a few words by Prof. Rachob Taba, The Registrar , RGUand  a few word by Prof. Amitav Mitra, The Finance Officer, RGU.

*Introduction of Seminar Theme by Prof. Utpal Bhattacharjee , secretary , NCIT2015*

Then, the Resource Person of the inaugural function, Prof. Shivashankar B. Nair, was introduced to the audience about his career track and the awards and achievements received by him. And also pointed various posts held by him in different government sectors and the present post in detail the role played by him the department of higher education and the training provided to the engineering students across the country.

The presidential address to the gathering was given by eminent Vice chancellor, Prof. Tamo Mibang

Prof. Rachob Taba, The Registrar , RGU addressing the gathering

The chief guest, in his inaugural address to the gathering, pointed out that the Nano-Technology, Cloud computing, guidance and industrial training provided by the department of higher education to the engineering students and discussed various real world problems.

The Chief Guest was discussing about role of nature and natural resources where young engineers can play a vital role which gave so much of inspirations to the academicians and researchers . And also he was mentioning about the training which will be given to the faculty community in higher education which will in turn mould the student community not only in the academic field but also with extra curricular activities.

Prof.Shivashankar B. Nair, Professor, IIT , Guwahati  giving the Keynote Speech

The presidential address to the gathering was given by eminent Vice chancellor, Prof. Tamo Mibang, During his speech, he highlighted the following Evolution of the Computer Technology from olden age to Future.

We should have reasonable expectation of the problem.

He also discussed about the future technology like E-Governance etc.,

The words of the Vice –Chancellor gave so much of energy and motivated the students, faculties and the researchers to think innovatively in the field of Computing Technologies in emerging scientific fields .Not only in these computing but he also discussed about how regional languages can be used up in.



Chief Guests at the dais

After the Presidential Address, our honorable vice chancellor Prof. Tamo Mibang has released the Abstract book of the The First National Conference on Recent Trends in Information Technology (NCIT 2015) and the first copy was received by the Prof. Shivashankar B. Nair .

And this national conference has been considered as a Knowledge Hub for all the Researchers from the various institutions across the country.

And finally Vote of Thanks for the inaugural function was given by Dr.Marpe Sora, Co-Convener of the national conference.



## 2.2.    PLENARY SESSIONS

NA

## 2.3.    TECHNICAL SESSIONS

**1.Mobile Agents for Bio-Inspired Cyber Physical Systems by Prof. Shivashankar B. Nair of IIT Guwahati**

- Simulation
  - Fit for closed world problem
  - Uniprocessing
    - One sample/solution processed at a time
  - Use of Globally accessible variables
- Emulations
  - What about open world problem
    - Robotics
    - Parallel & Real Environments
  - Parallel Processing
  - Can variables/information be made available to all entities of a population?
  - Is Decentralization achievable?

- How does emulation help?
  - Landslide problem
  - Decentralization (disallows global variables)
  - Global Variables can
    - Eat up bandwidth
    - Coherence
  - Does Nature perform (simulations) with global variables?
  - How does Nature handle this problem?
  - How can we thus emulate
    - Real Networks?
    - Real Agents & Mobility?
- Cyber Physical systems (?)
  - A system of

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**2.Digital Convergence Technology: Integrating the New Media and Traditional Mass Media by Dr. M. Nawaz Khan,Department of Mass Communication ,Rajiv Gandhi University**

Digital technology has revolutionized the core media technologies even as the ever-expanding virtual information superhighway has criss-crossed the world into a global village. Adoption of computer technology in all stages of production, distribution and consumption of media contents has helped the emergence of an inter-connected network of communications while the convergence technology has blurred the boundaries between different media as well as between interpersonal and mass communication. The availability of many media services based on digital platforms like the Internet has increased the variety of information and communication channels changing the way people communicate. As such, the digital revolution has brought about a communication paradigm shift from the 'one-to-many' model of mass communication to the 'many-to-many' web model of communication. In the interactive New

Media environment, this poses various challenges for the traditional mass media like the print, radio, television and films. Nonetheless, the traditional mass media have adopted innovative technology to integrate with the new media as a strategy for disseminating their contents digitally on multiple platforms. And today many of them have a presence on the Web while the Internet provides many mass media services. This paper explores the concept of digital media convergence and the practices of integrating the New Media and the traditional mass media as a strategy to meet challenges in the converging digital environment.

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### 3 .The Role of Information Technology and Sustained Competitive Advantage of the Firm: A Resource Based View Perspective by Gautam Huidrom.

A firm is said to have a sustained competitive advantage when it is creating more economic value than the marginal firm in its industry and when other firms are unable to duplicate the benefits of this strategy. There are two theories on Sustained Competitive Advantage: such as *Industrial Organization View* in which structure of the industry defines competitive advantage and *Resource Based View* where a firm's unique attributes define competitive advantage. With Resource Based View of Sustained Competitive Advantage the sources of competitive advantage is within the boundary of the firm and the resources that is the inputs that enable an organization to carry out its activities and capabilities which is a cluster of attributes that an organization possesses which in turn allows it to compete in the marketplace hence resources and capabilities are key building blocks of competitive advantage. RBV approach to strategy formulation is given as: Resources -> Capabilities -> Competitive Advantage -> Strategy. Resources and Firm's Competitive Advantage are Culture, Trust, Absorptive Capacity, Firm's Innovativeness and Firm's History. The IT Resource Attributes and its Role in Building Sustained Competitive Advantage are Switching Cost, Access to Capital, Proprietary Technology, IT Technical Skills, IT Managerial Skills

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### 4 .Review On Design of Emotional Speech Database by Tamchi Yani and Liaz Alhad of RGU

A simple text conversion doesn't reveal emotion while a emotional speech states the present scenario of ongoing conversation. Some of the popular databases are: Emotional Prosody Speech and Transcripts, Belfast Natural Database, Vermobil, Groningen Database, Spanish Emotional Speech Database etc, most of the existing databases six emotional states (happy, sad, angry, boredom, fear, disgust ) are considered. Emotional speech data are basically collected using these three scenarios: stimulated , elicited and  natural. In *stimulated* condition the emotional speech is generated based on the explained situation. In *elicited* condition the emotional speech is generated by recalling some past memories. In *natural* scenario the emotional speech is collected in natural way. So it is difficult to get such data. The Nyishi emotional speech database(NESD) is created in Nyishi local language of Arunachal Pradesh. The

emotional speech is collected using local peoples in stimulated scenario. This database contains only four emotional speech including neutral. The emotionally robust speaker verification system is a need of the present time with the emergence of voice based customer support systems. So for developing such systems there is a demand of emotional speech database. As there is no emotional speech database in Nyishi language so this database is generated for research purpose. In the present work we have analyzed different emotional speech database analyzed their suitability for speaker verification research.

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*Day 1 (15.09.2015)* Time: 2.00 P.M - 5.00 P.M

*Session II :*

**5. Cooperative Spectrum Sensing in Cognitive Radio Networks: Issues and Challenges by Nityananda Sarma of Tezpur University.**

Cognitive Radio (CR) is a novel technology which allows to improve the utilization of precious Natural Resource - the Radio Spectrum by enabling Opportunistic Access to the Licensed Band by Unlicensed Users. Enabling Technology for CR is Software-Defined Radio (SDR) and some of the CRN platforms are: Universal Software Radio Peripheral (USRP) with GNU Radio as backend, Wireless open Access Research Platform(WARP) and Sundance etc. Advances in Cognitive Radios are carried out by the research groups of J. Mitola, I. Akyildiz, S. Haykin, Q. Zhao. Key functions of CRs are Spectrum Sensing, Spectrum Management, Spectrum Mobility, Spectrum Sharing. Factors which are affecting detection performance are multipath fading, shadowing, and receiver uncertainty problem. Cooperative Spectrum Sensing overcome multipath, shadowing, hidden terminal problem. The main issues in Cooperative Sensing are Cooperation Method, Cooperative Gain, Cooperation Overhead. Classification of Cooperative Sensing based on how cooperating users share the sensing data in the network are Centralized, Distributed and Relay-assisted

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**6. Integrating Face and Iris trait to design a Personal Authentication Technique (PAT) by using PCA (Principle Component Analysis) & canny edge detection method by Rima Rani Chutia.**

A biometric is a *physiological* or *behavioral* characteristic of a human being that can *distinguish* one person from another and that theoretically can be used for *identification* or *verification* of identity. In correspondence to biometrics, multimodal biometric systems are those that utilize more than one physiological or behavioral characteristic for recognition or authentication purposes. Its Motivation & Objective are Combining face and iris in a multi modal system, it can prove useful in security related applications for recognition. Human face may change in time, but iris is the part of the human which is not changeable and is stable throughout the life.

Proposed technique: Proposed steps for biometric recognition
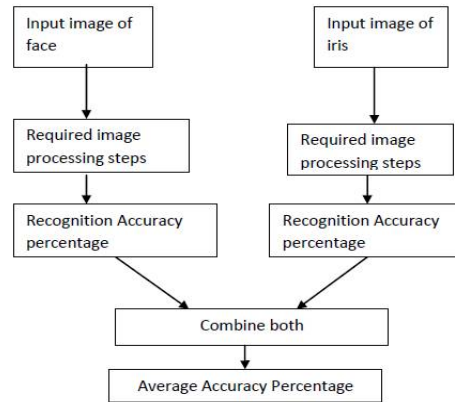


Face recognition part



Feature Extraction (PCA) contains the following steps get some data(x and y axis), subtract the mean (Adjusted dataset A, say), calculate the co-variance matrix, M(say), calculate the eigenvectors and eigen values of the covariance matrix M, sort the eigenvectors according to eigen values from highest to lowest, choosing components (choosing the highest order one and ignoring the lowest order respectively) and forming a feature vector(F) using the transpose of eigenvectors, deriving the new data set which is new data set=F x A(transposed).

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**7. Speech recognition System for Mymensingia dialect of Bangla using HTK by Afruza Begum, Sanghamitra Nath, S Md. S Askari, Utpal Sharma of Tezpur University**

Speech is the most popular and most important form of communication in everyday life. Automatic speech recognition is the task of taking an utterance of speech signal as an input, captured by a microphone, a telephone etc., and convert it into a text sequence as close as possible to the spoken data. Although attempts have been made for Bangla speech recognition, the Mymensingia dialect of Bangla language is distinct from standard Bangla. So far it is found from our survey that no speech recognition system is available in Mymensingia dialect, it is a dialect of Bangla language. This dialect is spoken by a large group of people in Assam (mostly in lower Assam), West Bengal and various districts of Bangladesh. HTK (Hidden Markov Model Toolkit): It is a software toolkit for Handling Hidden Markov Models. It is primarily used for

speech recognition research, it has also been used for various other applications speech synthesis, character recognition and DNA sequencing.

Processing stages of HTK
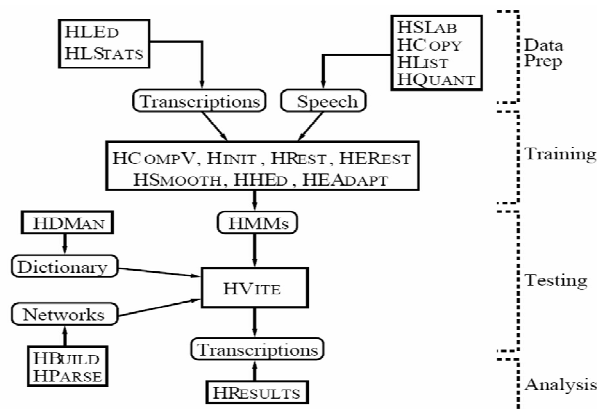


Creating Pronunciation Dictionary, Prompts file and Recording: A pronunciation dictionary is created , that's contain  sorted list of the  words of Mymensingia dialect with pronunciation. Promts file is created, which is the text transcription what we will record. Then all the sentence of the prompts file is recorded.

Recognition Evaluation:
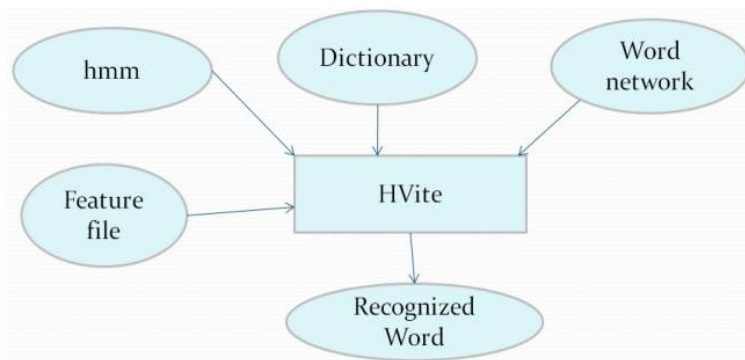


Results and Analysis: Performance of the system is tested against two types of  independent speaker, one who is involve both  training and testing , and another one evolved only in testing. Performance is checked in the normal room environment in the absent of noise. Training of our system is done by taking a small database of 30 sentences; it covers  around 100- 150 words. Our  Recognition System recognize 80%  word .

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**8. Prospective Teachers' Perception on ICT in Teacher Education by Dr. C. Siva Sankar of Dept. of Education Rajiv Gandhi University**

ICT (Information and Communication Technology): Haddad and Draxler (2002) identified five levels of technology use in education which are *Presentation*, *Demonstration*, *Drill-Practice*, *Interaction* and *Collaboration*. Objectives of this study is to find out prospective teachers' awareness on ICT in Teacher Education due to variation in gender and to find out prospective teachers' attitude on ICT in Teacher Education due to variation in gender. The Hypotheses of the study is to see if there exists no significant difference in prospective teachers' awareness on ICT in Teacher Education due to variation in gender and there exists no significant difference in prospective teachers' attitude on ICT in Teacher Education due to variation in gender. The insights for research on ICT: In long-scale studies related to Teacher Education ICT are needed to: Measure the effects of teachers' and pupils' ICT skills on the teaching and learning of specific subjects, monitor and assess the whole learning process, which is made up of various learning experiences in relation to ICT and Compare the effects of different uses of ICT on the learning of the same subject.

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**9. Dialect detection of Apatani language of Arunachal Pradesh by Bomken Kamdak Bam of RGU**

An introduction of Apatani Language: Apatani is one of the major tribe of Arunachal Pradesh of North-East India. Apatani language is spoken by around 60,000 people who contribute 2% of total population of state of Arunachal. Apatani People efficiently and effectively use Roman Script to write and read. The basic parameters in acoustic representation of Apatani words are Formant Frequencies and Pitch. Pitch is an important attribute of voiced speech. It contains speaker-specific information. There are a large set of methods that have been developed in the speech processing area for the estimation of pitch. Among them the mostly used method is autocorrelation of speech. Following are the observation recorded the $1^{st}$ formant and $2^{nd}$ formant frequencies for both male and female speakers from Hong village is higher than corresponding counterpart for Hija and Tajang village speakers.

$$F1_{Hong} > F1_{Tajang} > F1_{Hija}$$
$$F2_{Hong} > F2_{Tajang} > F2_{Hija}$$

It is observed from the recorded table that formant frequencies for female speakers is comparatively higher than the male speakers for all the villages.

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*Day 2 (16.09.2015)* **Time: 10.00 A.M - 1.00 P.M**

*Session III :*

## 10. Speaker Recognition: Advancements, Issues and Challenges by Prof Utpal Bhattacharjee of CSE RGU

Speech signal: The primary objective of using speech is to convey message, which is called textual information. In addition, it conveys information like general identity of the speaker, ethnicity, socio-economic background, emotion states etc. These are called paralinguistic information.

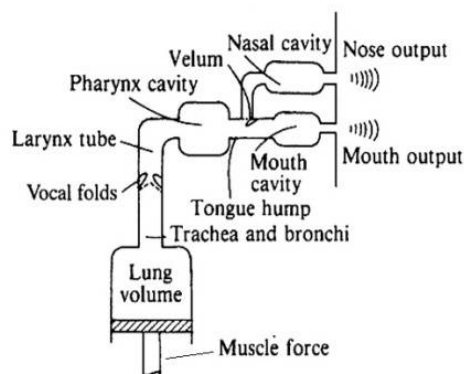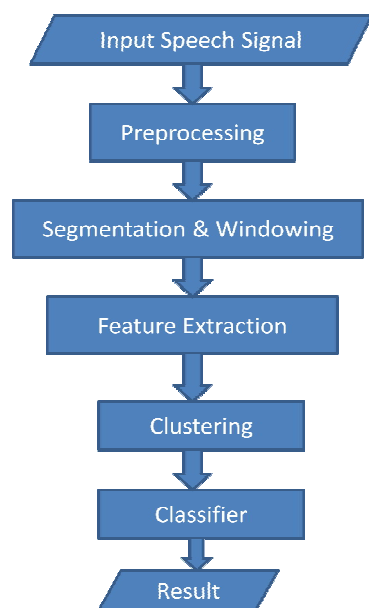How information is coded in a speech signal



Fig. The Vocal Organs

Textual information are mainly in the filter and the way it changes its properties over time, Paralinguistic information are mainly in the source parameters such as lung pressure which determines the intensity, vocal fold periodicity that determines instantaneous frequency or "pitch" and configuration of the glottis determines overall spectral tilt "voice quality". Identification is the term used to determines who is talking from set of known voices here no identity claim from user (one to many mapping) where as verification determines whether person is who he/she claim to be here user makes identity claim (one to one mapping). Speaker verification systems are of two categories such as text-dependent and text-independent. Phases of Speaker Verification System there are two distinct phases to any speaker verification system first being Enrollment Phase and second Verification Phase. Digitizing Speech (A/D) Involves three operations which are Sampling, Quantization and Encoding. Framing is done because speech is not a stationary signal and we want information about a small enough region that the spectral information is a useful cue. Cepstrum analysis is a technique for separating the components of the source and the vocal track filter. The speech signal can be expressed in terms of excitation e(t) and the vocal track model h(t) as a convolution in the time domain s(t) = e(t). h(t). Cepstral based features are Linear Predictive Cepstral Coefficient (LPCC), Mel-Frequency Cepstral Coefficient (MFCC) and Perceptual Linear Predictive Cepstral Coefficient (PLPCC). There are three feature level Noise Reduction Techniques which are Spectral Subtraction, Cepstral Mean Variance Normalisation and Variable Frame Rate Analysis. Speaker Modeling Techniques is in which speech analysis is motivated by the desire to reduce the spectral variability among multiple examples of the same word uttered with different background noise. The Gaussian Mixture model GMM has become established as the standard

classifier for text-independent speaker recognition; it is often used for speaker verification because this mode has good ability of recognition.  A popular method to find performance of the speaker verification system is the equal error rate (EER) which corresponds to the operating point where probability of False Acceptance Rate (FAR%) is equal to False Rejection Rate (FRR%). Some of the major Challenges of Speaker Recognition (open Problems) are channel mismatched condition, multilingual environments and environmental noise.

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## 11. Speech Based Gender Identification Using Feed Forward Neural Networks By, Seema Khanum, RGU

Gender Identification is the key to solve other problems such as Automatic Speaker Recognition,   Automatic Speech Recognition, Speech Coding.

Proposed Model



Input Speech Signal → Preprocessing → Segmentation & Windowing → Feature Extraction → Clustering → Classifier → Result

NOIZEUS Database is used for input speech signal which has 30 IEEE sentence database of  3 male and 3 female speakers and corrupted by 8 different real-world noises at different SNRs. For
feature extraction Mel-Frequency Cepstral Coefficient (MFCC) is taken which has Model loudness perception in human auditory system, easy, relatively fast and reduces the frequency information of the speech signal into smaller no. of coefficients. Clustering objectives require high computational cost and inappropriate for real time identification. Fuzzy C Mean Clustering is a data clustering technique in which each data point belongs to a cluster to some degree that

is specified by a membership grade. Feedforward Neural Network a common architecture consists of three layers (input, hidden, and output).
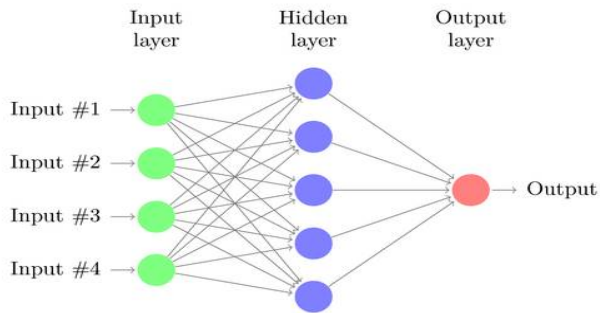


Experiments & Results are as follows ANN Training: Clean speech samples with different hidden neurons keeping the No. of Fuzzy clusters = 6, ANN Testing: Speech samples at SNRs of 0dB, 5dB, 10dB and 15dB are used. Spectral Subtraction Method is used for Noise Removal Technique because it's simple and effective method of noise reduction and the noisy signal y(m) is a sum of the desired signal x(m) and the noise n(m). In conclusion MFCC and ANN with noise elimination techniques can identify gender of the noisy speech signal better. The highest identification rate achieved is 83.3% for clean speech.

## 12. Temperature dependent current-voltage and photovoltaic properties of chemically prepared (p)Si/(n)Bi2S3 heterojunction by Dr.Amir Hussain ,Department of Physics, Rajiv Gandhi University

Ni-doped nanocrystalline Bi2S3 thin film is deposited on single crystal (p)-Si substrate by chemical bath deposition to form (p)Si/(n)Bi2S3 heterojunction structure. The electrical characterization of the (p)Si/(n)Bi2S3 heterojunction is carried out in the temperature range of 300K-340K and capacitance-voltage characteristics is measured at a frequency of 1KHz at 300K. Various junction parameters are calculated from the I-V characteristics. The ideality factor is found to be greater than unity with high series resistance. The ideality factor and series resistance decreases whereas the saturation current density increases with increase in temperature. The J-V characteristics under illumination showed poor photovoltaic effect of the junction. The existence of higher value of ideality factor and large number of interface states in (p)Si/(n) Bi2S3 heterojunction reduced the photovoltaic conversion efficiency.

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## 13. Comparison of BER in various fading environments in single antenna systems by Ankur Sarma from Jorhat Engineering College.

In wireless communication signals travels from transmitter to receiver via multipath, this can cause fluctuations in amplitude, phase and angle of the original message signal, This phenomenon is called fading (Means-attenuation of signal). Fading can further be classified into Rayleigh fading, Rician fading and Nakagami-m fading. Rayleigh fading resembling the Rayleigh distribution, hence known as Rayleigh fading and it is a non-line of-sight distribution. Rician fading is a situation when Line of sight (LOS) propagation occurs. Where as Nakagami-m fading

is a flexible model and it encircles both Rayleigh and Rician fading. The procedure followed was at first we have generated a random data stream of length as our input binary data using Matlab 14a, then randomization process has been carried out to convert long sequences of 0's and 1's in a random sequence using BPSK. The modulated data bits are then passed through AWGN (Additive White Gaussian Noise) and fading channel after which the signal is equalized using zero forcing equalization, then the error is being found out by subtracting the equalized signal from the transmitted signal and finally the Eb/N0 vs BER curve is being plotted.

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## 14. A Review on Various Techniques of Microstrip Patch Antenna Design for Wireless Application by Bikram Patir from RGU

Microstrip antenna is a good candidate which fulfils all requirements of wireless devices with several features like light weight, low fabrication cost, capable of multi band operations, low scattering cross section etc. There are various techniques to increase the performance of Microstrip patch antennas such as Slotting techniques, using thickness of the substrate, defected ground plane, stacked patches and Metamaterial loading. For designing and simulation the rectangular microstrip patch antenna (MPA), there are various designing software's are available, some of them are Zeland IE3D, Ansoft HFSS (High Frequency System Simulator), CST (Computer Simulation Technology). For antenna design there are three essential parameters, the resonant frequency, the thickness dielectric substrate and the dielectric constant. A thick substrate having low dielectric constant provides large bandwidth, better efficiency with reasonable gain and good radiation. A 9 Slots dual band microstrip patch antenna is designed to improve the bandwidth for wireless communications is reported by G. Vijaya Kumari et al. The antenna resonates in the frequency ranges of 5.27 GHz and 7.61 GHz with bandwidths of 11.87% & 11.22%. The antenna is fed with coaxial feeding and VSWR of the both bands is less than 1.09 is obtained from designed antenna. It is suitable WLAN applications. A triple band microstrip patch antenna with microstrip feeding technique has been successfully designed, simulated and analysed by Mukul Bhardwaj et. al. The design of this work gives the following results; The first band has resonant frequency 5.5 GHz and bandwidth 66 MHz with return loss -12.95. This frequency range is used for Wi-MAX applications. In conclusion it is reviewed that in MPA design it is very hard to achieve wide impedance bandwidth as well as high gain. In multiband operation the devices operate on different frequencies and to make antenna resonates on this multiple frequencies is very difficult. The initial seed physics efforts are only now beginning to bear some engineering applications fruit. There remain many challenging and potentially rewarding problems left to solve.

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## 15. Boundary Probabilistic Algorithm for Source Location Privacy in Wireless Sensor Networks by: Hanjabam Saratchandra Sharma from NERIST

Wireless sensor network (WSNs) is an ad-hoc network of wireless sensor nodes with reduced or no mobility. Sensor nodes are capable of sensing an event, collect information, process those information and disseminate them. Location Privacy is necessary so that an attacker cannot get the information from the node. It can be classified into two types Location privacy of data source and Location privacy of Base Station. Two types of attackers are Mote-class in which attacker can monitor communications between a limited number of nodes and Laptop-class in which an attacker can monitor area covering the entire network. Solutions for Laptop-Class Attacks are Naive Algorithm, Greedy Algorithm, Probabilistic Algorithm and Proxy-Based Filtering Scheme (PFS). The Goal being protection of the source location against laptop-class monitoring and minimize the cost of solutions in terms of the resources such as energy required in the sensor network. Steps involved in Naive Algorithm are finding Hopcount of each node upto the base station, each and every node broadcast maintenance message after fixed time interval and finally one of the node sensed event message. Probabilistic Algorithm contains the following steps finding Hopcount of each node upto the base station, each node has its own random maintenance period, a random number, suppose p in the range 0 to 1 is also assigned to each node, each node sends a dummy message at the end of each maintenance period and finally a preset threshold value, $P_{th}$, has been used to check the generation of dummy messages. Boundary Probabilistic has the following steps finding Hopcount of each node upto the base station, each node has its own random maintenance period, a random number, suppose p in the range 0 to 1 is also assigned to each node, each node in the delivery path from boundary node to base station sends a dummy message at the end of each maintenance period, a preset threshold value, $P_{th}$, has been used to check the generation of dummy messages. Comparison on delivery time of naive, probabilistic and boundary probabilistic algorithm is shown below
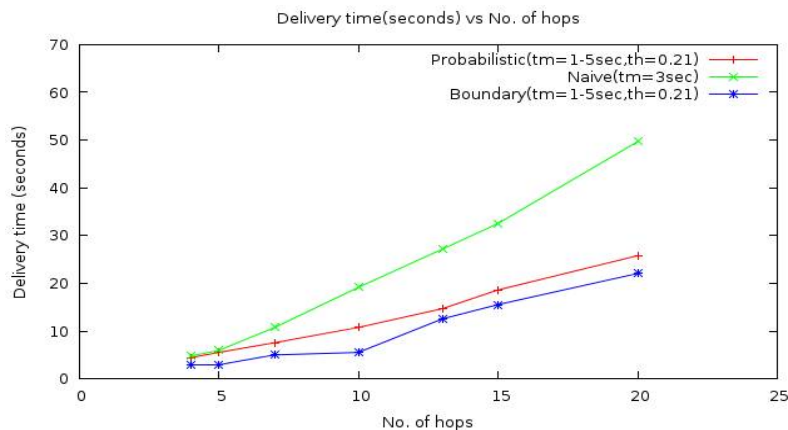


In conclusion the Boundary Probabilistic Algorithm not only provides privacy but also reduces energy consumption by avoiding unnecessary generation of dummy messages as Naive and Probabilistic algorithm, thereby increasing battery life of the nodes which in turn increases the total life span of the entire network.

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**16. A study on the role of Human Resource Information Systems (HRIS) and its significance for the effective functioning of the Human Resources Department by ARINDAM GARG of RGU.**

HRIS is a key management tool which collects, maintains, analyses and reports information on people and jobs. It is a system because it integrates all the relevant data, which otherwise might have been lying in a fragmented and scattered way at various points in the larger system; converts this data into meaningful conclusions or information and makes it accessible to the persons, who need it for their decisions. In the new millennium electronic services such as e-learning, e-commerce and e-business became possible and common because of the invention of World- Wide-Web (www). Along with the development of HRIS the concept of electronic HRM (e-HRM) has also been launched as an internet invention and implementation of HRIS. Employee interaction at various locations as well as employee related operations happens through the HRIS system. HRIS is used for a variety of purposes for example it is used for strategic, tactical, and operational decision, it is also used to avoid litigation and also it is used to evaluate programs, policies, or practices. Key Aspects in HRIS implementation are Implementing, Technical support, Work Flow analysis and Change Management. Some implementations of HRIS are as follows HR Planning & Analysis , equal Employment Opportunities, staffing, HR development, compensation & benefits, health, safety, welfare, employee & labour relations, Auditing records, Exit Interview Analysis, Employee work history

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## 17. Influence of Thinking, Feeling and Reasoning in Learning by Dr. B. Reena Tok of Department of Education RGU

Fields with researches who identify with HCI includes human factor, information system, cognitive science, organizational psychology, information science. Cognition is a mental activity where as thinking is defined as the manipulation of mental representations of information. Associationist theories of thinking in which thinking is taken as response learning. There are three elements in associationist theory which are stimulus a problem solving situation, response a particular problem solving behavior and associations that is strength between stimulus and response. Reasoning is the process by which information is used to draw conclusions and make decisions. When faced with making decisions, we often turn cognitive shortcuts. Strength and weakness of Expert system is show as follows

| Human Expertise | Artificial Expertise |
|---|---|
| **The Good News** | |
| Perishable | Permanent |
| Difficult to transfer | Easy to transfer |
| Difficult to document | Easy to document |
| Unpredictable | Consistent |
| Expensive | Affordable |
| **The Bad News** | |
| Creative | Uninspired |
| Adaptive | Needs to be told |
| Sensory experience | Symbolic input |
| Broad focus | Narrow Focus |
| Commonsense knowledge | Technical knowledge |

In Conclusion the physiology of emotion and its consequent Process of feeling have enormous repercussion for the way we learn and the way we consolidate and access knowledge.

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 *Day 2 (15.09.2015)* Time: 2.00 P.M - 3.45 P.M

*Session IV :*

### 18. Genetic Algorithm: An Introduction by Aswini Kumar Patra of NERIST

A genetic algorithm conceptually follows steps inspired by the biological processes of evolution. Simple Genetic Algorithm produce an initial population of individuals and evaluate the fitness of all individuals, the algorithm is while termination condition not met do select fitter individuals for reproduction, recombine between individuals, mutate individuals, evaluate the fitness of the modified individuals, generate a new population End while.

The Evolutionary Cycle
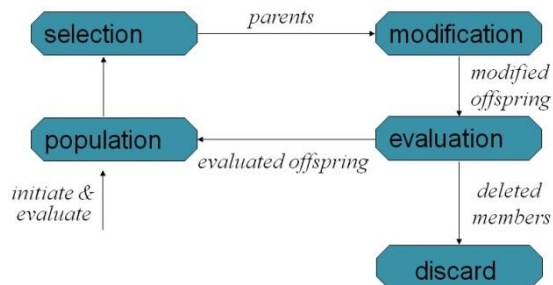


Stochastic operators are Selection: replicates the most successful solutions found in a population at a rate proportional to their relative quality, Crossover: decomposes two distinct solutions and then randomly mixes their parts to form novel solutions and Mutation: randomly perturbs a candidate solution. In selection the purpose is to focus the search in promising

regions of the space, its inspiration is Darwin's "survival of the fittest" and it is important to keep variety in the population. Various types of selection are Roulette wheel, Tournament, Truncation and Elitist. In crossover there is a chance that the chromosomes of the two parents are randomly recombined (crossover) to form offspring, generally the chance of crossover is between 0.6 and 1.0. There are three types of crossovers such as single point crossover, two-point cross over and uniform crossover. The purpose of mutation is to simulate the effect of errors that happen with low probability during duplication. One of the advantages of mutation is it can "generate" new genes where as a crossover can only explore the combinations of the current gene pool. Types of mutation are Bit-flip, Bit-Exchange and Inversion. There are three ways to decide the members of the new population which are Delete-all, Steady-state and Steady-state-no duplicates. Advances in Genetic Algorithm are Vector Evaluated Genetic Algorithm (VEGA), Weighted based genetic algorithm (WEGA), Multiple objective genetic algorithm, Non-dominated Sorting Genetic Algorithms (NSGA).

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## 19.Network Intrusion Detection Using A Graph based hybrid Approach by  S Md. S  Askari , Kongkon Kalita,  Afruza Begum,  D.K. Bhattacharyya

Data that do not conform the expected behavior are termed as anomaly, outliers, discordant observations etc. An anomalous traffic in a network could mean that a hacked computer is sending out sensitive data to an unauthorized destination. IDS allows an organization to protect their system from these threats. Analysis are based on two types: *Signature* Based which searches for a specific pattern of attack Signature in the data, previously known attacks are effectively detected without  large no. of false alarms, but new types of attacks are not detected. *Anomaly* based it models for normal behavior and detects significant deviations from it. It Assumes all intrusive activities are anomalous and new attacks are detected easily. For lunching real life attacks following tools are used: *Network Mapper* (Nmap) which is used to generate the probe attacks in which more than 30 types of probe attacks can be generated. *Targa* is used for lunching the DoS Attack. It's a combination of 11 different types of DoS attacks. For capturing the traffic and processing the following tools are used: Wireshark, Gulp, TCP Trace and for capturing traffic data in flow level the tool which can be used is Nfdump. The features extracted are basic features, content based features, time based features, connetion based features, and window based features. Nfdump  is the netflow display and analyzing program. Nfdump contains the following tools where all tools support netflow v5, v7 and v9. Nfdump **-** netflow dump: Reads the netflow data from the files stored by nfcapd. It's syntax is similar to tcpdump. Nfdump displays netflow data and can create lots of top N statistics of flows IP addresses, ports etc ordered by whatever order you like. Another tool for cpturing the Packet level traffic and processing is Nfsen which is a graphical web based front end for the

Nfsen netflow tools, which allows for display our netflow data: Flows, Packets and Bytes using RRD (Round Robin Database), easily navigate through the netflow data, process the netflow data within the specified time span. Parameters which were considered are flow-start, Duration, Proto, Src-IP, src.-Port, Dest-IP, dest.-Port, Flags, ToS, Packets, Bytes, pps, bps and Bpp. Proposed Algorithm is given as follows Phase-1

START:
1. Until the dataset is scanned completely
2. For the current record $v_i$ scan dataset until a similar record is found or the dataset is over j=i+1.
3. Calculate the similarity measure $\mu_i$ between the two records $V_i$ and $V_j$.
4. If $\mu_i \leq \partial$
   a. Put an edge $e_{(i,j)}$ between the two records $V_i$ and $V_j$
   b. Mark the $V_i$ and $V_j$ as selected
   c. Update $V_j \leftarrow V_{i+1}$:i+1$\neq$j and if so update $V_i \leftarrow V_{j+1}$
   d. Go to step(2)
5. Else update $v_j \leftarrow v_{j+1}$ go to step(3)
6. If no record is found similar for the record $V_i$ then keep vi as isolated graph $g_i$
7. Update $V_i \leftarrow V_{i+1}$ go to step(2)
END


Phase-2
START:
1. Until no two graphs can be joined.
2. For the current graph $g_i$ scan graph set until a similar graph is found or the graph set is over j=i+1.
3. Calculate the similarity measure $\mu_i$ between the two graphs $g_i$ and $g_j$.
4. If $\mu_i \leq \partial$
   a. Put an edge $e_{(i,j)}$ between $g_i$ and $g_j$
   b. Mark the $g_i$ and $g_j$ as selected
   c. Update $g_j \leftarrow g_{i+1}$:i+1$\neq$j and if so update $g_i \leftarrow g_{j+1}$
   d. Go to step(2)
5. Else update $g_j \leftarrow g_{j+1}$ go to step(3)
6. If no graph is found similar to $g_i$ then keep gi as it was in $G_i$.
7. Update $g_i \leftarrow g_{i+1}$ go to step(2)
END

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## 2.4.    TARGET GROUP

Research scholars, PG students, faculty members and industry people in national level.

## 2.5.    HOW THE CONFERENCE WAS BENEFICIAL FOR THE PARTICIPANTS

The purpose of this Conference was to enable the participants to apply the skills learned through various research papers and presentations of the conference. Participation in this conference enabled the participants to learn how to utilize the Data science infrastructure in a better and productive way.

This conference seeks to bridge the divide between what has traditionally been viewed as the sole objective of Information Technology and what CAN be the triple bottom line for forward-thinking Information Technology: its real application, ease of use, advancements and profit.

## 2.6.    THE CONFERENCE DETAILS

1. Registration of conference started Date:  22-4-2015

    and Last Date for registration: 28-08-2015

2. The  conference date: 14-15 September 2015 ( 2 days)

3. The Total Number of Registrations: 213

4. The faculty members and research scholars from the following states (12 states) and Union Territory, registered for conference.

|      |                   |       |               |
|------|-------------------|-------|---------------|
| i.   | Andhra Pradesh    | viii. | Manipur       |
| ii.  | Arunachal Pradesh | ix.   | Rajasthan     |
| iii. | Assam             | x.    | Tamil Nadu    |
| iv.  | Bihar             | xi.   | Uttar Pradesh |
| v.   | Karnataka         | xii.  | West Bengal   |
| vi.  | Kerala            |       |               |
| vii. | Maharashtra       |       |               |

5. Conference proceedings and Instructions about conference communicated through mails to all participants.

### *2.7.    PANEL DISCUSSIONS*

<div align="center">NA</div>

### *2.8.    VALEDICTORY SESSION*

<div align="center">

**2 days conference on**

# Recent Trends in Information Technology (NCIT 2015)

**Organized by**
Department of Computer Science and Engineering,
Rajiv Gandhi University

In association with

NATIONAL BOARD FOR HIGHER MATHEMATICS

(15-16 September 2015)

**INAUGURAL SESSION on 16 September 2015 at 10.00 AM**

</div>

| 03.50 pm – 04:00 pm | Participants Join the Meeting |
|---|---|
| 04:00 pm – 04:10 pm | welcome Address by Dr. Marpe Sora, co-coordinator, NCIT2015 |
| 04:10 pm – 04:20 pm | Outcome of the conference by Prof. Utpal Bhattacharjee, Professor , secretary |
| 04:20 pm – 04:30 pm | Vote of Thanks Mr. Sikdar Md. Sultan Askari , co-coordinator, NCIT2015 |

The Two day National Conference on Recent Trends in Information Technology (NCIT 2015) , successfully came to an end which provided a resource platform as a knowledge hub to all the academicians and the researchers with fullest support from the Rajiv Gandhi University , Vice- Chancellor , Registrar, Dean( E & T ), Faculties and Students, and all others who has directly or indirectly who helped in organizing this Conference.

## 3.  MAJOR TAKEAWAYS

### 3.1.  ACADEMIC CONTEXT

It was increasingly feasible to create and sustain virtual networks using resources such as videoconferencing and web 2.0 communications, which allowed substantial value in bringing people together to be immersed in a common experience. Personal interactions also allow for informal communication outside the defined schedule that can be valuable to the network-building process. Experience from 2 years of conference 15-16 September 2015 suggests that 2 to 3 day long conference would be optimal, given the amount of new material that participants would be expected to absorb and the value of cumulative learning-by-doing.

A key element for ensuring success and enhancing sustainability in this conference is the participation of teams from institutions, including a range of junior to senior members on each team. The adopted conference model has shown added success and commitment by participants if their home institute provides at least modest resources to help implement what faculty learns.

### 3.2.  RESEARCH CONTEXT

As the design of the planning committee meeting of Dept of CSE,RGU suggested, the conference built around extensive, direct participation. Participants have the opportunity to be both "students" and "teachers," to practice the methods they are learning, and to develop "teachable tidbits" and other materials (e.g., appropriate assessments) to help them implement their research or modules at their innovation practices.

An important feature of this conference's hands-on approach is the commitment to assist participants in implementing what they have learned. In addition to implementing new ideas or courses, they acquired experience and resources to plan and carry out effective assessments of whether the learning goals of their new activities are being met. Through this conference participant academics from various universities may discussed didactical approach of research in data science and get its benefits for their research.

## 3.3.    POLICY MAKING AND PRACTICE CONTEXT

At this conference, we will deliberate on some of the critical aspects of modern trends of advanced research tools in higher education. This conference introduces the various science research product families and provides a high-level overview of the major capabilities. Conference highlights include examples that demonstrate first-person modeling, modeling paradigms, and black box modeling with a special reference to Machine learning and Deep learning.

The resource persons through tutorials explained how we can use deep learning modules for data exploration to invert the classroom and create a more active learning environment. It is also covered best practices on incorporating technical computing, modeling, and simulation in research based academic curricula.

## 3.4.    SUMMARY

The 2 Days conference(ONLINE) on Recent Trends in Information Technology organized by Department of CSE, Rajiv Gandhi University in association with National Board For Higher Mathematics was concluded today. Total 168 participants from various parts of the country attended the program connecting through online mode from their home.

Prof. Tomo Mibang, Hon'ble Vice-Chancellor congratulated the participants who completed the  program and told that learning is a continuous process that promote teachers' teaching skills, master new knowledge, develop new proficiency, which in turn, help improve students' learning . He expressed that, the outbreak of COVID-19 pandemic in India has caused extreme distress to the society and is a setback to academic activity. In this moment of crisis, RGU has endeavored to leverage digital access for continuation of the academic activities by online mechanisms, he said. He appreciated the Department of CSE for organizing the program in an appropriate time. Prof. A. Mitra, Pro-Vice Chancellor stressed the importance of online platforms for learning during this pandemic.  Prof. Rachob Taba, Registrar stressed that RGU always tries to provide the best and innovative learning environment to the participants, this time in an online mode.

All the participants expressed that they had wonderful learning experience during the conference and conveyed their gratitude to the conference secretary Prof. Utpal

Bhattacherjee and convener Dr. Firos A. They said that these 2 Days experience would take them a long way in their academic prospects.

The conference organized by RGU was meant for faculty and researchers. The conference is specially designed to meet the modern education requirements of teachers, researchers, and trainers in HRD, training colleges and industrial organizations. The 2 Days programme from September 14, 2015 to September 15, 2015 not only covered basic idea about the modern research trends, which can play great role in almost all research areas but also focused on qualitative and quantitative research methods and innovative pedagogical techniques.

A unique component of the conference was to provide information and guidelines to develop expertise in using R functions and the ways to access packages of R in various research works. The programme incorporated rigorous exercises and live projects. Participants were given the learning resources that will support their classroom instruction as well as in their research in future. The added advantage for this offering was the scope to learn through diversity in the participant's background. They were from different fields of Engineering, Management, Finance, Marketing, HR, etc. and came with a rich array of experience. The participants from all over the country worked together in groups, staying at home and connecting through online platform. Their presentations and reports were of high standards and reflected their learning through diversity and the honed analytical skills of academicians.

## 4. APPENDIXES & ANNEXURE

## ANNEXURE 1: PHOTOGRAPHS



**Dr. Nawas Khan Presenting Paper**



*Delegates*

Department of Computer Science and Engineering,RGU



*Department of Computer Science and Engineering,RGU*

*The First National Conference on Recent Trends in Information Technology (NCIT 2015)*

## ANNEXURE 2: MEDIA COVERAGE

Media coverage about the conference is published on 16 September 2015 edition of Arunachal Front.

## ANNEXURE 3: JOURNAL PUBLICATION OF THE NCIT-2015 CONFERENCE PAPERS

The selected papers presented at the conference is published in the International Journal of Computer Applications (IJCA)- ISSN for IJCA Digital Library is 0975 - 8887. International Journal of Computer Applications (IJCA) is a peer reviewed journal published by Foundation of Computer Science (FCS).  The published paper of the conference is available at the link Number 1 (ISBN: 973-93-80892-18-1): https://www.ijcaonline.org/proceedings/ncit2015/number1/