Advances in Intelligent Systems and Computing 1125

Vijender Kumar Solanki
Manh Kha Hoang
Zhonghyu (Joan) Lu
Prasant Kumar Pattnaik *Editors*

Intelligent Computing in Engineering

Select Proceedings of RICE 2019

Springer

Advances in Intelligent Systems and Computing

Volume 1125

Series Editor

Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland

Advisory Editors

Nikhil R. Pal, Indian Statistical Institute, Kolkata, India
Rafael Bello Perez, Faculty of Mathematics, Physics and Computing, Universidad Central de Las Villas, Santa Clara, Cuba
Emilio S. Corchado, University of Salamanca, Salamanca, Spain
Hani Hagras, School of Computer Science and Electronic Engineering, University of Essex, Colchester, UK
László T. Kóczy, Department of Automation, Széchenyi István University, Gyor, Hungary
Vladik Kreinovich, Department of Computer Science, University of Texas at El Paso, El Paso, TX, USA
Chin-Teng Lin, Department of Electrical Engineering, National Chiao Tung University, Hsinchu, Taiwan
Jie Lu, Faculty of Engineering and Information Technology, University of Technology Sydney, Sydney, NSW, Australia
Patricia Melin, Graduate Program of Computer Science, Tijuana Institute of Technology, Tijuana, Mexico
Nadia Nedjah, Department of Electronics Engineering, University of Rio de Janeiro, Rio de Janeiro, Brazil
Ngoc Thanh Nguyen, Faculty of Computer Science and Management, Wrocław University of Technology, Wrocław, Poland
Jun Wang, Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong, Shatin, Hong Kong

The series "Advances in Intelligent Systems and Computing" contains publications on theory, applications, and design methods of Intelligent Systems and Intelligent Computing. Virtually all disciplines such as engineering, natural sciences, computer and information science, ICT, economics, business, e-commerce, environment, healthcare, life science are covered. The list of topics spans all the areas of modern intelligent systems and computing such as: computational intelligence, soft computing including neural networks, fuzzy systems, evolutionary computing and the fusion of these paradigms, social intelligence, ambient intelligence, computational neuroscience, artificial life, virtual worlds and society, cognitive science and systems, Perception and Vision, DNA and immune based systems, self-organizing and adaptive systems, e-Learning and teaching, human-centered and human-centric computing, recommender systems, intelligent control, robotics and mechatronics including human-machine teaming, knowledge-based paradigms, learning paradigms, machine ethics, intelligent data analysis, knowledge management, intelligent agents, intelligent decision making and support, intelligent network security, trust management, interactive entertainment, Web intelligence and multimedia.

The publications within "Advances in Intelligent Systems and Computing" are primarily proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

**** Indexing: The books of this series are submitted to ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar and Springerlink ****

More information about this series at http://www.springer.com/series/11156

Vijender Kumar Solanki · Manh Kha Hoang ·
Zhonghyu (Joan) Lu · Prasant Kumar Pattnaik
Editors

Intelligent Computing in Engineering

Select Proceedings of RICE 2019

Springer

Editors
Vijender Kumar Solanki
CMR Institute of Technology
Hyderabad, India

Manh Kha Hoang
Hanoi University of Industry
Ha Noi, Vietnam

Zhonghyu (Joan) Lu
University of Huddersfield
Huddersfield, UK

Prasant Kumar Pattnaik
KIIT University
Bhubaneswar, India

ISSN 2194-5357 ISSN 2194-5365 (electronic)
Advances in Intelligent Systems and Computing
ISBN 978-981-15-2779-1 ISBN 978-981-15-2780-7 (eBook)
https://doi.org/10.1007/978-981-15-2780-7

© Springer Nature Singapore Pte Ltd. 2020
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface

The 4th International Conference on Research in Intelligent and Computing in Engineering, popularly known as RICE 2019, was held on August 08–09, 2019 in Hanoi University of Industry (HaUI), Hanoi, Vietnam.

The Fourth edition of RICE 2019, organized by the Electronic Engineering Faculty of the HaUI, provides an international forum which brings together the researchers as well as the industry practitioners, who are actively involved in the research in fields of intelligent computing, data science, or any other emerging trends related to the theme covered by this conference. RICE 2019 provided an opportunity to account state-of-the-art works, to exchange ideas with other researchers, and to gather knowledge on advancements in informatics and intelligent systems, technologies, and applications.

This conference has technical paper sessions, invited talks, and panels organized around the relevant theme. RICE 2019 was the event where the author had the opportunity to meet some leading researchers, to learn about some innovative research ideas and developments around the world, and to become familiar with emerging trends in Science and Technology.

RICE 2019 received a huge response in terms of submission of papers across the countries. RICE 2019 received papers from various countries outside Vietnam such as India, China, Russia, Australia, New Zealand, and many more. The Organizing Committee of RICE 2019 constituted a strong international program committee for reviewing papers. A double-blind review process has been adopted. The decision system adopted by EasyChair has been employed and 118 papers have been selected after a thorough double-blind review process. The proceedings of the conference will be published as one volume in Advances in Intelligent Systems and Computing, Springer, indexed by ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar, and Springerlink.

We convey our sincere gratitude to the authority of Springer for providing the opportunity to publish the proceedings of RICE 2019.

To realize this conference in 2019, we really appreciate Hanoi University of Industry to host the conference and to be continuously supporting the organization team during the preparation as well as 2 days of the conference. In addition, we

would like to give a special thanks to Vintech City, a member of Vingroup, that has supported the conference as a diamond sponsor. We would also like to thank the financial support of ASIC Technologies to RICE 2019. Without their support, this conference would have not been successful as the first time being held in Vietnam.

Our sincere gratitude to all keynote address presenters, invited speakers, session chairs, and high officials in India and Vietnam for their gracious presence in the campus on the occasion.

We would like to thank the keynote speaker as Prof. Vijender Kumar Solanki, CMR Institute of Technology, Hyderabad, TS, India; Dr. Le Hoang Son, VNU, Hanoi Vietnam; Dr. Kumbesan, Australia; Dr. P K Pttanaik, KIIT Bhubaneswar, Odisha, India; Dr. Rashmi Agarwal, MRIIS, Haryana, India for giving their excellent knowledge in the conference.

We would like to thank the reviewers for completing a big reviewing task in a short span of time.

We would also like submit our sincere thanks to the program committee members such as Dr. Le Van Thai, Dr. Hoang Manh Kha, Dr. Nguyen Thi Dieu Linh, Dr. Phan Thi Thu Hang, Dr. Tong Van Luyen—Electronic Engineering Faculty of the HaUI; Prof. Tran Duc Tan—Phenikaa University, Vietnam; and Dr. Raghvendra Kumar, GIET University, Gunupur, Odisha, India for their efforts to make congress success.

Moreover, we would like to thank all the authors who submitted papers to RICE 2019 and made a high-quality technical program possible. Finally, we acknowledge the support received from the faculty members, scholars of Electronic Engineering Faculty of the HaUI, officers, staffs, and the authority of Hanoi University of Industry.

We hope that the articles will be useful for the researchers who are pursuing research in the field of computer science, information technology, and related areas. Practicing technologists would also find this volume to be a good source of reference.

Hyderabad, India — Vijender Kumar Solanki
Ha Noi, Vietnam — Manh Kha Hoang
Huddersfield, UK — Zhonghyu (Joan) Lu
Bhubaneswar, India — Prasant Kumar Pattnaik

Contents

Assessment of the Heart Disease Using Soft Computing Methodology 1
Dharmpal Singh, Sudipta Sahana, Souvik Pal, Ira Nath and Sonali Bhattacharyya

The Reasons for Rail Accident in India Using the Concept of Statistical Methods: An Analytical Approach 9
Dharmpal Singh, Sudipta Sahana, Souvik Pal, Ira Nath, Sonali Bhattacharyya and Srabanti Chakraborty

Automatic Music Genre Detection Using Artificial Neural Networks 17
Pratanu Mandal, Ira Nath, Nihal Gupta, Madhav Kumar Jha, Dev Gobind Ganguly and Souvik Pal

Role of Ad Hoc and Sensor Network for Effective Business Communication 25
Ishu Varshney and Sunny Prakash

Implementation of Integrated Security System by Using Biometric Function in ATM Machine 33
Pushpa Choudhary, Ashish Tripathi, Arun Kumar Singh and Prem Chand Vashist

DTSS and Clustering for Energy Conservation in Wireless Sensor Network 43
Arpana Mishra, Shubham Shukla, Akhilesh Kumar Singh and Anika Gupta

Load Distribution Challenges with Virtual Computing 51
Neha Tyagi, Ajay Rana and Vineet Kansal

Mobile Ad Hoc Network and Wireless Sensor Network: A Study of Recent Research Trends in Worldwide Aspects 57
Ishu Varshney

Comparative Analysis of Clustering Algorithm for Wireless Sensor Networks 63
Smriti Sachan, Mudita Vats, Arpana Mishra and Shilpa Choudhary

Concept of Cancer Treatment by Heating Methodology of Microwave 73
Awanish Kumar Kaushik, Smriti Sachan, Shradha Gupta and Shilpa Choudhary

Novel Approach to Detect and Extract the Contents in a Picture or Image 81
Awanish Kumar Kaushik, Shilpa Choudhary, Shashank Awasthi and Arun Pratap Srivastava

LEACH with Pheromone Energy Efficient Routing in Wireless Sensor Network 91
Arpana Mishra, Shilpa Choudhary, Mudita Vats and Smriti Sachan

Industrialization of IoT and Its Impact on Biomedical Life Sciences 99
Aritra Bhuiya and Sudan Jha

Parts of Speech Tagging for Punjabi Language Using Supervised Approaches 107
Simran Kaur Jolly and Rashmi Agrawal

Development of Decision Support System by Smart Monitoring of Micro Grid 117
Laxmi Kant Sagar and D. Bhagwan Das

Gender Recognition from Real-Life Images 127
Apoorva Balyan, Shivani Suman, Najme Zehra Naqvi and Khyati Ahlawat

Applications of Raspberry Pi and Arduino to Monitor Water Quality Using Fuzzy Logic 135
Padmalaya Nayak, Chintakindi Praneeth Reddy and Devakishan Adla

Developing a Smart and Sustainable Transportation Plan for a Large-Sized City: An Approach to Smart City Modeling 145
Sushobhan Majumdar and Bikramjit Sarkar

Improved Data Dissemination Protocol for VANET Using Whale Optimization Algorithm 153
Bhoopendra Dwivedy and Anoop Kumar Bhola

A Novel IoT-Based Approach Towards Diabetes Prediction Using Big Data 163
Riya Biswas, Souvik Pal, Nguyen Ha Huy Cuong and Arindam Chakrabarty

Technical Solutions to Build Technology Infrastructure for Applications in Smart Agricultural Models 171
Nguyen Ha Huy Cuong, Souvik Pal, Sonali Bhattacharyya, Nguyen Thi Thuy Dien and Doan Van Thang

Edge Detection Through Dynamic Programming in Ultrasound Gray Scale Digital Images 177
Anju Mishra, Ramashankar Yadav and Lalan Kumar

Impact of Heterogeneous IoT Devices for Indoor Localization Using RSSI 187
Bhagwan Sahay Meena, Sujoy Deb and K. Hemachandran

Indoor Localization-Based Office Automation System Using IOT Devices 199
Bhagwan Sahay Meena, Ramin Uddin Laskar and K. Hemachandran

Ensemble Based Approach for Intrusion Detection Using Extra Tree Classifier 213
Bhoopesh Singh Bhati and C. S. Rai

Fourth Industrial Revolution: Progression, Scope and Preparedness in India—Intervention of MSMEs 221
Arindam Chakrabarty, Tenzing Norbu and Manmohan Mall

Call Admission Control in Mobile Multimedia Network Using Grey Wolf Optimization 229
Sanjeev Kumar and Madhu Sharma Gaur

Feature Classification and Analysis of Acute and Chronic Pancreatitis Using Supervised Machine Learning Algorithm 241
R. Balakrishna and R. Anandan

RUDRA—A Novel Re-concurrent Unified Classifier for the Detection of Different Attacks in Wireless Sensor Networks 251
S. Sridevi and R. Anandan

Health-Care Paradigm and Classification in IoT Ecosystem Using Big Data Analytics: An Analytical Survey 261
Riya Biswas, Souvik Pal, Bikramjit Sarkar and Arindam Chakrabarty

Human Activity Recognition from Video Clip 269
Rajiv Kumar, Laxmi Kant Sagar and Shashank Awasthi

A Framework for Enhancing the Security of Motorbike Riders in Real Time 275
Yash Khandelwal, Sajid Anwar, Samarth Agarwal, Vikas Tripathi and Priyank Pandey

Fisherman Communication at Deep Sea Using Border Alert System 283
N. R. Rajalakshmi and K. Saravanan

Promoting Green Products Through E-Governance Ecosystem: An Exploratory Study 297
Arindam Chakrabarty, Mudang Tagiya and Shyamalee Sinha

Intervention of Smart Ecosystem in Indian Higher Education System: Inclusiveness, Quality and Accountability 305
Arindam Chakrabarty, Mudang Tagiya and Shyamalee Sinha

A Study of Epidemic Approach for Worm Propagation in Wireless Sensor Network 315
Shashank Awasthi, Naresh Kumar and Pramod Kumar Srivastava

Adaptive Super-Twisting Sliding Mode Controller-Based PMSM Fed Four Switch Three Phase Inverter 327
K. Balaji and R. Ashok Kumar

Design of Multiplier and Accumulator Unit for Low Power Applications 339
J. Balamurugan and M. Gnanasekaran

Design and Implementation of IoT-Based Wireless Sensors for Ecological Monitoring System 349
G. Santhosh, Basava Dhanne and G. Upender

Enhancing Security in Smart Homes-A Review 361
Bhuvana Janita, R. Jagadeesh Kannan and N. Kumaratharan

Accident Detection Using GPS Sensing with Cloud-Offloading 371
D. Srilatha, B. Papachary and N. Sai Akhila

Non-linear Correction of Transient Authentication System for Cloud Security 379
S. Shanthi and R. Jagadeesh Kannan

Automatic Nitrate Level Recognition in Agriculture Industry 387
Md. Ankushavali, G. Divya and N. sai Akhila

Edge Detection-Based Depth Analysis Using TD-WHOG Scheme 397
P. Epsiba, G. Suresh and N. Kumaratharan

Friend List-Based Reliable Routing in Autonomous Mobile Networks 409
C. Sivasankar and T. Kumanan

Construction of Domain Ontology for Traditional Ayurvedic Medicine 417
M. Gayathri and R. Jagadeesh Kannan

Systolic FIR Filter with Reduced Complexity SQRT CSLA Adder . . . 427
M. Gnanasekaran and J. Balamurugan

Design of Digital FIR Filters for Low Power Applications 433
Gunasekaran and G. P. Ramesh

Reduced Frequency and Area Efficient for Streaming Applications Using Clock Gating and BUFGCE Technology 441
N. Lavanya, B. Harikrishna and K. Kalpana

Survey on Modular Multilevel Inverter Based on Various Switching Modules for Harmonic Elimination 451
Varaparla Hari Babu and K. Balaji

ANFIS-Based MPPT Control in Current-Fed Inverter for AC Load Applications 459
Shaik Mohammad Irshad and G. P. Ramesh

Dynamic Load Balancing Using Restoration Theory-Based Queuing Model for Distributed Networks 471
P. Sheeba Ranjini and T. Hemamalini

Design of Tree-Based MAC for High-Speed Applications 483
Joseph Prabhakar Williams, M. Madan and Narendra Prasad

A Survey of Workload Management Difficulties in the Public Cloud 491
K. Baskar, G. K. D. Prasanna Venkatesan and S. Sangeetha

A Review on Multiple Approaches to Medical Image Retrieval System 501
Lakshmi R. Nair, Kamalraj Subramaniam
and G. K. D. Prasannavenkatesan

Efficient FPGA-Based Design for Detecting Cardiac Dysrhythmias . . . 511
S. Kripa and J. Jebastine

Light Fidelity System 521
N. Noor Alleema, Aadil Khatri, Ankur Gupta and Devika Senapatil

Link Quality and Energy-Aware Metric-Based Routing Strategy in WSNS 533
Vijayabaskar and T. Kumanan

Genetic Algorithm-Based PCA Classification for Imbalanced Dataset 541
Mylam Chinnappan Babu and Sangaralingam Pushpa

Radix-2/4 FFT Multiplierless Architecture Using MBSLS in OFDM Applications 553
G. Manikandan and M. Anand

Multipath Routing Strategy for Reducing Congestion in WSNS 561
M. Jothish Kumar and Baskaran Ramachandran

Cascaded Multilevel Inverter-Fed Soft-Start Induction Motor Using DTFC 569
R. Murugesan and R. Karthikeyan

Analysis of Digital FIR Filter Using RLS and FT-RLS 579
N. C. Sendhilkumar Prasad and G. P. Ramesh

Analysis of Interline Dynamic Voltage Restoration in Transmission Line 587
M. Padmarasan and R. Samuel Rajesh Babu

Polariton Modes in Dispersive and Absorptive One-Dimensional Structured Dielectric Medium 597
N. Chandrasekar and G. P. Ramesh

QoS-Based Multi-hop Reverse Routing in WSNs 607
G. Elangovan and T. Kumanan

Mitigation of Power Quality in Wind DFIG-Fed Grid System 615
P. T. Rajan and G. P. Ramesh

Detection and Avoidance of Single and Cooperative Black Hole Attacks Using Packet Timeout Period in Mobile Ad hoc Networks . . . 625
S. G. Rameshkumar and G. Mohan

Brain Image Classification Using Dual-Tree M-Band Wavelet Transform and Naïve Bayes Classifier 635
A. Ratna Raju, Suresh Pabboju and R. Rajeswara Rao

Comparative Analysis of Cascaded Multilevel Inverter with Switched Capacitor-Fed Single-Phase Multilevel Inverter for Improving Voltage Gain 643
Shaik Nagulmeeravali and K. Balaji

Review on Induction Motor Control Strategies with Various Converter and Inverter Topologies 653
Meera Shareef Sheik and K. Balaji

EROI Analysis of 2 KW PV System 665
Harpreet Kaur Channi and Inderpreet Kaur

Suggesting Alternate Traffic Mode and Cost Optimization on Traffic-Related Impacts Using Machine Learning Techniques 673
M. S. Manivannan, R. Kavitha, R. Srikanth and Veena Narayanan

Rare Lazy Learning Associative Classification Using Cogency Measure for Heart Disease Prediction 681
S. P. Siddique Ibrahim and M. Sivabalakrishnan

Intensify of Metrics with the Integration of Software Testing Compatibility 693
S. Vaithyasubramanian, P. M. S. S. Chandu and D. Saravanan

Petri Nets for Pasting Tiles 701
M. I. Mary Metilda and D. Lalitha

Ad Hoc Wireless Networks as Technology of Support for Ubiquitous Computation 709
Amjed Abbas Ahmed

An Experimental Study on Optimization of a Photovoltaic Solar Pumping System Used for Solar Domestic Hot Water System Under Iraqi Climate 717
Mahmoud Maustafa Mahdi and A. Gaddoa

A Novel Technique for Web Pages Clustering Using LSA and K-Medoids Algorithm 727
Nora Omran Alkaam, Noor A. Neamah and Faris Sahib Al-Rammahi

Enhancement in S-Box of BRADG Algorithm 737
Ahmed J. Oabid, Salah AlBermany and Nora Omran Alkaam

A SECURITY Sketch-Based Image Retrieval System Using Multi-edge Detection and Scale Inverant Feature Transform Algorithm 747
Alaa Qasim Rahima and Hiba A. Traish

Smart Photo Clicker 755
N. Noor Alleema, Ruchika Prasad, Akkudalai Priyanka and Archit Bhandari

Design of VLSI-Architecture for 128 Bit Inexact Speculative 767
Peddi Ramesh, M. Sreevani and G. Upender

Investigation of Solar Based SL-QZSI Fed Sensorless Control of BLDC Motor 779
A. Sundaram and G. P. Ramesh

Design of Hybrid Electrical Tricycle for Physically Challenged Person 789
S. Swapna and K. Siddappa Naidu

Intravascular Ultrasound Image Classification Using Wavelet Energy Features and Random Forest Classifier 803
A. Swarnalatha and M. Manikandan

Adaptive Thresholding Skin Lesion Segmentation with Gabor Filters and Principal Component Analysis 811
Dang N. H. Thanh, Nguyen Ngoc Hien, V. B. Surya Prasath, Uğur Erkan and Aditya Khamparia

Simple Model for Thermal Denaturing of Proteins Absorbed to Metallic Nanoparticles 821
Luong Thi Theu, Van Dung Nguyen, Pham Thi Thu Ha and Tran Quang Huy

Trajectory Tracking Sliding Mode Control for Cart and Pole System 829
Gia-Bao Hong, Mircea Nitulescu, Ionel Cristian Vladu, Minh-Tam Nguyen, Thi-Thanh-Hoang Le, Phong-Luu Nguyen, Thanh-Liem Truong, Van-Dong-Hai Nguyen and Xuan-Dung Huynh

Online Buying Behaviors on E-Retailer Websites in Vietnam: The Differences in the Initial Purchase and Repurchase 845
Nguyen Binh Minh Le and Thi Phuong Thao Hoang

Combination of Artificial Intelligence and Continuous Wave Radar Sensor in Diagnosing Breathing Disorder 853
Nguyen Thi Phuoc Van, Liqiong Tang, Syed Faraz Hasan, Subhas Mukhopadhyay and Nguyen Duc Minh

An Adaptive Local Thresholding Roads Segmentation Method for Satellite Aerial Images with Normalized HSV and Lab Color Models 865
Le Thi Thanh and Dang N. H. Thanh

Flexible Development for Embedded System Software 873
Phan Duy Hung, Le Hoang Nam and Hoang Van Thang

Trajectory Tracking Pid-Sliding Mode Control for Two-Wheeled Self-Balancing Robot 885
Anh Khoa Vo, Hong Thang Nguyen, Van Dong Hai Nguyen, Minh Tam Nguyen and Thi Thanh Hoang Le

Evaluating Blockchain IoT Frameworks 899
Le Trung Kien, Phan Duy Hung and Kieu Ha My

An Improved Approach for Cluster Newton Method in Parameter Identification for Pharmacokinetics 913
Thang Van Nguyen, Tran Quang Huy, Van Dung Nguyen, Nguyen Thi Thu and Tran Duc Tan

An Efficient Procedure of Multi-frequency Use for Image Reconstruction in Ultrasound Tomography 921
Tran Quang Huy, Van Dung Nguyen, Chu Thi Phuong Dung, Bui Trung Ninh and Tran Duc Tan

Intelligent Rule-Based Support Model Using Log Files in Big Data for Optimized Service Call Center Schedule 931
Hai Van Pham and Long Kim Cu

Hybrid Random Under-Sampling Approach in MRI Compressed Sensing 943
Thang Van Nguyen, Tran Quang Huy, Van Dung Nguyen, Nguyen Thi Thu, Gian Quoc Anh and Tran Duc Tan

Dynamics of Self-guided Rocket Control with the Optimal Angle Coordinate System Combined with Measuring Target Parameters for Frequency Modulated Continuous Wave Radar 951
Le Hai Ha, Nguyen Quang Vinh and Nguyen Tang Cuong

An Approach of Utilizing Binary Bat Algorithm for Pattern Nulling 963
V. L. Tong, Manh Kha Hoang, T. H. Duong, T. Q. T. Pham, V. T. Nguyen and V. B. G. Truong

An Application of WSN in Smart Aquaculture Farming 975
Thong Nguyen Huy, Khanh Nguyen Tuan and Thanh Tran Trung

A Newly Developed Approach for Transmit Beamforming in Multicast Transmission 985
T. D. Thong, D. D. Vien and L. T. Hai

Post-quantum Commutative Deniable Encryption Algorithm 993
Nguyen Hieu Minh, Dmitriy Nikolaevich Moldovyan, Nikolay Andreevich Moldovyan, Quang Minh Le, Sy Tan Ho, Long Giang Nguyen, Hai Vinh Nguyen and Cong Manh Tran

Indoor Positioning Using BLE iBeacon, Smartphone Sensors, and Distance-Based Position Correction Algorithm 1007
Anh Vu-Tuan Trinh, Thai-Mai Thi Dinh, Quoc-Tuan Nguyen and Kumbesan Sandrasegaran

Assessing the Transient Structure with Respect to the Voltage Stability in Large Power System 1017
Luu Huu Vinh Quang

Cellular Automata Approach for Optimizing Radio Coverage: A Case Study on Archipelago Surveillance 1027
Tuyen Phong Truong, Toan Hai Le and Binh Thai Duong

Smart Bicycle: IoT-Based Transportation Service 1037
Vikram Puri, Sandeep Singh Jagdev, Jolanda G. Tromp and Chung Van Le

LNA Nonlinear Distortion Impacts in Multichannel Direct RF Digitization Receivers and Linearization Techniques 1045
Ngoc-Anh Vu, Thi-Hong-Tham Tran, Quang-Kien Trinh and Hai-Nam Le

Modified Biological Model of Meat in the Frequency Range from 50 Hz to 1 MHz 1055
Kien Nguyen Phan, Vu Anh Tran and Trung Thanh Dang

A Research on Clustering and Identifying Automated Communication in the HTTP Environment 1069
Manh Cong Tran, Nguyen Quang Thi, Nguyen The Tien, Nguyen Xuan Phuc and Nguyen Hieu Minh

Sequential All-Digital Background Calibration for Channel Mismatches in Time-Interleaved ADC 1081
Van-Thanh Ta and Van-Phuc Hoang

Comparison BICM-ID to Turbo Code in Wide Band Communication Systems in the Future 1091
Do Cong Hung, Nguyen Van Nam and Tran Van Dinh

A Design of a Vestibular Disorder Evaluation System 1105
Hoang Quang Huy, Vu Anh Tran, Nguyen Thu Phuong, Nguyen Khai Hung, Do Dong Son, Dang Thu Huong and Bui Van Dinh

About Model Separation Techniques and Control Problems of Wheeled Mobile Robots 1119
Dao Phuong Nam, Nguyen Hoang Ha, Vu Anh Tran, Do Duy Khanh, Nguyen Dinh Khue and Dang Van Trong

Fuzzy Supply Chain Performance Measurement Model Based on SCOR 12.0 1129
Debasish Majumder, Rupak Bhattacharjee and Mrinmoy Dam

Lightweight Convolution Neural Network Based on Feature Concatenate for Facial Expression Recognition 1141
Xiaohong Cai, Zheng Yan, Fang Duan, Di Hu and Jiaming Zhang

Design and Issues for Recognizing Network Attack Intention 1149
Anchit Bijalwan and Satenaw Sando

Web-Based Learning: A Strategy of Teaching Gender Violence 1157
Jyotirmayee Ojha and Deepanjali Mishra

A Deep Neural Network Approach to Predict the Wine Taste Preferences 1165
Sachin Kumar, Yana Kraeva, Radoslava Kraleva and Mikhail Zymbler

A Global Distributed Trust Management Framework 1175
Son Doan Trung

Single-Phase Smart Energy Meter—IoT Based on Manage Household Electricity Consumption Service 1185
Thi Dieu Linh Nguyen, Ngoc Duc Tran and Thi Hien Tran

Survey on Machine Learning-Based Clustering Algorithms for IoT Data Cluster Analysis 1195
Sivadi Balakrishna, Vijender Kumar Solanki, Raghvendra Kumar and M. Thirumaran

Promoting Green Products Through E-Governance Ecosystem: An Exploratory Study

Arindam Chakrabarty, Mudang Tagiya and Shyamalee Sinha

Abstract Green product is the future of global sustainability. The e-governance has been emerged as a form of effective and efficient strategy of the state to optimize its resources and delivery mechanism. The green product needs serious attention, encouragement, investment, and effective promotional strategies so that it gathers the desired momentum in the market. This paper has attempted to understand the basic concept of green products and its various illustrations across diversified product segments. The paper has proposed a conceptual model which is simple but effective to encourage the consumers by appropriately exercising reward-incentive mechanism. This research paper is exploratory in nature, which has been developed using various secondary information and research outcomes.

Keywords Green products · Sustainability · Green technology · E-governance · Ecosystem

1 Introduction

1.1 Green Product and Commitment Toward Environment

There are products having the feature of less impact on the environment or are less detrimental to human health than traditional equivalents. Such products fall under the category of green products. These may be developed or partly developed from recycled components, manufactured in a more energy-conservative way, supplied to the market with less packaging, or manufactured from local materials to reduce the need for transportation and also reduce carbon footprints. In today's world, the

A. Chakrabarty (✉)
Department of Management, Rajiv Gandhi University (Central University), Itanagar, Arunachal Pradesh 791112, India
e-mail: arindam.management@gmail.com

M. Tagiya · S. Sinha
North Eastern Regional Institute of Science and Technology, Nirjuli, Itanagar, Arunachal Pradesh, India

© Springer Nature Singapore Pte Ltd. 2020

V. K. Solanki et al. (eds.), *Intelligent Computing in Engineering*,
Advances in Intelligent Systems and Computing 1125,
https://doi.org/10.1007/978-981-15-2780-7_34

planet needs to be protected. Human greed and selfish ambition has exploited the resources and put the planet in a critical predicament. By using and promoting the green products, one may contribute to the safety and preservation of the resources provided from the planet, such as metals, plastics, and even water. Today, more number of people needs to be aware about green products and its application so that it would benefit all living beings in the planet earth. 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 [1].

1.2 Emerging Green Management Practices

1.2.1 Green Marketing

Green marketing incorporates a broad range of activities, including product modification, changes to the production process, packaging changes, as well as modifying advertising. Yet defining green marketing is not a simple task. Indeed, the terminology used in this area has varied; it includes: green marketing, environmental marketing, and ecological marketing. While green marketing came into prominence in the late 1980s and early 1990s, it was first discussed much earlier. The American Marketing Association (AMA) held the first workshop on "Ecological Marketing" in 1975 [2]. Green or environmental marketing consists of all activities designed to generate and facilitate any exchanges intended to satisfy human needs or wants such that the satisfaction of these needs and wants occurs, with minimal detrimental impact on the natural environment [3].

1.2.2 Green HRM

Nowadays, green HRM has become a significant thrust area for management which can have an enormous impact on people issues in an organization.

It is the application of HRM policies in the way to encourage sustainable use of resources in an organization by increasing awareness and commitments among the employees toward the issues of sustainability to protect and preserve natural resources. It consists of two important elements, that is, environment-friendly HRM practices and the protection of knowledge capital. Green HRM consists of process and practices, like acquisition, induction, training, performance management, and reward system, which have a bearing on the whole carbon footprint of an organization. Green practices under green HRM that are followed by the company are power saving, internal environment and energy audit, eco-friendly or green surveys, going paperless

by using software and apps and so on, recycle waste, water saving, alternative energy sources and so on.

1.2.3 Green Finance

Green finance refers to financial investments flowing into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy. Green finance includes climate finance but is not limited to it. It also refers to a wider range of other environmental objectives, for example industrial pollution control, water sanitation, or biodiversity protection. Mitigation and adaptation finance is specifically related to climate change related activities: mitigation financial flows refer to investments in projects and programs that contribute to reducing or avoiding greenhouse gas emissions (GHGs) whereas adaptation financial flows refer to investments that contribute to reducing the vulnerability of goods and persons to the effects of climate change [4].

1.2.4 Green Technology, Green Manufacturing, and Green Services

Green technology is considered as environment-friendly based on its production process or supply chain. It also may refer to a means of energy production that is less harmful to the environment than more traditional ways of generating energy, such as burning fossil fuels. This technology is considered as young market comparatively, but investor's interest runs very high in response to global warming fears and the increasing scarcity of many natural resources (*Investopedia*). It aims to conserve nature and mitigate the impact of human activities. This technology provides the benefits not only to nature but also for a clean and greener human lifestyle. This technology ensures that the earth remains well for all generations and exist. On the other hand, the "green" manufacturing is known for the renewal of production processes and the establishment of environment-friendly operations within the manufacturing field. In the process the workers use minimal natural resources, reduce pollution and waste, recycle and reuse materials, and moderate emissions in their processes.

2 Theoretical Background

There was a time where many practicing managers regarded a preoccupation with green management almost exclusively as a threat. Nowadays, it is more widely accepted that green management can be profitable [5–7]. Green management can act as a vital role in the optimization of production processes and new-product development, not only in pollution-sensitive industries, such as petrochemicals and electric power and manufacturing, but also in high-tech industries [8]. The need for

green management springs from a variety of sources, including societal mandates incorporated into laws, treaties, and regulations [9].

Since green management is a type of public good, whose full value a firm cannot entirely appropriate [10], government's role in the acquisition of green capabilities is obviously important [11]. Management or managers should pre-define green goals, targets, and responsibilities for their strategic business unit, and corporates should assess number of green incidents, use of environment responsibility, and successful communication of environmental policy within their scope of their operations for improving the performance [12, 13].

3 Objectives of the Study

I. To study the concept of green product and its representation across various product segment.
II. To formulate comprehensive model and flowchart to increase and optimize green movement in India through efficient e-governance.

4 Research Methodology

This paper is designed on the basis of various reports, articles, research papers, and information collected from varied secondary sources. The conceptual model has been proposed in order to motivate the users toward green products by establishing real-time network with the market players. The e-governance framework may retrieve adequate information about the green product and its purchase indents so that it could establish a structured reward-incentive mechanism for promoting green marketing.

5 Analysis

5.1 Analysis—I

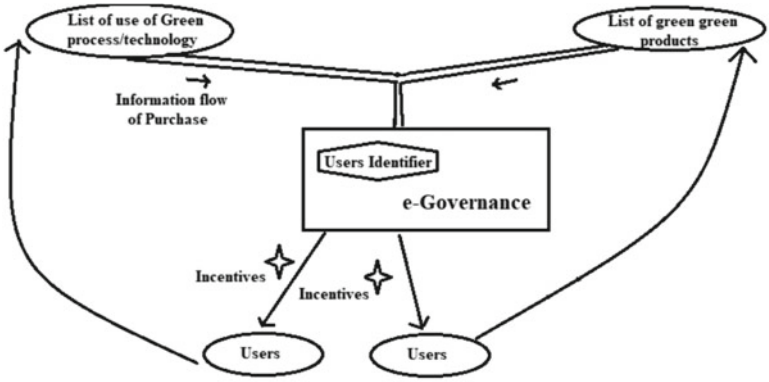
The wave of sustainable development has drawn the attention of the manufacturers, service providers, users, policy makers, and so on across the globe. It has been trickle down from the developed economies to the developing nations of the world. The affinity of the people of India has been increasing to the extent that it has found that the propensity of using green products has been significantly observed among the indigenous community of Arunachal Pradesh, the least population density state in India [1]. The study conducted by Chakrabarty and Tagiya [1] has emphasized that the attitude of the consumer toward environment and green products has combined

effect on favorable purchase intention behavior. However, price sensitivity, quality enhancement, brand familiarity, ease of access, and convenient to use are the decisive factors that influence the attitude of consumer toward green product. The availability, ease of access, and awareness of green product predominantly encourage the buyers for purchasing or availing green product or green technology. The green products are gaining popularity day-by-day and it became available in various sectors, for example, FMCG, consumer durability, health care, white goods, packaging material, and transportation. The indicative list of green products is illustrated below:

FMCG Sector: Biodegradable detergents, soaps, green tea, eco-friendly disinfectants, all types of papers (writing papers, tissues, toilet).
Consumer Durable Segment: Recyclable batteries, LED light bulbs and tubes, solar panels, clay-based cutlery, and crockery.
Health Care Sector: Biodegradable fittings and fixtures, cotton-based consumables for dressing or bandit materials, cotton bed sheet, eco-friendly disinfectants, biodegradable gloves.
White Goods Segment: Water heater tank (electric), dish washer, high-efficiency washing machine and clothes dryer, induction top cooker, energy star refrigerators, vacuum cleaner, dual-blade twin window fan.
Packaging Industry: Edible package material, paper bags, tetra-pack package.
Transportation sector: Bio fuel, low-carbon emission gas (CNG), recyclable tires.

5.2 Analysis—II

The popularity and penetration of green product may essentially be enhanced by the collective efforts of all the stake holders, including the dominant role of the government. The strategic and interactive roles among the stake holders are the prerequisite for enabling the green products in the demand baskets of its users. The strong network needs to be established that would yield desired result for effective promotion strategy of green products. A conceptual model has been proposed where the e-governance can facilitate to promote green consumerism.



Positive Reinforcement Model for Green Product through e-Governance

5.3 Modus Operandi of Proposed Model

Step 1*: The Government should identify the lists of green products, green technology, and green processes. Appropriate awareness campaign may be initiated to create customer pool for this segment.*
Step 2*: The market players may be identified and are established with the real-time network through which any transaction made at their end may send the overview of purchased details.*
Step 3*: Based on the purchase details, the customer profile would be identified and tracked. The incentive package or any form of subsidy may be extended to the identified customer through electronic transfer in the form of "Direct Benefit Transfer" (DBT).*
Step 4*: The real-time reward-incentive mechanism would reinforce and promote the green product among the target segments.*

6 Conclusion

In the dynamics of fourth industrial revolution, to apply threshold level of technology emerged, particularly in the domain of IoT ecosystem. This is high time to create appropriate interface and network between public–private interactions through new generation devices. The e-governance is quite popular and useful in augmenting the efficient delivery system across the world even in India. The success of smart card in Andhra Pradesh is the testimony of India's success story where the system minimizes its leakage [14]. The paper has showcased how the appropriate reward-incentive mechanism can be offered to the green product users using augmented electronic governance. This model may be implemented that would essentially increase green

consumerism in the market, which in turn would fulfill the commitment of sustainable development as expressed in Brundtland Commission 1987.

References

1. Chakrabarty A, Tagiya M (2018) Awareness and affinity towards green products among young generation: a case of arunachal pradesh. In: Mathirajan M (ed) 6th international conference on business analytics and intelligence 2018 (ICBAI-2018). I.K. International Publishing House Pvt. Ltd, pp 142–154
2. Ottman J, Books NB (1998) Green marketing: opportunity for innovation. J Sustain Prod Des 60(7):136–667
3. Polonsky MJ (1995) A stakeholder theory approach to designing environmental marketing strategy. J Bus Ind Mark 10(3):29–46
4. Höhne N, Khosla S, Fekete H, Gilbert A (2011) Mapping of green finance delivered by IDFC members in 2011. Ecofys, Cologne. http://www.idfc.Org/Downloads/Publications/01_green_finance_mappings/IDFC_Green_Finance_Mapping_Report_2012_14-06-12.Pdf
5. Porter ME, Van der Linde C (1995) Toward a new conception of the environment-competitiveness relationship. J Econ Perspect 9(4):97–118
6. Sharma S (2000) Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy. Acad Manag J 43(4):681–697
7. Sharma S, Vredenburg H (1998) Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. Strateg Manag J 19(8):729–753
8. King A (1999) Retrieving and transferring embodied data: Implications for the management of interdependence within organizations. Manag Sci 45(7):918–935
9. Marcus AA (1980a) Promise and performance: choosing and implementing an environmental policy, Vol 39. Praeger Pub Text
10. Teece DJ (2007) Explicating dynamic capabilities: the nature and micro foundations of (sustainable) enterprise performance. Strateg Manag J 28(13):1319–1350
11. Marcus A (1980b) The Environmental protection agency. The politics of regulation
12. Renwick D, Redman T, Maguire S (2008) Green HRM: a review, process model, and research agenda. Univ Sheff Manag Sch Discuss Pap 1:1–46
13. Renwick DW, Redman T, Maguire S (2013) Green human resource management: a review and research agenda. Int J Manag Rev 15(1):1–14
14. Chakrabarty A (2019) Is India poised for M-commerce in the cashless milieu? In: Singh A, Duhan P (eds) M-commerce experiencing the phygital retail. Apple Academic Press, CRC, Taylor and Francis Group, pp 205–216. Hard ISBN: 9781771887144, E-Book ISBN: 9780429487736. https://doi.org/10.1201/9780429487736