CHITKARA UNIVERSITY | National Chung Cheng University | IEEE

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ICAN2020

Indo-Taiwan IEEE Sponsored
International Conference on Computing, Analytics and Networks

February 7-8, 2020 – Taiwan | February 14-15, 2020 – India

OVERVIEW

Chitkara University, Punjab, India and National Chung Cheng University, Chiayi, Taiwan jointly organized the second edition of IEEE sponsored International Conference on Computing, Analytics and Networks (ICAN2020) in February 2020. The four-day conference was held for two-days in Taiwan, on February 7-8, 2020 and for two-days in India, on February 14-15, 2020. We envisioned the concept of twin-nation conference so as to provide a platform where a large number of like-minded professionals and researchers could engage and share their work, ideas and culture. Collectively, ICAN2020 received 159 paper submissions from all over the world, of which 61 submissions were accepted. This proceeding is featuring 61 papers that were presented during the conference. In addition to paper presentations, ICAN2020 also featured four keynote talks, four invited talks, two industry sessions, a panel discussion session and two tutorials. Around 200 delegates attended the conference.

INTRODUCTION

It was in the year 2017 when we first came up with an idea of organizing a conference to discuss current issues in the domain of computer science and engineering. After much deliberation by all the stakeholders, it was decided to focus on key technology areas of computing, analytics and networks as broad theme of the conference. International Conference on Computing, Analytics and Networks 2017 abbreviated as ICAN2017 was the first edition of the conference that was conducted by Chitkara University on October 27-28, 2017 in collaboration with Springer Nature. The proceeding of the conference was published by Springer Nature in CCIS series.

When we were planning for the second edition of the conference, we decided to take two giants leaps. One was to hold the conference in two different countries and second was to obtain technical sponsorship from IEEE for the publication of conference proceeding. We could achieve both our objectives and thus 2nd International Conference on Computing, Analytics and Networks, ICAN 2020 was jointly organized by Chitkara University, Punjab, India and National Chung Cheng University, Chiayi, Taiwan along with the technical sponsorship from IEEE. The conference was held on February 7-8, 2020 in Taiwan and on February 14-15, 2020 in India. 25 high quality research papers were presented in the Taiwan edition of the conference and 36 quality research papers were presented in the India edition of the conference. All the 61 full papers are featuring in this conference proceeding.

THEME OF THE CONFERENCE

As it is mentioned earlier, the objective of this conference has been to focus on key technology areas of computer science and engineering. Since computing, analytics and networks are three of the most prominent areas in the field of computer science and engineering today, therefore we decided to focus on them. These technology areas have been evolving very-very rapidly and they present unique opportunities and challenges for the researchers.

Cloud computing is one of the key technologies that is growing exponentially across the globe, and it is only going to grow even faster in times to come. A large number of companies today believe that benefits of scalability and cost that cloud computing offers are unparalleled. According to Gartner, most enterprises that have delivered growth in revenues lately are infact driven by cloud-first strategy. Today enterprises are adopting multi cloud strategies with a combination of private and public clouds. It has also been reported that adoption of pubic cloud services has been increasing at an unprecedented rate. All these trends are indicative of vast opportunities that are available in cloud computing space for building solutions and applications.

We are generating huge amount of data today, and according to one close estimate, data generation doubles every three years. In order to fetch meaningful information from this huge data, our data scientists are working on building intelligent algorithms and programs. They are ably supported by enormous computing power that is available at our disposal, thanks to advance microprocessors technology. Data analytics along with its associating technologies like internet of things (IoT), machine learning, 5G are evolving very fast. Today, almost all departments in majority of the organizations rely on data analytics. These

departments include (but not limited to) supply chain management, customer service, recruitment process, resource management, finance management and optimization, industry automation etc.

With technologies like IoT, 5G, and cloud computing our digital perimeter has been expanding so fast and therefore it is all the more important today to build secure networks. Take, for instance, the attacks on IoT networks that have been increasing rapidly, with 105 million attacks in first half of 2019 in contrast to 12 million in first half of 2018 as per Kaspersky. Cloud security is even more important today to keep the risks of unauthorized access, data loss, misconfiguration etc. under control. Today attackers are using advanced technologies of artificial intelligence and machine learning to break into the systems. Therefore, the field of network security is also presenting many unique challenges for the researchers to address.

Table below highlights the key areas in computing, analytics and networks that were targeted in ICAN2020.

Mobile Cloud Computing	Big Data Analytics & Deep Learning	Secure Networks
Distributed Computing	Statistical Techniques for Big Data Analysis	Security in Cloud Computing
Mobile Device Management	Predictive Modeling, Behaviors Analytics	Feature extractions & classifier techniques for network security.
Communication Efficiency	Applications of Big Data Analytics	Data & Information Security, Cryptography
Mobile Virtualization	Handling Structured, Semi-Structured and Un-Structured Data	Privacy in Big Data and Cloud Environment
Protocols, Platforms, Architectures	Open Source Framework for processing Big Bata	
Algorithms For Secure, Scalable Mobile Computing	Statistical Language for Big Data Analysis	
Mobile Web Services	Data Mining, Data Processing and Data Simulation	
	Deep Learning Models and Methods	
	Deep Learning Applications including Image Processing, Sensor Data, etc.	

COMMITTEES AND COLLABORATORS

This section presents different committees of the conference and acknowledges the support received from them. The section also acknowledges the support received from different third party collaborators who endorsed the conference.

COMMITTEES

Table below displays the core committee that envisaged and steered the conference.

Conference Position	Name
Patrons	• Dr. Ashok K. Chitkara – Chancellor, Chitkara University • Dr. Madhu Chitkara – Pro Chancellor, Chitkara University
Conference Chairs	• Archana Mantri – Vice Chancellor, Chitkara University, Punjab, India • Jack S.-M. Huang – Dean of Research and Development, National Chung Cheng University, Taiwan • Hua-Fu Hsu – Dean of International Affairs, National Chung Cheng University, Taiwan
Technical Program Chairs	• Pao-Ann Hsiung - Vice Director, Taiwan-India AI Technology Innovation Research Center, National Chung Cheng University, Taiwan • Rajnish Sharma – Dean Research, Chitkara University, India • Wei-Yang Lin - National Chung Cheng University, Taiwan
Conveners and Publication Chairs	• Chun-Hsian Huang – Associate Professor (CSIE), National Taitung University, Taiwan • Sagar Juneja – Associate Professor (ECE), Chitkara University, India
Keynote and Tutorial Chairs	• Wei-Ta Chu - National Chung Cheng University, Taiwan
Publicity Chairs	• Cheng-Kuo Chiang - National Chung Cheng University, Taiwan • S.N. Panda - Chitkara University, Punjab, India • Sushil Kumar - Chitkara University, Punjab, India
Panel Chairs	• Ching-Chun Huang - National Chung Cheng University, Taiwan
Industrial Liaison Chairs	• Wei-Min Liu - National Chung Cheng University, Taiwan
Finance Chairs	• Trong-Yen Lee - National Taipei University of Technology, Taiwan • Satpal Singh - Chitkara University, Punjab, India • Rajat Bhatia - Chitkara University, Punjab, India

IEEE Delhi section was very supportive in giving direction with regard to the technical program of the conference. Thanks are due to the IEEE oversight committee for giving continual feedback during the organization of the conference. Table below showcases the members of IEEE oversight committee.

Name	Institution
Mahesh Bundele	Poornima Group of Colleges, Jaipur
Arun Sharma	IGDTUW, New Delhi
Geeta Sikka	Dr B R Ambedkar National Institute of Technology, Jalandhar
Shabana Urooj	Gautam Buddha University, Greater Noida
Shyam Sunder Tyagi	Manav Rachna International University, Faridabad
Sudhanshu Shekhar Jamuar	IIT (ISM), Dhanbad

Technical committee and reviewers' committee remained instrumental in selecting only the top quality papers in the conference. Collectively, 159 submissions were received in the conference. As per IEEE guidelines, at least two independent reviewers reviewed each paper, and additional review was sought for all those papers where conflicting reviews were received. Double blind review process was followed and in order to ensure quality in the review process, no more than three papers were assigned to single reviewer. Table below shows members of technical program committee and the subsequent Table shows members of reviewers' committee. There were more than 100 members in both the committees combined.

Name	Affiliation	Name	Affiliation
A.K. Sharma	Indian Council of Agricultural Research (ICAR)-NDRI, Karnal, India	Rajesh K Shukla	Sagar Institute of Research and Technology, Bhopal, India
Amanpreet Singh	I.K.Gujral Punjab Technical University, India	Rakesh Goel	I.K.Gujral Punjab Technical University, India
Amey Karkare	IIT Kanpur, India	Ren-Hung Hwang	National Chung Cheng University, Taiwan
Ana Hol	University of Western Sydney, Australia	S. Balamurugan	QUANTS IS & Consultancy Services, India
Cheng-Kuo Chiang	National Chung Cheng University, Taiwan	S.N.Panda	Chitkara University, India
Ching-Hsien Hsu	National Chung Cheng University, Taiwan	S.S.Manivannan	Vellore Institute of Technology,Vellore
Chitra Babu	SSN College of Engineering, Kalavakkam, India	Sanjay P. Sood	Centre for Development of Advanced Computing (CDAC), Mohali, India
Chun-Hsian Huang	National Taitung University, Taiwan	Sandeep Mehmi	I.K.Gujral Punjab Technical University, India
Chun-Yi Tsai	National Taitung University, Taiwan	Saurbah N. Mehta	Vidyalankar Institute of Technology, Mumbai
Durai Raj Vincent	Vellore Institute of Technology, Vellore	Sao-Jie Chen	National Taiwan University, Taiwan
Eric Hsueh-Chan Lu	National Cheng Kung University, Taiwan	Satvir Singh	I.K.Gujral Punjab Technical University, India
Hong-Jie Dai	National Kaohsiung University of Science and Technology	Sonia Hamnane	Digital Strategy Consultant, France
Horng-Chang Yang	National Taitung University, Taiwan	Sukhbir Singh Walia	I.K.Gujral Punjab Technical University, India
Hsiao-Li Tsao	National Chiao Tung University, Taiwan	Tei-Wei Kuo	National Taiwan University, Taiwan
H.S. Jatana	Semiconductor Laboratory, Mohali	Tong-Yu Hsieh	National Sun Yat-sen University
I-Chen Wu	National Chiao-Tung University	Trong-Yen Lee	National Taipei University of Technology, Taiwan
Jagdish Lal Raheja	CEERI, Pilani	Tsi-Ui Ik	National Chiao Tung University, Taiwan
Jyotir Moy Chatterjee	Asia Pacific University of Technology & Innovation, Kathmandu, Nepal	Upasana Gitanjali Singh	University of KwaZulu-Natal, Durban, SA
Keng-Pei Lin	National Sun Yat-sen University	Vincent Shin-Mu Tseng	National Chiao-Tung University
Marco D. Santambrogio	Milan University, Italy	Vipul Sharma	I.K.Gujral Punjab Technical University, India
Morshed U. Chowdhury	Deakin University, Australia	Wei-Kuan Shih	National Tsing-Hua University, Taiwan
N.P. Singh	I.K.Gujral Punjab Technical University, India	Wei-Ta Chu	National Chung Cheng University, Taiwan
Neeraj Mohan	I.K.Gujral Punjab Technical University, India	Yean-Ru Chen	National Cheng Kung University

Po-Yu Kuo	National Yunlin University of Science and Technology	Yi-Chung Chen	National Chi Nan University, Taiwan
Pooja Sharma	I.K.Gujral Punjab Technical University, India	Yi-Shin Chen	National Tsing-Hua University
Pradeep Kumar Singh	Jaypee University of information Technology, India	Yuling Hsueh	National Chung Cheng University, Taiwan

Name	**Affiliation**	**Name**	**Affiliation**
A.K. Sharma	ICAR-NDRI, Karnal	Jerwinprabu A	Bharati Robotic Systems India Pvt. Ltd.
Amrit Kaur	IKGPTU, Kapurthala	K.R. Ramkumar	Chitkara University, Punjab
Ashwani Kush	Kurukshetra University, Kurukshetra	Maheswar Rajagopal	VIT Bhopal University
B Srinivas Rao	Gokaraju Rangaraju Institute of Engineering & Technology	Manuel Frutos-Perez	University of the West of England - UWE Bristol
Balaka Biswas	CSIO, Chandigarh	Mohd Maroof Siddiqui	AMA International University, Bahrain
Bhupinder Verma	Lovely Professional University	Naresh Kumar	YMCA University of Science & Technology
Deepak Mehta	Lovely Professional University	Nishant Shrivastava	Jaypee University, Anupshahr
Deepika Chaudhary	Chitkara University, Punjab	Phan-Anh-Huy Nguyen	HCMC University of Technology & Education, Vietnam
Disha Handa	Punjab University, Chandigarh	Prabhakara Rao Kapula	B V Raju Institute of Technology
Kuldeep Kumar	NIT Jalandhar	Preetinder Singh Brar	Chitkara University, Punjab
Meenu Sharma	Thesis Chandigarh	Rajkumar Sharma	Vikram University, Ujjain
Pradeep Teotia	BSNL	Rakesh Goyal	I K Gujral Punjab Technical University, Kapurthala
Saurabh Srivastava	Smart Tech Technologies	Ruchi Mittal	Chitkara University, Punjab
Vijay Kumar	NIFTEM	S. Rajagopalan	Alagappa University, Karaikudi
Ashok Kumar	Teerthanker Mahaveer University, Moradabad	S. Mahalakshmi	BMSIT&M, Bangalore
C. P. Ravikumar	Texas Instruments	S.S. Manivannan	VIT Vellore
Durai Raj Vincent	VIT Vellore	Sachin Ahuja	Chitkara University, Punjab
Harsimran Kaur	Chitkara University, Punjab	Sandeep Kautish	LBEF Campus, Kathmandu
Jyotir Moy Chatterjee	Asia Pacific University of Technology & Innovation, Kathmandu, Nepal	Sapna Saxena	Chitkara University
Maninderjit Singh Khanna	Chitkara University, Punjab	Satrio Yudo Prawiro	Telkom University
Neela Chattoraj	BIT Mesra	Sukhpreet Kaur	I K Gujral Punjab Technical University, Kapurthala
Neerja Garg	CSIR-CSIO, Chandigarh	Sumit Kushwaha	Kamla Nehru Institute of Technology, Sultanpur
Sanjeev Kumar Prasad	Galgotias University, Gr. Noida	T Nandha Kumar	University of Nottingham Malaysia Campus
Shakti Kundu	Teerthanker Mahaveer University, UP	Veena Goswami	KIIT University, Odisha
Sonia Goyal	Punjabi University, Patiala	Yanhui Guo	University of Illinois, Springfield
Subash Chander	Punjabi University College, Jaitu	Meghana Sambhaji Kasbe	Solapur University
Sukhdev Singh	Multani Mal Modi College, Patiala	Raman Kapoor	ABES Engineering College
T.H. Mujawar	Solapur University, Solapur	Ashok Kumar Sahoo	Graphic Era Hill University
Gagandeep Jagdev	Punjabi University, Patiala	Himanshu Sharma	JECRC University, Jaipur
Guhanathan Poravi	Informatics Institute of Technology, Colombo, Sri Lanka	Sartajvir Singh	Chitkara University, Punjab
Gurpreet Kaur	Chandigarh Group of Colleges, Landran	Monika Sharma	Amity University
Jagreet Gill	Xenon, Chandigarh	Prasenjit Das	Chitkara University
Jaiteg Singh	Chitkara University, Punjab	Abhishek Kumar	Chitkara University

COLLABORATORS

Several prestigious institutions and groups endorsed the conference. All these collaborators played constructive role in getting quality submissions to the conference, and they also helped in building the technical program of the conference. Figure below shows the logos of all the collaborators of ICAN 2020 and Table below shows and acknowledges respective members from each of the collaborators that constitute the advisory committee of ICAN2020.

Name	Affiliation
Dheeraj Sanghi	Punjab Engineering College, Chandigarh
N.P. Singh	I.K.Gujral Punjab Technical University, India
Angsuman Sarkar	Kalyani Government Engineering College, WB, India
P.K. Khosla	Centre for Development of Advanced Computing (CDAC), Mohali, India
Krishna Vedula	IUCEE
Sanjay Sood	Centre for Development of Advanced Computing (CDAC), Mohali, India

TECHNICAL PROGRAM OVERVIEW - KEYNOTES AND SPECIAL SESSIONS

TAIWAN EDITION OF THE CONFERENCE

Taiwan edition of the conference was held on February 7 and 8 at National Chung Cheng University, Chiayi on Day 1 and at Nice Prince Hotel, Chiayi, Taiwan on Day 2. Day 1 of the conference featured two keynote talks, a panel discussion session, two industry sessions and papers presentation in parallel tracks.

The first keynote was delivered by Dr. Chia-Wen Lin from National Tsing Hua University, Taiwan. His talk was centered on deep learning techniques in IC fabrication in which he discussed about data-driven prediction approach. The second keynote was also about deep learning but for the very different application, which was Smart Baby Monitoring. It was delivered by Dr. Chuan-Yu Chang, Yunlin University of Science and Technology, Taiwan.

The panel discussion session was conducted on the topic Big Data and AI for Computing and Networking: What are the Success Stories, Opportunities, and Open Challenges? The experts in the panel were Dr. Chia-Wen Lin (National Tsing Hua University, Taiwan), Dr. Chuan-Yu Chang (Yunlin University of Science and Technology, Taiwan), Dr. Hsiang-Chen Wang (Chung Cheng University, Taiwan), and Dr. Alan Liu (Chung Cheng University, Taiwan). The panel was moderated by Dr. Ching-Chun Huang, National Chiao Tung University, Taiwan. Figure is a picture of panel discussion session.

Day 2 of the conference featured an invited talk by Dr. Rajnish Sharma, Dean (Research), Chitkara University, Punjab, India on the topic Outcome and Relevance of Research in Artificial Intelligence Domain in Asia: Challenges and Opportunities. It was followed by papers presentations in two parallel tracks.

Industry sessions were held on technologies/topics of Amazon Web Services (AWS), Oracle, Microsoft, Matlab, and Open AI Fab. Industry exhibits were also set-up by companies and groups including E-Smart Technology Inc., Huayu Mecho Electrical Enterprise Co. Ltd., H.P.B. Optoelectronics, Marvel Technologies, YunTech Intelligent Recognition Industry Service Center, Terasoft Inc., CCU University Social Responsibility Project, and Indo-Taiwan Joint Research Center on Artificial Intelligence.

INDIA EDITION OF THE CONFERENCE

India edition of the conference was held at Chitkara University, Punjab, India on February 14 and 15, 2020. Day 1 of the conference featured two keynote talks and three invited talks in addition to papers presentation in five parallel tracks. Day 2 of the conference featured two parallel sessions of conference tutorials.

Dr. Rohit Y. Sharma from Indian Institute of Technology (IIT), Ropar delivered the first keynote talk in which he spoke about Artificial Intelligence and Industry 4.0 from India perspective. He spoke about various Government of India initiatives in boosting these segments. In Figure below Dr. Rohit Sharma can be seen delivering his keynote address. Dr. Pao-Ann Hsiung from National Chung Cheng University, Taiwan delivered the second keynote of the morning and he discussed about how landslide detection can be done by data reconstruction using Deep Neural Networks.

The afternoon session featured three invited talks by - Dr. Jagdish Lal Raheja (Central Electronics Engineering Research Institute, Pilani, India) on the topic Unobtrusive and Non-Invasive Human Activity Recognition; Dr. Wei-Ta Chu (National Cheng Kung University, Taiwan) on Case Studies of Thermal Face Detection, Facial Landmark Detection, and Recognition; and Dr. Ren-Song Ko (National Chung Cheng University, Taiwan) on Alternative Approach to Model WSNs and its Application in Routing Problems.

Day 2 of the conference featured two tutorials. Dr. Meenu Khurana (Dean, Department of Computer Science and Engineering, Chitkara University, Punjab) and Ms. Rishu Chhabra (Associate Professor, CSE, Chitkara University, Punjab) delivered one of the two tutorials on the topic Nexus on Wheels. They discussed with the help of simulations, various routing protocols for vehicular ad hoc network. The other tutorial session was delivered by Prof. Prakash Hegade (Assistant Professor, KLE Technological University, Hubballi) on the topic of Computational Thinking. With the help of several hands-on exercises, he highlighted how computational thinking can be applied for problem solving with specific focus on problem related to devising algorithms and computer programs.

OVERVIEW OF THE PRESENTED PAPERS

A total of 61 papers were presented in Taiwan and India editions of the conference combined. All these papers are featuring in the conference proceedings published by IEEE on IEEE Xplore. In this section, an attempt has been made to give an overview on all the papers by categorizing them under five different heads depending upon their application area.

AI, MACHINE LEARNING AND THEIR APPLICATIONS

Chia-Chi et al. have studied the effects of teaching social skills course to school students with Autism disorder using a virtual reality platform in this work.

Eesha et al. have proposed a deep learning based planogram system for virtual merchandising in retail stores in this paper. They have used connectionist text proposal network and convolutional recurrent neural network models for reading planogram drawings and images.

Hsiu-Chun et al. have studied the effect of using face recognition method for athletes during the National Intercollegiate Athletic Games held at their university. They used Expectation-Confirmation Theory to test eight hypotheses in their study and reported the results.

Manaswinee et al. have taken exchange rate predictions from the year 2000 to 2019 into consideration and discussed various artificial neural networks and deep learning models for making these predictions and forecasts.

Meng-Jin et al. have proposed an artificial intelligence based model to classify News based on its content. They have used web crawler, data preprocessing, Jieba and natural language processing to train their model in this work.

Merry et al. have reported different types of machine learning algorithms that have been developed in the last 5 years for the prediction of Parkinson's disease in this survey paper.

Risab et al. have proposed the use of artificial intelligence for identification and discovery of drugs. They have used region based convolutional neural network (R-CNN) method and have claimed that clinical trials time can be considerably reduced with their solution.

Risab et al. have proposed an algorithm for the identification and classification of pathological diseases in plants. They have used OpenVINO™ Toolkit for building and optimizing their deep neural network based model.

Saravjeet et al. have used supervised learning technique for identification of topological errors in OpenStreetMap (OSM) dataset of two states in India. The proposed technique in this paper can be used to improve the quality of OSM dataset.

Sumanth et al. have proposed a deep neural network based model for retrieving relevant images from a pool of images. The search takes place with the help of image captions, as the proposed model takes word or sentence to be looked in image captions as input in this paper.

Trong-Yen et al. have proposed a convolutional neural network based model for the detection of diseases in Potato crop. They have used Adam as optimizer, cross entropy for model analysis and Softmax as final judgment function in their work.

Wing-Kwong et al. have proposed a deep learning based face recognition application that runs on a private cloud. In this work, authors have used machine-learning platform that runs on Docker container and Kubernetes for building their application.

COMPUTING APPLICATIONS

Baljinder et al. have proposed a segmentation algorithm for mammogram images in order to carry out early stage detection of breast cancer. Proposed study can help radiologists in classifying tumors either as non-cancerous or cancerous.

Disha et al. have studied the differences and similarities between acoustic signals of joyful scream and distress scream in order to develop security device based on emotions for women.

Edward et al. have proposed social media app based object-tracking system for equipment monitoring and geo-fencing applications. They have tested their system in a hospital in which 17 mobile medical devices were traced.

Gagan et al. have reported their findings on optimization of look-up table in DSP chip in order to reduce power consumption and area requirement. They have proposed memory-based structure for the same in their work.

Mong-Jen has carried out a survey on capacitated covering problem in this work and he has discussed research progress made in the field so far.

Preetinder et al. have surveyed various IoT based techniques and frameworks for rescue operations in large indoor environment post disaster like for example earthquake, fire etc.

Salahuddin et al. have designed a front-end circuit for acquiring EEG signal in this work for future Brain-Computer Interface (BCI) applications. Their EEG front end consists of active electrodes, instrumentation amplifier, filters, ADC and microcontroller.

Shalini et al. have proposed a real time human activity recognition system based on depth imaging in this work. The system is particularly useful in monitoring movements and activities of elderly people in indoor environment for health care purposes.

Shubham et al. have studied the effect of using VR based game like environment for teaching. They have developed a game called Magnex to teach concepts of magnetism and magnetic current; and in order to measure the impact, they carried out Instructional Materials Motivation Survey (IMMS) that is based on ARCS model.

Sukhpreet et al. have proposed text to speech synthesis for Punjabi language using random forest and mixed excitation approach in this work.

Varun et al. have developed an algorithm for robotic vision in this work. The proposed algorithm has three parts namely, object detection, object recognition and object localization to find the position of identified object using robotic vision.

DATA MINING AND ANALYTICS

Adesh et al. have proposed an intelligent hybrid neurogenetic model for precise prediction of adsorption and desorption isotherms in dried acid casein powder. It has been claimed that the proposed mode is better than conventional empirical sorption models.

Arpita et al. have proposed a preprocessing technique for textual data, which has been claimed as an important step before data mining algorithms are applied. In the proposed work, cleaning of raw tweets has been done before applying sentiment analysis.

Chuan-Yu et al. have proposed a pedestrian tracking model in this work, which is based on the combination of pre-trained pedestrian association model and pedestrians' appearance and moving model.

Ching-Che et al. have proposed MobileNet hardware accelerator for data analytics application in edge devices. The proposed quantization-aware training technique has been used to make the model lightweight, energy efficient and fast.

Chia-Wei et al. have proposed a semi-supervision learning model to pre-identify anomalies in solar panels inside a solar power plant. They have trained their model using the data collected from 500kW solar power plant.

Gagandeep et al. have carried out a study in order to understand the impact of big data in sports. Two databases have been created for the study, and a systematic approach has been devised to fetch meaningful data from these databases.

Hao-Ting et al. have proposed a method to extract strokes information in Chinese characters and they have trained a model to find out strokes order for writing these characters. Combination of feature extraction and keypoint detection methods has been used to predict the strokes' order of the characters.

Jaswinder et al. have proposed a software re-engineering process in order to reduce the complexity of the software. The process has been implemented using Scrum agile approach in this paper.

Jyun-You et al. have proposed a smart glass system for visually impaired people in this work. The system works on object detection algorithm and text to speech conversion using deep learning method.

Prakash et al. have proposed a novel crawler by inference model that crawls through the right set of web pages and produces better search results. The model is based on semantic similarity, paradigmatic similarity and rules of inference.

Qingjie et al. have studied how the interactions on social media have influenced public opinion and public sentiments. They have carried out this study based on the data of 2019 Hong Kong protests.

Sukhpreet et al. have discussed in this work how big data has impacted the automotive industry and how different big data analytics techniques have been used in automotive sector.

Shanshan et al. have proposed a garbage classification technique based on convolutional neural network. They have used images of garbage objects and classified them into one of the many recycling categories using their deep learning model.

Tanisha et al. have used data from three sets of sensors including electrocardiogram (ECG), galvanic skin response (GSR), and pulse sensor to recognize human behavior in this work. They conducted their experiment on 12 volunteers and reported their results.

Wei-Ta et al. have proposed residual learning based multi-scale framework for generating images based on certain attributes. Reference image and weather attributes have been used as inputs for generating high-resolution images by the authors of this work.

Wen-Ling et al. have developed an algorithm to improve the efficiency of iterative learning technique used in industrial machining. The proposed algorithm automatically generates desired convergence ratio at each iteration and thus improves the learning efficiency of the model.

DATA PRIVACY AND INFORMATION SECURITY

Chun-Sheng et al. have proposed a formal verification framework in this work to verify instructions implementation on open-source ethereum virtual machine (EVM).

Ding-Jia et al. have used face recognition and landmark detection methods in order to carry out identity recognition and liveness detection in this work. Proposed application of this work as reported by the authors is for securely running of financial services in mobile phones.

Gaurav et al. have discussed distributed approach in order to ensure consistency and integrity of data in JavaScript Object Notation (JSON) and Extensible Markup Language (XML) in their work along with the benefits of the same.

Jaideep et al. have proposed a blockchain based fog enabled IoT architecture in order to ensure more security in IoT network.

Kudratdeep et al. have surveyed in this work, different homomorphic encryption standards in order to ensure privacy in cloud environment.

Prakash has discussed a random poem generation algorithm and its application in security domain like generation of one-time-password for carrying out secure transactions.

Ramkumar et al. have discussed security issues in ad-hoc network that are mainly related to authentication and confidentiality. They have used a technique of path preservation for route discovery and key exchange using polynomial interpolations for path updating.

Simarpreet et al. have proposed an optical diagonal identity matrices codes algorithm for communication system. The proposed algorithm has optical gating, zero cross-correlation and it offers enhanced security.

Shaminder et al. have surveyed hardware security issues in electronic systems. They have discussed about current status and future direction in the field of side channel attacks and fault injection techniques.

Wei-Chen et al. have surveyed different state-of-the-art data deletion techniques in different layers of the system and in different types of storage media in this work. The objective is to ensure privacy of users' data and information.

NETWORKS AND COMMUNICATION

Chu-Yi et al. have proposed integration platform for IoT network in this work, which simplifies the configuration, interaction and management of different IoT devices in the IoT network.

Kuang-Hui et al. have proposed a cache model for cellular network in order to ensure smooth handovers among femtocells in the network. The proposed work ensured that data connectivity is not lost during mobility across different cells.

Mandeep et al. have reported simulation results of a proposed multiband MIMO antenna in this work. The proposed antenna element is a simple planner design implemented on PCB substrate. Antenna array consists of four elements and it has been designed for millimeter wave applications.

Manoj et al. have proposed a super wideband omni-directional monopole MIMO antenna is this work. The proposed antenna is a compact design and it has been designed to have dual notched band characteristics.

Meenu et al. have proposed multipath mitigation technique using antenna diversity for vehicular ad-hoc network (VANET) applications. VANET should have low latency and high reliability, but multipaths affect their performance, therefore multipath mitigation is important in VANET.

Monika et al. have proposed a dynamic bandwidth allocation technique for improving quality of service in generalized multi protocol label switched (GMPLS) optical network. A statistical model of the network has been developed, and a technique has been proposed to reduce the blocking probability.

Naresh et al. have proposed a monopole patch antenna for ultra wideband and X-band applications. The antenna has been designed by merging two rectangular patches and three slots have been incorporated for triple notched operation.

Preeti et al. have investigated performance of clustering techniques in wireless sensor networks based on dissimilarity factor. In this work different clustering techniques such as K-mean, Fuzzy C mean, Mean shift and Hierarchal clustering (HC) have been simulated and compared.

Rafael has derived an optimal quality of service to 5G data bearer mapping for an extended network in this work. Using this methodology author has been able to report higher throughput while meeting latency requirement of heterogeneous 5G network.

Sahil et al. have investigated two communication systems, one with optical wireless communication and the other one with free space optics. In both systems bit rate error and quality factor have been used as performance metrics and comparative results have been reported.

Wei-Kuo et al. have proposed edge based refactoring LTE/EPC architecture for the future cellular network. The proposed architecture reduces network congestion and in-efficiencies thereby offering high-speed mobility.

Ying et al. have investigated an open platform communications unified architecture for industry IoT applications in order to solve the problem of network load during the transmission of information under emergency situations.

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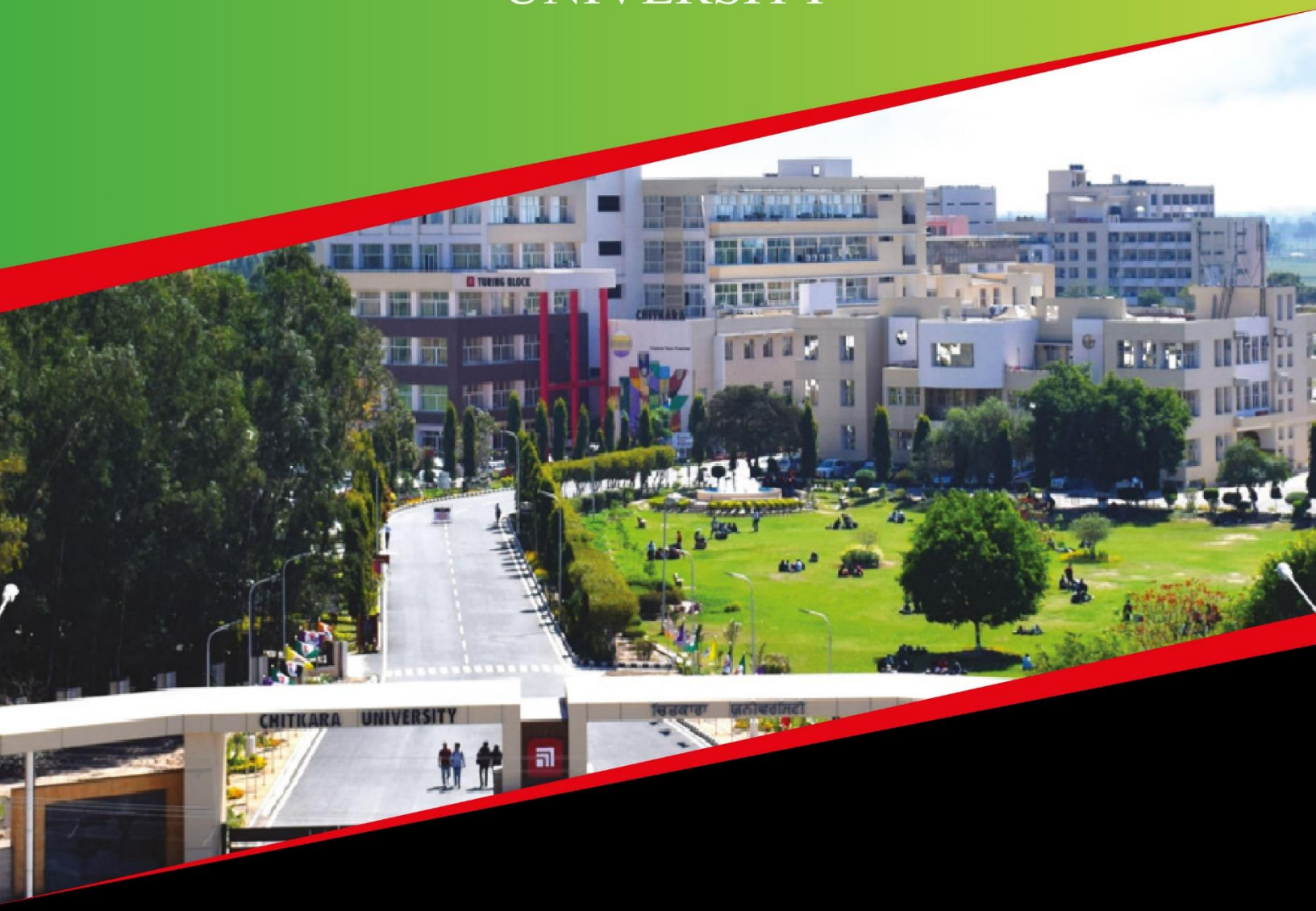

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