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COMSYS

ALWAYS AHEAD IN TECHNOLOGY

INTERNATIONAL CONFERENCE ON FRONTIERS IN COMPUTING AND SYSTEMS

COMSYS 2020

January 13 - 15, 2020

Jalpaiguri Government Engineering College
Jalpaiguri, West Bengal, India

EDITORS:
Debotosh Bhattacharjee
Dipak Kumar Kole
Nilanjan Dey
Subhadip Basu
Dariusz Plewczynski

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TECHNICAL COOPERATION

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Messages

Message from Comsys 2020 General Chair

Subhadip Basu, Professor of Computer Science & Engineering, Jadavpur University, Jadavpur, West Bengal, India

Dariusz Plewczynski, Head of Functional & Structural Genomics Laboratory, Center of New Technologies(CeNT), University of Warsaw, Warsaw, Poland

Welcome to COMSYS-2020, the first edition of the International Conference on Frontiers in Computing and Systems. Core objective of this conference is to offer an intellectually stimulating ambiance for the scientists and researchers active in the domain of computing and systems. COMSYS-2020 provides a unique platform for the delegates to exchange new ideas and to establish business or research relations. We sincerely hope that the conference constitute significant contribution to the knowledge in the scientific fields of machine learning, computational intelligence, VLSI, networks and systems, computational biology and security.

The choice of the venue for the COMSYS-2020 as Jalpaiguri Government Engineering College (JGEC) in West Bengal, India is also significant, as it is an important public funded engineering institution in India. Located in the picturesque city of Jalpaiguri, at the foothill of the Himalayas, JGEC acted as the perfect host for COMSYS-2020.Many thanks to the local committee for arranging the details related to the beautiful conference site, as well as organizing the conference.

COMSYS-2020 spans over three days. The two half-day tutorials on the first day will be delivered by eminent scientists in the field, giving researchers, practitioners, and students an excellent opportunity to learn about the latest trends in computing and systems. In addition to the technical sessions, the COMSYS-2020 program includes two keynote/invited talks by visionaries and thought leaders in the field. COMSYS-2020 also organizes several technical competitions and provides a platform for the start-up entrepreneurs.

We are especially indebted to the Patrons of the COMSYS-2020, Prof.SaikatMaitra, Vice Chancellor, MAKAUT and Prof.Amitava Ray, Principal, JGEC. Special thanks to our International Advisory Committee for theircontinued guidance and support.

Finally, I would like to thank all the sponsoring organizations, especially, the Department of Science & Technology, Government of India, for their generous financial support.

Messages

Message from Comsys 2020 Program Chair

Debotosh Bhattacharjee, Jadavpur University, Kolkata, India

Swagata Mondal, Jalpaiguri Government Engineering College, Jalpaiguri, India

It is with great pleasure that we welcome you to the conference COMSYS2020 in the Town of Olive, Jalpaiguri. The conference has attracted papers on various topics, which are grouped into four tracks: Computer Intelligence, Computational Biology, Security, and VLSI.

Being FREE, tutorials at COMSYS2020 are a great way to get up to speed on important and active research topics. In this event, we have two tutorials offered by experts from India and abroad. The technical program includes twelve oral presentation sessions, one poster session and two keynote addresses.

We would like to express our gratitude to the Program Committee and reviewers for their careful review and evaluation of the submissions. The success of this conference represents the efforts of all our colleagues that are too numerous to name individually. We want to thank all of you to participate in this conference, making this a lively community dedicated to the advancement of technology.

We hope that you will find the COMSYS2020 program exciting and stimulating, and enjoy the opportunity to interact with researchers from various fields. Welcome!

Messages

Message from Comsys 2020 Patron

Prof. (Dr.) Amitava Ray, Principal, Jalpaiguri Government Engineering College, Jalpaiguri, India

As your host and patron of the event, I would love to extend a warm welcome to all the delegates of the International Conference on Frontiers in Computing and Systems (COMSYS-2020) to be held from 13th to 15th of January, 2020 at our institution, Jalpaiguri Government Engineering College and also to our town Jalpaiguri, a city in West Bengal, India, located on the foothills of the Himalayas. The conference, a first of its kind in our college, will be jointly organised by the Department of Computer Science and Engineering and the Department of Electronics and Communication Engineering of the institution. The main objective of COMSYS2020 is to present the latest research and results of scientists related to Machine learning, Computational Intelligence Track, VLSI, Networks and Systems Track, Computational Biology Track, Security Track topics. This conference provides opportunities for the different areas delegates to exchange new ideas and application experiences face to face, to establish business or research relations. It will bring together the researchers from academia and industry onto a common platform and help them to develop a comprehensive understanding of the challenges of technological advancements from different viewpoints. This conference also will help in fostering a healthy and vibrant relationship between academia and industry.

To introduce the institution to you all, it was established on 7th August 1961 and Jalpaiguri Government Engineering College is the fifth oldest of all technical institutions in the state of West Bengal. The college is an autonomous technical institution offering B.Tech and M.Tech courses in engineering affiliated to Maulana Abul Kalam Azad University of Technology, West Bengal.

Finally, we shall always remain indebted to Prof. Saikat Mitra, Vice Chancellor, MAKAUT, Our Chief Patron, Dr. Dipak Kumar Kole, Associate Professor, Dept. of CSE, Jalpaiguri Govt. Engg. College, Our Organizing Chair, Prof. Subhadip Basu, Professor, Jadavpur University and Prof. Dariusz Plewczynski, Professor, University of Warsaw, Poland, our General Chairs and Prof. Debotosh Bhatterjee and Dr. Swagata Mondal, Professor, Jalpaiguri Govt. Engg. College, our Program Chairs.

We look forward to your participation in this fascinating and rewarding experience.

Messages

Message from Comsys 2020 Organizing Chair

Dipak Kumar Kole, Jalpaiguri Government Engineering College, Jalpaiguri, India

We offer a grand welcome to all the delegates at the International Conference on Frontiers in Computing and Systems (COMSYS-2020), being held on 13th-15th of January, 2020 jointly organized by the Dept. of Computer Science & Engineering and the Dept. of Electronics & Communication Engineering at Jalpaiguri Government Engineering College, West Bengal, India. It is an honour for us to lead COMSYS 2020 this year.

COMSYS 2020 maintains a very competitive review process, high-quality technical papers, stimulating an in-depth tutorial, and a wide variety of start-up and competition forum presentation.

The successful organization of COMSYS 2020 has required the direction and advice provided by the COMSYS steering committee, the COMSYS advisory board, and various other members of the organizing committee. We appreciate the initiative, dedication and the time of all the committee members and the volunteers, and the strong support that we have been receiving from all of our sponsors, specialy Science and Engineering Research Board (SERB) under the department of science and technology (DST), Govt. of India for their partial grant-in-aid. I thank all the authors and presenters for their contributions — helping us to have an excellent technical program. We also thank all members of our team who has helped us in organizing the logistics and in event management, and worked sincerely in providing publicity for raising adequate awareness in the community. With all efforts perfectly coordinated and aligned in the right path, we are confident that the conference will set the trend around its theme of achieving new heights in the area of "Machine learning, Computational Intelligence, VLSI, Networks and Systems, Computational Biology, Security".
We look forward to your participation in this fascinating and adorning experience.
Last but not the least we like to mention the guidance, the support and specially the motivation we received from our respected Professors at Jadavpur University without which this conference would never get its present form. We offer our gratitude to Prof. Subhadip Basu, Prof. Debotosh Bhattacharjee, Prof. Mita Nasipuri, Prof. Ram Sarkar, Prof. Nibaran Das, Prof. Nilanjan De, and Prof. Dariusz Plewczynski for there continuous support and contribution.

Finally, a very warm welcome to you all at Jalpaiguri, a beautiful place of North Bengal.

Committees

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Ram Sarkar, Jadavpur University , Jadavpur , West Bengal, India
Nibaran Das, Jadavpur University , Jadavpur , West Bengal, India
Dipak Kumar Kole, Jalpaiguri Government Engineering College, Jalpaiguri, India
Swagata Mondal, Jalpaiguri Government Engineering College, Jalpaiguri, India

General Information

Organizer

Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal, India

Dates & Venue

Dates	13 - 15 January, 2020
Venue	Jalpaiguri Government Engineering College
Mail Address	comsys@jgec.ac.in, comsys2020@gmail.com
Web	https://jgec.ac.in/comsys2020

Registration / Information Hours

COMSYS 2020 Registration Desk is at

Monday, January 13 9:00 AM - 9:30 AM
Tuesday, January 14 9:00 AM - 9:30 AM
Wednesday, January 15 9:00 AM - 9:30 AM

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Neelotpal Chakraborty, *Jadavpur University , Jadavpur , West Bengal, India*

Kaustav Sengupta , *Centre of New Technologies, Warsaw, Poland*

Program at a Glance

January 13, 2020 | Monday

10:00am – 10:30am	**Registration** *Venue:* **Registration Desk**
10:30am - 11:45am	**TUTORIAL-1** *Venue:* **Language Lab.** **Prof. Ananda Shankar Chowdhury** *Topic:* **Deep Learning Enhanced Computer Vision**
11:45am-12:00pm	**Tea Break**
12:00pm – 01:15pm	**TUTORIAL-1 (Continued...)**
01:15pm - 02:15pm	**Lunch Break**
02:15pm – 03:30pm	**TUTORIAL-2** *Venue:* **Language Lab.** **Dr. Jacek Sroka** *Topic:* **Introduction to processing of Large Datasets in Apache Spark**
3:30pm-3:45pm	**Tea Break**
3:45pm- 5:00pm	**TUTORIAL-2 (Continued...)**

January 14, 2020 | Tuesday

09:00am – 09:30am	**Registration** *Venue:* **Registration Desk (College New Auditorium, JGEC)**
09:30am – 10:15am	**INAUGURAL SESSION** *Venue:* **College New Auditorium, JGEC**
10:15am – 10:30am	**High Tea**
10:45am – 11:45am	**Keynote 1** *Venue:* **College New Auditorium** Prof. Dariusz Plewczynski
11:45am -01:00pm	**Technical Session 1** *Track:* **Computer Intelligence Track** *Venue*: **Central Computer Lab.**
11:45am -01:00pm	**Technical Session 1** *Track:* **Computational Biology Track** *Venue*: **Language Lab.**
11:45am -01:00pm	**Technical Session 1** *Track:* **Security Track** *Venue*: **EDUSAT, Dept. Of CSE**
02:00pm -03:00pm	**Technical Session 2** *Track:* **Computer Intelligence Track** *Venue*: **Central Computer Lab.**
02:00pm -03:00pm	**Technical Session 2** *Track:* **Computational Biology Track** *Venue*: **Language Lab.**
02:00pm -03:00pm	**Technical Session 2** *Track:* **Security Track** *Venue*: **EDUSAT, Dept. Of CSE**
02:00pm -03:00pm	**Technical Session 2** *Track:* **Poster Session** *Venue*: **Seminar Hall, Dept. Of ECE**
05:30pm – 09:30pm	**Cultural Program & Banquet Dinner** *Venue*: **La Vita Nouva (3Star Hotel),** Gajoldoba, Jalpaiguri

January 15, 2020 | Wednesday

09:30am-10:30am	**Keynote 2** *Venue:* **Language Lab.** Prof. Punam K. Saha
10:30am – 10:45am	**Tea Break**
10:45am -01:15pm	**Technical Session 3** *Track:* **Computer Intelligence Track** *Venue*: **Central Computer Lab.**
10:45am -01:15pm	**Technical Session 3** *Track:* **Computational Biology Track** *Venue*: **Language Lab.**
11:45am -01:00pm	**Technical Session 3** *Track:* **VLSI Track** *Venue*: **EDUSAT, Dept. Of CSE**
02:00pm -04:00pm	**Technical Session 4** *Track:* **Computer Intelligence Track** *Venue*: **Central Computer Lab.**
02:00pm -04:00pm	**Technical Session 4** *Track:* **Computer Intelligence Track** *Venue*: **Language Lab.**
02:00pm -04:00pm	**Technical Session 4** *Track:* **VLSI Track** *Venue*: **EDUSAT, Dept. Of CSE**
04:00pm – 04:45pm	**Valedictory Session** **Dr. Swagata Mandal** *Venue*: **Language Lab.**
04:45pm – 05:00pm	**High Tea**

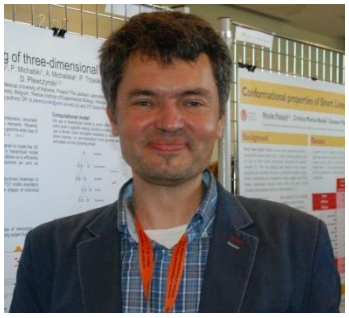
KEYNOTE TALKS

January 14, 2020 | Tuesday

Keynote Speech 1 | 10:45am – 11:45am

Three dimensional genome computational modelling using genomics and imaging data at the population scale

Speaker: Dariusz Plewczynski,Head of Functional and Structural Genomics Laboratory, Center of New Technologies (CeNT),University of Warsaw, Warsaw, Poland



Dariusz Plewczynski interests are focused on **functional and structural genomics**. His functional attempts make use of the vast wealth of data produced by high-throughput genomics projects, such as 4DNucleome (structural genomics consortium), 1000 Genomes Project, UK BioBank, Simons Genome Diversity Project, Earth BioGenome Project, ENCODE, and many others. The major tools that are used in this interdisciplinary research endeavor include statistical data analysis (GWAS studies, clustering, machine learning), genomic variation analysis using diverse data sources (karyotyping, confocal microscopy, aCGH microarrays, next generation sequencing), bioinformatics (protein sequence analysis, protein structure prediction), and finally biophysics (polymer theory and simulations) and genomics (epigenetics, genome domains, three dimensional structure of chromatin). He is presently involved in several Big Data projects both in US (4DN at Jackson Laboratory for Genomic Medicine, Earth BioGenome at University of California Davis), EU (INDEPTH, INC COST actions, ENHPATHY ITN) and in Poland (CeNTUniversity of Warsaw and MINI Warsaw Technical University). He is actively participating in two large consortia projects, namely **bioinformatics and genomic analysis** of 1000 Genomes Project population data for structural variants (SV) and single nucleotide polymorphism (SNP) identification in the context of 3D nuclear structure; and **biophysical modelingof chromatin three-dimensional conformation**within 4Dnucleome projectfor multiple human cell lines using HiC and ChIA-PET techniques. His goal is to combine SV,epigenomic, transcriptional and super-resolution imagingdata with spatial and temporal nucleus structure for better understanding of the biological function of genomes, the genomic structural variation within populations of cells and between individuals from different species, the spatial constrainsfor the natural selection during the evolutionary processes, mammalian cell differentiation, and finally cancer origin and development.

Abstract: Chromosomal folding are important features of genome organization, which play critical roles in genome functions, including transcriptional regulation. Recent advances in high-throughput chromosome conformation capture (3C) technology, such as Hi-C and ChIA-PET, have demonstrated the importance of 3D genome organization in development, cell differentiation and transcriptional regulation. There is now a widespread need for computational tools to generate and analyze 3D structural models from 3C data. ChIA-PET is unique in its ability to generate multiple datasets (in a single experiment), including binding sites, enriched chromatin interactions (mediated by specific protein factors, like CTCF), as well as non-enriched interactions that reflect topological neighborhoods of higher-order associations.

Together with my collaborators I have developed the foundations of the 3D GeNOme Modeling Engine (3D-GNOME) - a web service which generates 3D structures from 3C data and provides tools to visually inspect and annotate the resulting structures, in addition to a variety of statistical plots and heatmaps which characterize the selected genomic region. 3D-GNOME simulates the structure and provides a convenient user interface for further analysis. Alternatively, a user may generate structures using published ChIA-PET data for the GM12878 human cell line by simply specifying a genomic region of interest. 3D-GNOME is

freely available at http://3dgnome.cent.uw.edu.pl/ providing unique insights in the topological mechanism of human variations and diseases.

Moreover, we developed machine learning models of human genome three-dimensional structure that combine one dimensional (linear) sequence specificity, epigenomic information, and transcription factor binding profiles, with the polymer-based biophysical simulations in order to explain the long-range chromatin looping within Topologically Associating Domains (TADs). The predicted interactions were consistent with the experimental long-read ChIA-PET interactions mediated by CTCF and RNAPOL2 for GM12878 cell line. The contribution of sequence information and chromatin state defined by epigenomic features to the prediction task was analyzed and reported. Furthermore, we design three-dimensional models of chromatin contact domains (CCDs) using real (ChIA-PET) and predicted looping interactions. Both types of 3D computational models (constructed from experimental or predicted interactions) are consistent. We confirmed3 the association between genome sequence, epigenomic and transcription factor profiles, and three-dimensional interactions.

High-quality ChIA-PET data (combined with data from the 1000 Genomes Catalogue of Human Genetic Variation and from the GWAS Catalogue) enables us to perform genome-wide population-scale analysis at the finest resolution. We show different effects genetic variations have on genome regulation when altering chromatin interaction networks mediated by different protein factors. Our results show a close link between variation in chromatin interaction networks mediated by RNA polymerase II and differential gene transcription.

Altogether, our studies show the critical impact of genetic variants on the higher-order organization of chromatin folding and provide insight into the mechanisms regulating gene transcription at the population scale.

January 15, 2020 | Wednesday

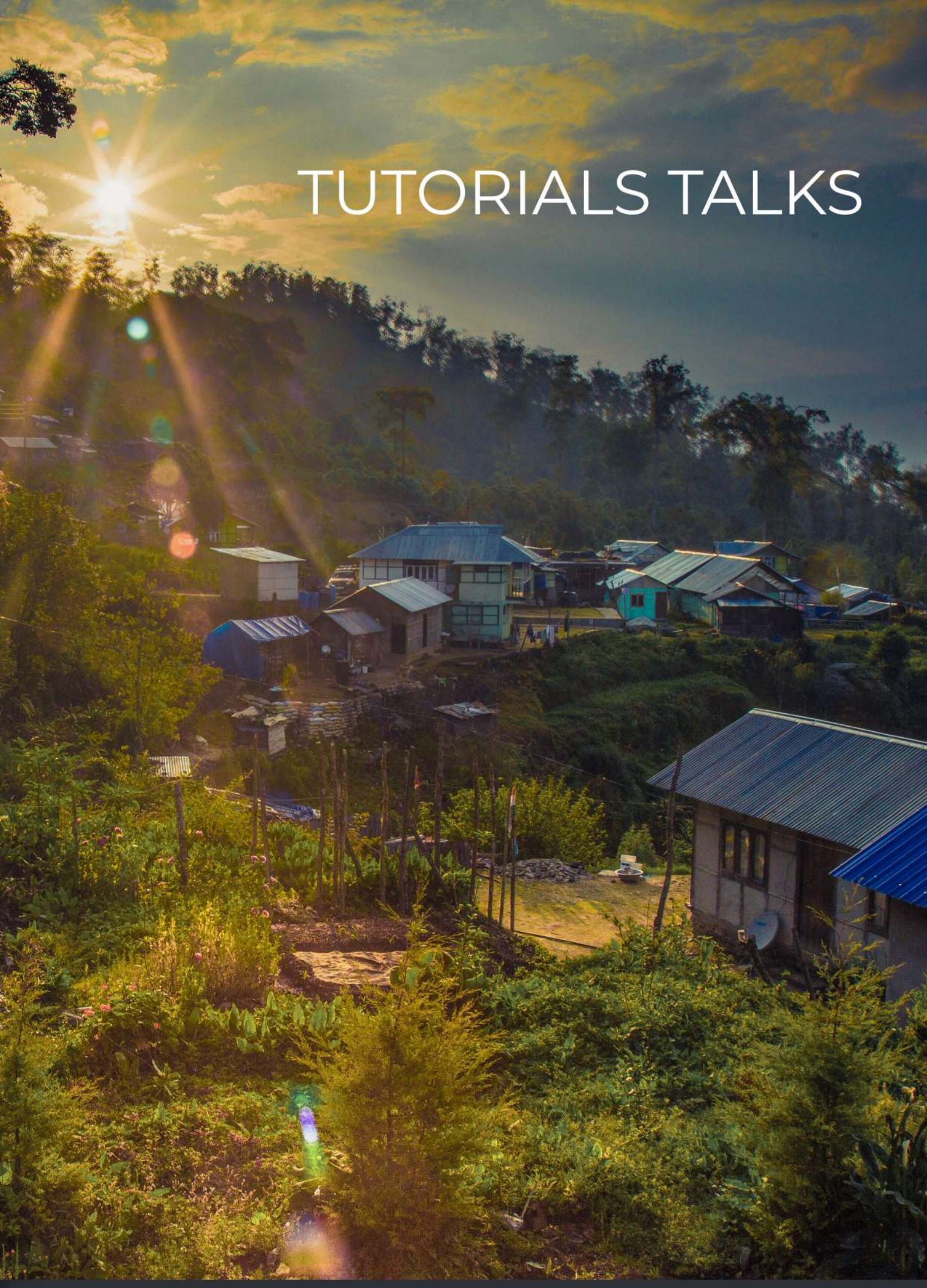
Keynote Speech 2 | 09:30am – 10:30am

Osteoporosis, Bone Micro-architecture, and Imaging – Recent Developments and Translational Studies

Speaker: Punam K Saha, Professor, Electrical and Computer Engineering,University of Iowa, United States

Punam Kumar Saha received his Ph.D. degree in 1997 from the Indian Statistical Institute, where he served as a faculty member during 1993-97. In 1997, he joined the University of Pennsylvania as a postdoctoral fellow, where he served as a Research Assistant Professor during 2001-06, and moved to the University of Iowa in 2006, where is currently serving as a tenured professor of Electrical and Computer Engineering and Radiology. His research interests include image processing and pattern recognition, quantitative medical imaging, musculoskeletal and pulmonary imaging, image restoration and segmentation, digital topology, geometry, shape and scale. He has published over 100 papers in international journals and over 300 papers/abstracts in international conferences, holds numerous patents related to medical imaging applications, has served as an associate editor of Pattern Recognition and Computerized Medical Imaging and Graphics journals, and has served in many international conferences at various levels. Currently, he is an Associate Editor of the IEEE Transactions on Biomedical Engineering and the Pattern Recognition Letters journals. He received a Young Scientist award from the Indian Science Congress Association in 1996, has received several grant awards from the National Institute of Health, USA, and is a Fellow of IEEE, IAPR and AIMBE.

Abstract: Osteoporosis is a common age-related disease characterized by reduced bone density and increased fracture-risk. Nearly 40 percent of women and 13 percent of men suffer one or more fragility fractures in their lifetime, and the fracture prevalence will further rise with continued increase in life-expectancy. Osteoporotic hip fractures reduce life expectancy by 20 percent and add an annual healthcare cost of nearly 19 billion dollars in the United States only.Early and accurate diagnosis of osteoporosis and assessment of fracture-risk is fundamental to handle the disease, and bone imaging plays an important role to accomplish this goal.Dual-energy X-ray absorptiometry (DXA) measured bone mineral density (BMD) is clinically used to characterize osteoporosis.It is known that BMDexplains 60-70% of the variability in bone strength and fracture-risk, and the remaining variability comes from collective effects of other factors such as cortical and trabecular bone distribution, and their micro-structural basis.Accurate and robust measurement of effective cortical and trabecular bone microstructural features, associated with bone strength and fracture-risk, is of paramount clinical significance. State-of-the-art imaging modalities for bone microstructural assessment include magnetic resonance imaging (MRI), high-resolution peripheral quantitative computed tomography (HR-pQCT), flat-panel cone beam CT (CBCT), and whole-body multi-row detector CT (MDCT).Different research groups have applied various methods for characterization of bone microstructure related to cortical porosity and thickness, trabecularvolume, network area, spacing, number, star volume measure, structure model index, connectivity number etc. Our research group has developed unique methods for *in vivo*clinical CT-based assessment of cortical porosity and trabecular plate-rod and longitudinal-transversemicro-architecture.This talk presents the principles and basis of these methods,experimental results evaluating their fidelity, generalizability, and impact on translational and clinical research studies.


TUTORIALS TALKS

Jun. 13, 2020 Monday

Tutorial 1 | 10.30 am - 11.50 am

Deep Learning Enhanced Computer Vision

Prof. Ananda Shankar Chowdhury, Imaging Vision and Pattern Recognition Group, Department of Electronics and Telecommunication Engineering, Jadavpur University, Kolkata.

Abstract: In this tutorial, I will show how different problems in computer vision can be efficiently solved using knowledge of deep learning. Some basic concepts in computer vision and deep learning will be discussed first. Three different computer vision problems will be explored next. The first problem of egocentric video summarization will be solved using deep features and an optimal clustering approach. The deep architecture GoogleNet will be used for feature extraction. An optimal clustering algorithm, based on a center-surround model and an Integer Knapsack type formulation for the K-means clustering, will be applied next to obtain the summary. For the second problem of lung nodule segmentation from CT images, a coarse-to-fine solution strategy will be adopted. Segnet, another deep learning architecture, will be employed here to obtain coarse segmentation. This will be followed by a shape driven evolution of level sets for achieving fine segmentation. Finally, the problem of scale invariant person re-identification will be addressed. As a solution, two scale-invariant residual networks, one deeper and one shallower will be discussed. Deep metric learning for both the networks will be realized through a new loss function.

Jun. 13, 2020 Monday

Tutorial 2 | 10.15 pm - 3.30 pm

Introduction to processing of large datasets in Apache Spark

Prof. Jacek Sroka, Faculty of Mathematics, Informatics and Mechanics, University of Warsaw, Poland

Abstract: In this tutorial we will give a short introduction to processing of large datasets with Apache Spark. Spark is a distributed data-processing engine that can be run on clusters of commodity computers. As compared to its predecessor, the Apache Hadoop and MapReduce programming model, Spark is much more efficient especially in iterative computation and can take better advantage of modern hardware, e.g., increased memory and more cores per processor. At the same time the programming API is more robust, which removes the so called accidental complexity of Map Reduce programming - the same problem can be solved with much less code. Also Spark includes subprojects for: running SQL on big datasets, machine learning, graph processing and streaming. They can be combined and intermixed without extra overhead, while at the same time giving opportunities for additional optimizations. During the tutorial will introduce basic Spark concepts and APIs including: RDDs, Data Frames and Data Sets. Then, Spark subprojects like Spark SQL, Graph X / Graph Frames, Spark Streaming and MLlib will be presented. Finally, we will discuss the most important optimizations that make Spark so fast.

COMSYS 2020
Startup Idea Proposal Competition

Startup Chair: Prof. Vikramkumar Pudi, Department of Electrical Engineering Indian Institute of Technology, Tirupati

On of the COMSYS2020 Technical Program Committee, we are delighted to inform you that we have received overwhelming responses from the students and researchers in the start-up idea categories. Our main objectives in this category were to encourage the students and researchers to demonstrate new bookish idea that can be useful for our society and mankind. Most of the submitted ideas are quite new and innovative. The ideas are thoroughly scrutinized by technical panel comprising of renowned faculty members and expert from industry. Based on the decision of the panels technical committee has decided to select WriteSay,Automated Postal Kiosk ideas. Details of the selected ideas are given below.

We hope not only the selected ideas but also all the remaining ideas can be implemented in a nice way and show a new direction of business in the industry. Thanks all the participants for submitting their ideas in start-up categories in COMSYS2020.

COMSYS 2020 :: Summary of Selected Best Startup Idea Proposal

Title: WriteSay

Purbayan Kar, Department of Computer Science and Engineering, Jalpaiguri Government Engineering College, West Bengal , India

Writesay is a social media platform for writers and their potential readers. Have you ever wanted to be a writer,poet or storyteller? have you ever wanted to express yourself in a way only you can? Then writesay is the perfect platform for you.in this world of digitalization, we bring you the website/app that writers have been missing.budding writers from around the world can bring their works out to the world and earn money throuh it as well.

Title: Automated Postal Kiosk

Tathagata Nath, Ayatullah Faruk Mollah ,Department of Computer Science and Engineering, Aliah University, West Bengal , India

In modern day, human lifestyle has turned to be very dynamic. As a consequence, saving time and increasing efficiency has become a critical indicator of the dynamism. Current postal system is not at per with this dynamism and may therefore be considered to be outdated. So, an automated postal system with minimum manual involvement is a dire need that will operate 24x7 hours a week. Here, we propose a machine integrated with many components like display, keyboard, weight machine, money receiving box and a goods/envelop receiving box etc. One can post any material with this kiosk (like an ATM) anytime and anywhere. This proposed machine will easily carry out many postal operations automatically.

In these days, postal systems are gradually loosing interests due to non-compliance to modern technologies. In order to revive the fading interest of people, the proposed system may be a significant boostup. Like ATMs, postal kiosks may be opened for 24x7 hours a week so that people do not need to wait till the next working day. We strongly believe that such systems may restore relevance of postal system as well as it can serve importance necessity of modern human civilization. We are open to funding from interested bodies to implement such systems as a joint venture.

TECHNICAL PROGRAM SCHEDULE

COMSYS 2020 Technical Program Schedule

International Conference on Frontiers in Computing and Systems
January 13-15, 2020
Organizing by
Dept. of Computer Science & Engineering and Electronics & Communication Engineering
Jalpaiguri Government Engineering College
Jalpaiguri-735102, West Bengal, India

(Monday, 13.01.2020) **Time: 10:30am - 11:45am**	**TUTORIAL-1** *Venue:* **Language Lab.** **Prof. Ananda Shankar Chowdhury** *Imaging Vision and Pattern Recognition Group* Department of Electronics and Telecommunication Engineering Jadavpur University, Kolkata *Topic:* **Deep Learning Enhanced Computer Vision**
Time: 11:45am-12:00pm	**Tea Break**
Time:12:00pm – 1:15pm	**TUTORIAL-1 (Continued...)**
(Monday, 13.01.2020) **Time: 02:15pm – 03:30pm**	**TUTORIAL-2** *Venue:* **Language Lab.** **Dr. Jacek Sroka** *University of Warsaw, Poland* *Topic:* **Introduction to processing of Large Datasets in Apache Spark**
Time: 3:30pm-3:45pm	**Tea Break**
Time: 3:45pm- 5:00pm	**TUTORIAL-2 (Continued...)**

International Conference on Frontiers in Computing and Systems
January 13-15, 2020
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Dept. of Computer Science & Engineering and Electronics & Communication Engineering
Jalpaiguri Government Engineering College
Jalpaiguri-735102, West Bengal, India
Schedule for Paper Presentation

Track	**Date & Time**		**Venue**
Keynote 1	**Tuesday, 14.01.2020**	**10:45am – 11:45am**	**College New Auditorium**
Technical Session 1: (Tuesday, 14.01.2020) **Time: 11:45am -01:00pm**			
Track	**Venue**		**Paper IDs**
Computer Intelligence Track	Central Computer Lab.		78, 5,8, 15, 17, 63, 13
Computational Biology Track	Language Lab.		20,23,32, 45, 89,94
Security Track	EDUSAT, Dept. Of CSE		30,48,49,57, 59,75, 97,
Technical Session 2: (Tuesday, 14.01.2020) **Time: 02:00pm -03:00pm**			
Track	**Venue**		**Paper Ids**
Computer Intelligence Track	Central Computer Lab.		109, 82,118,51, 127,
Computational Biology Track	Language Lab		115,121,74,76, 122
Security Track	EDUSAT, Dept. Of CSE		124,12,24,84,85, 117
Poster Session	Seminar Hall, Dept. Of ECE		14,26,52

COMSYS 2020 Technical Program Schedule

International Conference on Frontiers in Computing and Systems

January 13-15, 2020

Organizing by

Dept. of Computer Science & Engineering And Electronics & Communication Engineering

Jalpaiguri Government Engineering College

Jalpaiguri-735102, West Bengal, India

Schedule for Paper Presentation

Track	Date & Time		Venue
Keynote 2	**Wednesday, 15.01.2020**	**9:30am-10:30am**	**Language Lab.**
Technical Session 3: (Wednesday, 15.01.2020) **Time: 10:15 -01:15pm**			
Track	**Venue**		**Paper IDs**
Computer Intelligence Track	Central Computer Lab.		25,27,28,34,105, 39, 110,111, 53,54,104
Computational Biology Track	Language Lab		137,22,125,135, 50,112
VLSI Track	EDUSAT, Dept. Of CSE		126,131,9,47,88,108,62,92
Technical Session 4: (Wednesday, 15.01.2020) **Time: 02:00pm -04:00pm**			
Track	**Venue**		**Paper Ids**
Computer Intelligence Track	Central Computer Lab.		136,44,132,133, 134,72, 58,67,69
Computer Intelligence Track	Language Lab		73,38,86,87,40,64,66,123
VLSI Track	EDUSAT, Dept. Of CSE		21,90,95,96, 99,106,107,114

COMSYS 2020 :: Abstracts

HOG and LBP based writer verification

Jaya Paul, Anasua Sarkar, Nibaran Das, Kaushik Roy

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Government College of Engineering and Leather Technology • Jadavpur University • Jadavpur University • Jadavpur University

We propose a writer specific off-line writer verification procedures to improve the reliability of verification system. It has to be a challenging task, particular in the off-line scenario, that uses images of scanned document, where the dynamic information is not available. In this paper, we propose local textural based feature Histogram of Oriented Gradients (HOG)and gradient based feature like local binary pattern (LBP). KNN, SMO and MLP classifiers are performed here. These different classiers trained individual for each writer and learn to verifiy a writer from others randomly selected unbised writer. Our method achieves 89.62% accuracy at KNN with 100 witers database,which is better than SMO and MLP. The experimental results show that these two features of writer verification improve the accuracy and reduce the error rate.

Implementation of Real Time Virtual Dressing Room using Microsoft Kinect SDK and Supervised Learning

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Presently the usage of Electronic Commerce has been growing at a rapid space and many customers choose the online shopping option available, to avoid waiting in a long queue. Before buying an item specially clothing item, jewellery or accessories the online shoppers have a desire to try them on. Female customers are worried about the security issue in the trial room of shopping complex. Using virtual dressing room people may virtually try and choose clothing, jewellery, accessories etc. at their home without any security issues. In the proposed work augmented reality technology has been used to give an efficient trial experience to the customer by implementing virtual dressing room using Microsoft Kinect Software Development

Kit (SDK), where Two Dimensional (2D) model of an apparel is superimposed on to the users image and it appears that the customers are wearing the actual dress and the results are satisfactory. In addition to this,work has been done using supervised learning algorithm and the same is in process. The proposed work eliminates the security issues as the privacy of woman customer is the major concern and they may feel like they are in trial room of shopping complex.

Verification of truth table minimization using Min term Generation Algorithm Weighted Sum Method

Rohit Kumar Baranwal, Debapriyo Saurav Mazumdar, Niladri Pramanik, Jishan Mehedi

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A conventional approach for preparing truth table(TT) is from Boolean logic function which is then demonstrated in the form of the sum of min terms corresponding to the rows in which it appears .This paper uses the idea of reduction of truth table forming new truth table in which one of the input of expression is reduced and the final expression is described using the exhausted input. The same is continued till all the inputs are used up and the final expression is generated . This paper proposed to verify the reduction of expression obtained from truth table with modified minterm generation algorithm with lesser difficulty A reduced truth table is proposed to avoid bigger size of the truth table for all circuits using multiple inputs, which is proposed in [6] and . There after this paper discusses about the verification of the final expression using weighted sum method to check the veracity of truth table minimization, over all the truth table given with same input and outputs described in any form . Min term algorithm uses the idea of input system which is could of any number is amounted in a matrix form and is recounted in SOP form. This paper shows the constructive and better logical understanding about truth table minimization and generation of min term which can be used any large number of inputs in an easier way.

Prevention Of The Man-In-The-Middle Attack On Diffie-Hellman Key Exchange Algorithm: A Review

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In this report we demonstrate the pros and cons of Diffie-Hellman key exchange algorithm that is frequently used for the exchange of keys in private key cryptosystem. A very frequently occuring problem of Diffie Hellman key exchange algorithm during transmission of the keys through some channel is the Man-In-The-Middle attack. Due to this attack the security of the message gets affected because the person who is in the middle, i.e. the attacker, tampers the message and modifies it according to his/her need. There are some well-known solutions available for the prevention of this attack and our aim is to review those available techniques.

Multiple radar data fusion to improve the accuracy in position measurement based on k-means algorithm

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The position of any moving object can be easily determined with the help of radar. It can identify the object by using radio waves and determine the range, azimuth, and elevation. Only a single radar cannot provide accurate position measurement hence, we have to use more radar for calculating accurate position. If we increase the number of radar then position measurement improves. At the same time if any of the radar has some wrong measurement then combined position measurement becomes acceptable. To integrate all the information from multiple numbers of radars data fusion techniques are applied. Data fusion is a process to solve a problem based on the idea of integrating several pieces of information to obtain more consistent, accurate and useful information. The integration of data from multiple radars can ap-prove the accuracy of information than using a single radar. This paper summarizes how the k-means algorithm can be used to identify the position of any object by the process of combining data from various radars. Our main aim here is to identify the techniques of combining the information from different radars to reach out to the best accurate solution.

A Brief Survey of Steganographic methods for ECG Signal

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Heritage Institute Of Technology, Government College Of Engg And Leather Technology, Government College Of Engg And Leather Technology

The following paper represents a survey of steganography techniques suitable for usage in ECG. A few steganographic methods have been discussed below, it has been believed that these methods can be exploited to bring out more techniques suitable for ECG. The objective of this paper is to provide a comprehensive survey of existing steganographic techniques for ECG .

Spectral-spatial active learning in hyperspectral image classification using threshold-free attribute profile

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Tezpur University • Tezpur University • Tezpur University

Limited availability of training samples makes the classication of hyperspectral images a challenging task. A small number of informative training samples may provide more accurate results than randomly selected samples. For detecting informative training samples active learning methods are suggested in the literature. These methods when applied on spectral values alone, are less eective than in cases when both spectral and spatial information are considered. To integrate spectral and spatial information in hyperspectral images a state-of-the-art method is threshold-free attribute prole. In this paper, we present an overview of the state-of-the-art active learning techniques and propose a spectral-spatial active learning model based on threshold-free attribute proles. To this end, rst a threshold-free extended attribute prole is constructed on reduced dimension of the hyperspectral image. Then, the informative training samples are iteratively selected based on uncertainty, diversity, cluster assumption or combination of these criteria. Experiments are conducted on two benchmark real hyperspectral data sets where the active learning methods based on spectral values alone are compared to the proposed active learning model. The results reveal that the proposed active learning model can identify more informative training samples.

Deep Learning based Automated Detection of age-related Macular Degeneration from Retinal Fundus Images

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The early and intermediate stages of age-related macular degeneration (AMD) are often asymptomatic and may lead to a neovascular form, which ends up causing blindness. The existing works on the detection of AMD make use of image processing and manual feature extraction methods. These methods detect drusen properties and use decision-making algorithms to obtain the desired results. The proposed work is a novel solution for the problem of AMD detection using a deep learning approach. The proposed method screens retinal images for detecting direct evidence of AMD. As a deep learning model calculates features and learns on its own, there is less chance of neglecting any important feature which may happen in the existing methods. The proposed approach is applied to check for the presence of AMD on a dataset of healthy and diseased cases and a detection accuracy of 84% is obtained.

A Supervised Trajectory Anomaly Detection using Velocity and Path Deviation

Suman Mondal, Arindam Roy, Sukumar Mandal

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Now-a-days, CCTV Surveillance applications have been significantly grown all over the world. Many methods have been implemented for detecting anomalies of moving objects in video. Implementation of fuzziness on features is one of the most robust detection techniques. Proposed model illustrate a novel detection technique with fuzziness on velocity and path deviation. This paper also covers a small survey on different techniques of detection of abnormalities and also shows the result on Queen Mary University of London junction dataset (QMUL).

An Artificial Bee Colony inspired density based approach for clustering with new index measure

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This article suggests a clustering approach that is inspired from the random searching of the Artificial Bee Colony optimization. It considers the density distribution of the objects which gives an insight into identifying the cluster structures. The unknown density distribution has been approximated by using Kernel Density Estimation, it eventually helps in identifying the thresholds that discriminate the core objects from the noises and inter cluster density transition. We have introduced a new index measure that serves the purpose of cluster evaluation. The superiority of the proposed approach has been drawn from the experimental analysis over different data sets.

An Investigation of Accelerometer Signals in the 0.5-4 Hz Range in Parkinson's Disease and Essential Tremor Patients

Olga Sushkova, Alexei Morozov, Alexandra Gabova, Alexei Karabanov, Larisa Chigaleychik

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An investigation of the 0.5-4 Hz little-studied frequency range of acceleration signals (ACC) was performed in patients with Parkinson's disease (PD) and essential tremor (ET). In this frequency range, new neurophysiological regularities were revealed. A new method was used to analyze the wave train electrical activity of the muscles based on the analysis of Morlet wavelet spectrograms and ROC curves. The method idea is to find local extrema (named wave trains) in the Morlet wavelet spectrogram and to calculate various parameters describing these wave trains: the number of wave trains per second, the duration of the wave trains in periods, the leading frequency of the wave trains, the width of the wave train frequency band. The AUC functional dependence on the values of the bounds of the ranges of these parameters is investigated. This method is aimed at studying changes in the time-frequency parameters (the shape) of signals including changes that are not related to the power spectral density of the signal.

Blind Source Camera Identification of Online Social Network Images Using Adaptive Thresholding Technique

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The ubiquitous use of digital images has led to a new provocation in digital image forensics. Source camera identification authorizes forensic investigators to discover the probable source model that are appointed to acquire the image under investigation in criminal cases like terrorism, child pornography etc. In the current digital aeon, problems in source camera identification including falsely identified source needs to be addressed with extreme care to avoid embroiling an innocent person. The source camera identification techniques proposed till now, however, are not suitable to work with images captured from smart phones and smartphone images which are uploaded and downloaded from online social networks. This is because while downloading images from these online social networks (OSN) such as Facebook, WhatsApp etc, the images lose their original quality, resolution and statistical properties. This is because the online social networks compress the images uploaded, according to the propriety image compression requirements, for efficient storage and transmission, which would prevent accurate forensic source investigation. In this paper, we propose an efficient forensic image source identification technique, which follows an adaptive thresholding mechanism to differentiate between high and low image-camera correlation. Our experimental results prove that the proposed technique drastically improves the performance of the blind source camera identification of compressed OSN images., as compared to traditional global threshold approach.

A Fuzzy Logic Based Site Specific Crop Recommendation System

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Soil, geographical and meteorological parameters have major impacts on sustained crop production. Most of the rural farmers have no adequate knowledge about the effects of these parameters on crop production. The rural farmers generally rely on their traditional knowledge to select a crop which often leads to huge economic loss. A scientific system considering these site-specific parameters along with the traditional knowledge of the farmers may be an effective solution. This paper suggests a fuzzy logic-based crop recommendation system to assists rural farmers. The proposed model has been designed to deal with eight major crops grown in the state of West Bengal. Separate fuzzy rule bases were created for each

crop to achieve faster parallel processing. The model was applied to a diverse dataset and achieved an accuracy of about 92%.

Community Detection and Design of Recommendation System Based on Criminal Incidents

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In this cutting-edge, growth in computational areas has evolved in every fields of science. Now days people are communicating to each other using internet and more precisely it can be said that the online social network platforms are playing a major role to connect people around the globe. Now researchers are trying to dig up these online social networks and trying to implement in different domains or trying to fetch useful knowledge from social networks. Here the intention is to use this ground to help the victims and use their information to stop the upcoming criminal activities through recommendation process. It will help the common people to know how and where antisocial activities are being occurred. The current paper aims to find out the relation between crime incidents and users profile using community detection algorithm where vector space model will play a key role and then to use recommendation algorithm on users to suggest the outcome of earlier analysis.

Personalized Word Recommendation System using Sentiment Analysis

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Online Social Networks is a place where a user is truly free to can express himself or herself out and it is observed to be so. The social networks are used by users for not only socializing but to buy or sell products. This user behavior is quite adamant from the type of comments they post on different social networks. The word recommendation system is still not personalized rather generalized for all different websites. It can however be personalized by the use of sentiment analysis and the model here has done the same here. The model has used subjec-tivity and polarity for making a personalized recommender system by analysing the behavior and classifying them. This provided the model with two greater ways to recommend i.e., recommending on the basis of the user as prevalent from their comments and also by the topics been discussed by them.

Event-B Based Formal Modeling of a Controller: a Case Study

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Event-B is an event-driven approach for system development. It has the flexibility to develop different discrete control systems. It is a modeling language over a wide range of application domain. It is a refinement based step by step modeling methodology, used to develop the model of the system incrementally. There is a well-tested open-source tool available for model B checking, formalization of mathematical proofs and system validation is RODIN. In this paper, we present a short survey on usage of Event-B based model to locate the research gaps followed by a case study to build a model using 2 stage refinement strategy of event B to stop the precious groundwater wastage and conserve it. We try to model the behavior required for the environment of the system. Our proposed controller then controls the environment. The controller acts accordingly and we achieve the goal of groundwater conservation.

Simulation of Action Potential Duration and its Dependence on [K]o and [Na]i in the Luo-Rudy Phase I Model

Ursa Maity, Anindita Ganguly, Aparajita Sengupta

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Cardiac arrhythmia is a major group of heart diseases, that are caused due to irregular heartbeats. There are several risk factors for lethal cardiac disrhythmia that have been discovered over the years and the primary methods of diagnosis have been based on models of cardiac action potential in mammalian ventricular cells. This paper aims towards giving an insight on the effect that ionic concentrations have on the Action Potential Duration Restitution (referred to as APDR) curves (Luo Rudy Phase I model and Faber Rudy Model) through simulations using SIMULINK. Abnormalities in K+ , Na+ and Ca+2 concentrations across the cell membranes may cause fatal cardiac deaths due to arrhythmic beats.

Development of a Publicly Available Terahertz Video Dataset and a Software Platform for Experimenting with the Intelligent Terahertz Visual Surveillance

Alexei Morozov, Olga Sushkova

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A publicly available terahertz video dataset and a software platform for experimenting with the terahertz intelligent video surveillance are developed. The video dataset includes short videos of people with objects hidden under the clothing. The dataset is multimodal, that is, it contains synchronized videos of various kinds: terahertz, thermal, visible, near-infrared, and 3D. A special software platform is developed for the acquisition and preprocessing of the video data. The software platform includes a translator of the Actor Prolog language to Java and an open-source library of built-in classes for data acquisition and processing. In particular, the software enables one to project terahertz/thermal video data onto three-dimensional point clouds using 3D lookup tables. An experiment with the terahertz video data analysis based on various CNN architectures is described.

Simulative performance analysis of all optical universal logic TAND gate using Refractive Semiconductor Optical Amplifier (RSOA)

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Reflective Semiconductor Optical amplifier (RSOA) is a versatile gain medium due to its double pass characteristics compared to ordinary semiconductor Optical Amplifier. RSOA based gain dynamics is utilized to design and analyzing the new RSOA based all optical logic TAND gate using Soliton pulses for the first time. The proposed logic TAND is a universal gate and using this gate NOT, OR and AND gates are also designed

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Identication of Plant Species using Deep Learning

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Classication of plant species using machine learning is an automatic task to recognize the unknown plant species. Recognition is very challenging due to its morphological variations, such as shape, size and textures. In this paper we propose a deep convolutional neural net- work (CNN) for the identication of plant species using plant leaf im- ages. The main intuition of using CNN is learning the leaf features di- rectly from the input images/data using CNN. Furthermore, the CNN methods signicantly increases the performances in case of plants having identical shape and size.

A Hybrid approach for Segmenting Grey and White Matter from Brain Magnetic Resonance Imaging (MRI)

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Magnetic Resonance Imaging (MRI) is one of the commonly used Medical Imaging diagnostic tools for the identication of disease(s) during clinical investigation. Brain MRI is used for diagnosis of brain related-diseases such as brain tumors, Alzheimer's disease, etc. This has proven to be advantageous over other diagnostic techniques and also adds to the versatility and diagnostic utility for surgical treatment plan- ning and clinical interventions. Brain tissues have grey matter and white matter whose intensity is almost similar, hence making the diagnosis of the brain-related disease dicult. Segmentation of grey matter and white matter is crucial to detect the various brain-related disease such as Alzheimer's, migraine, Huntington, multiple sclerosis and dyslexia which shows signicant volumetric changes in grey matter and white matter. Prior to the Segmentation of brain regions, Skull stripping is a necessity for accurate diagnosis of various brain-related diseases. In this paper, His- togram based Skull stripping technique is applied to separate the skull and then a novel hybridized technique is proposed using Fuzzy Edge Detection and Region Growing to Segment the Grey and White Matter from Brain MRI. The result of the proposed technique is compared with dierent known techniques such as Region growing; Histogram based method, fuzzy C Means and K-Means, etc. It is found that the proposed method produces convincing results.

Retinal Vessel Segmentation using Unsharp Masking and Otsu Thresholding

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In the diagnosis of various optical and cardiovascular diseases retinal blood vessel observation is an important task. So, it is required to accurately detect the retinal vasculature to assist in the diagnosis of complications in the eye. A method of segmentation of retinal blood vessel structure from fundus images is proposed in this paper. For pre-processing, the green channel of the image is extracted and subjected to an unsharp masking filter followed by contrast enhancement operations. Vessel extraction is done by using bit plane slicing and Otsu thresholding techniques and finally the morphological operation used for restoration. The proposed algorithm comes out to 95.30% accuracy with 99.43% specificity.

Automated Classification And Detection Of Malaria Cell Using Computer Vision

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With the advancement of technology, its involvement in medical science is inevitable. Rapid progress has been made in the fields of automated disease detection and diagnosis. The same concept has been extended to the field of malaria cell analysis in this research. From the image of a cell, this model is capable of determining whether it is uninfected or parasitized with malaria infection. The method discussed here is light weighted and easily implementable in terms of time and space complexity. Also, it has a training accuracy of 97.98% and a validation accuracy of 97.6%. A new method called Information Padding has been used and discussed in the methodology section.

Modular Secured IoT using SHAKTI

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Hardware planted bugs is a major security concern in today's Internet of Things (IoT) devices. Security testing of a hardware chip that integrates a computation and communication module together is complex, even though the software would only be few lines of code. In such a device, conventional software testing approaches such as code walk-throughs and reviews can be used for detecting security vulnerabilities. However, testing hardware security in such integrated IoT devices is a challenge. In this paper, we use the open source hardware SHAKTI E-Class as the computation element. Since the hardware design and code are available, security test of computation part can be performed independently of the communication part. For the communication part we externally integrate the widely used commercial ESP8266 Wireless LAN (WLAN) module through the Universal Asynchronous Receiver Transmitter (UART) with SHAKTI E-class. This ESP8266 WLAN chip can be security tested separately. Finally security testing of the computation and communication interface can be performed. This leads to a modular security testing approach that could be of immense importance in strategic sectors. This is a first successful attempt to increase security of IoT devices using the SHAKTI E-class open source processors.

High Payload RDH Through Directional PVO Exploiting Center-Folding Strategy

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In this paper, a high payload reversible data hiding scheme (HPRDH) has been designed using Directional Pixel Value Ordering (DPVO) Exploiting Center-Folding Strategy. At rst, Center-Folding Strategy has been applied on a cover image to embed secret informa- tion which generates Dual Marked Images (DMI). After that, Directional Pixel Value Ordering (DPVO) has been utilized to embed more secret data on interpolated Dual Marked Images (DMI). Here, the advantage of center folding method has been employed, which compresses the valu- able hidden information through averaging. On the other hand, DPVO provides repeated embedding on overlapped pixels of an image block in dierent directions like horizontal, vertical and diagonal one after an- other. The proposed method is highly adaptive in nature because of its variable size secret data along with dierent image block size for successful embedding. The experimental outcomes shows that the proposed method is

very suitable to embed more hidden data without compro- mising the visual quality of image compared to other state-of-the-art methods. The intended outcome brought into limelight some remark- able sublime characteristics in the eld of hidden data communication, tamper detection and digital forgery detection without which the techno- logical life is stunted. Innumerable government and private sector facet including health care, commercial security, defence, intellectual property rights gets immensely beneted from this scheme.

A Robust Audio Authentication Scheme Using (7,4) Hamming Error Correcting Code

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In the advancement of high speed internet technology and vast use of social media, peoples are sending audio and video message for their daily communication in case of textual information. Due to unprotected nature of communication channel and increasing unauthorise users or adversary, it is essential to measure some protection of valuable multimedia messages which is one of a popular research issue for various human centric application especially in law enforcement and military applications. In this context, an effective audio authentication scheme has been proposed using (11,7) Hamming codes which are employed on an audio file. Now, for first round any arbitrary position (say n^{th} position) bit will be consider as secret key and for rest of the cases data embedded position will be treated as a secret key position for the immediate round. For first round secret message bit will be embedded in the LSB position(if possible), otherwise next bit will be checked and for the remaining cases message bit will be embedded in a position where(LSB position bit ! = secret message bit) and (secret key position bit ! = secret message bit). Continue this process to embed all secret data bits within the cover audio file and produce stego audio. Various private, public and government sector will be benefited from this scheme.

A novel approach to 3D face registration for biometric analysis using Rcompute_ICP

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In this present work, 3D face registration with ICP (Iterative Closest Point) algorithm on 3D Face manifolds has been presented. This present work takes an unknown 3D face manifold as input and then registers it using a pre-initialized version of ICP algorithm named RCompute_ICP. The present work first assumes that there are many source models and one target model which has been given as input. We have to predict the pose of the unknown source model and find out the registration performance of the source model. Our present algorithm uses Iterative Closest Point (ICP) for prediction of pose and registration performance using a one to many mapping technique by mapping each source model to each of the target models present. Finally, the target model which gives the least error after mapping of the source model is finally designated to be the probable pose of the unknown source model which is then subsequently registered to the corresponding target model. We synthesize our results, through the experiments conducted on 3D Face manifolds from three different databases namely Frav3D, GavabDB and KinectJUDeiTy3DK Database (our new 3D Face database). The least error obtained after registration was as low as 0.0032 which subsequently depicts the robustness of our present method.

Region Growing Based Scheme for Extraction of Text from Scene Images

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Extraction of text from scene images is a key task for any OCR system. Binarization plays an important role for text extraction scheme form scene images. Therefore, an effective scheme for binarizatin as well as extraction of text from scene images is required. This work presents two effective schemes. First one is binarization and second one is text extraction from scene images. In the binarization scheme, Canny's edge information are added in the Savola's binarization scheme. This binarization scheme provides a number of connected components. Further, we proposed an effective region growing scheme for extraction of text components from the binary image. A number of text specific criteria are defined. Based on these criteria two seed points for text and non-text components are generated. Connected component based region growing scheme is applied based on these seed points. For selection of seed points, information from ground-truth images of text and our laboratory made non-text components are used. We experimented our schemes on

the publicly available ICDAR Born Digital data set. The performances are quite satisfactory.

An Automated Reflector based Traffic Signal System

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Smart traffic automation is an integral part of smart cities in recent days. Huge amount of energy and power is consumed by the usage of high end computers and electronic devices. An energy optimization technique is proposed in this pa-per to minimize energy dissipation and power consumption by the existing traffic systems. Green computing concept is implemented in automated traffic system. It is observed that a remarkable amount of energy is dissipated and eventually wast-ed due to use of regular electric lights at traffic points. Traffic Reflector concept is introduced in place of regular traffic lights. LED lights or incandescent bulbs in the traffic signal posts would be replaced by the reflectors. Sunlight would be fo-cused on these reflectors by properly placed mirrors. Mirrors would be adjusted automatically to change their angles according to sun position. Light source would be replaced by solar panel driven light in absence of sunlight at night or other weather conditions. Energy consumption by traffic signal lights at traffic signal points is minimized by our proposed approach.

A Novel Sentence Scoring Method for Extractive Text Summarization

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Saliency based sentence ranking is basic step of extractive text summariza-tion. Saliency of a sentence is often measured based on the important words that the sentence contains. One of the drawbacks of such saliency based sentence extraction me-thod is that it extracts mainly the sentences related to the most common topic in the doc-ument. But the input document may contain multiple topics or events and the users may like to see in the summary the salient information for each different topic or event. To alleviate such problem, diversity based re-ranking approach or sentence clustering based approach is commonly used. But re-ranking or sentence clustering makes summarization process slow. In this paper, we propose a novel summarization method that computes score of a sentence by combining saliency and novelty of the sentence. Without using any re-ranker or clustering of sentences, the proposed approach can automatically take care of diversity issue while produc-ing summary. We have evaluated performance of the system on DUC 2001 and DUC 2002 benchmark single document summarization datasets. Our experiments reveal that it outperforms several existing state-of-the art extractive summa-rization approaches.

Authentication on Interpolated Sub-Sampled based Image Steganography Exploiting Secret Sharing

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In this paper, we developed a secure secret sharing technique with authentication through steganographic scheme using interpolated sub-sampling methodology. Based on a (k, n)-threshold method, a secret image is shared by n shadow images which are embedded within n sub-sampled interpolated cover images. On the other-hand, k shadow images ($k \leq n$) can be used to recover the secret image. The proposed scheme uses a secure hash algorithm ($SHA12$) to enhance authentication that prevents dishonest participants from cheating.

A Novel Approach for Face Recognition Using Modular PCA and MAP MRF Classifier

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Automated Face Recognition involves identification of a person by comparing a copy of the facial image with the database of a known set of facial images. It consists of mainly two steps Feature Extraction and Classification. In this work, each facial image has been divided into 16 independent sub-blocks or modules and Modu-lar Principal Component Analysis (MPCA) has been applied for feature extraction. Considering each Module as a site, a method for labeling the site has been proposed. Maximum A Posteriori-Markov Random Field (MAP-MRF) classification technique has been used as it explores the site features and their contextual relation. As MRF follows Gibbs Distribution, posterior probability has been transformed into an energy function. A novel for defining energy function has also been proposed in this work.

Evolving Secret Sharing with Essential Participants

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Komargodski et.al. introduced Evolving Secret Sharing which allows a dealer to share a secret among unbounded number of participants over any given access structure. In their construction for evolving secret sharing over general access structure, the share size of the i^{th} participant happens to be exponential ($\mathcal{O}(2^{i-1})$). They also provided constructions for (k, ∞) threshold secret sharing. We consider the problem of evolving secret sharing with t essential participants, namely, over t-(k, ∞) access structure which is a generalization of (k, ∞) secret sharing ($t = 0$). We further generalize this access structure to a possible case of unbounded number of essential participants and provide a construction for secret sharing on it. Both the constructions are information theoretically secure and reduce the share size of the construction due to Komargodski et.al. over general access structure, exponentially. Moreover, the essential participants receive ideal (and hence, optimal) shares in the first construction.

Test-bench setup for testing and calibration of a newly developed STS/MUCH-XYTER ASIC for CBM-MUCH detectors

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Compressed Baryonic Matter (CBM) [1] is one of the experiments of the upcoming Facility for Antiproton and Ion Research (FAIR) [1] in Germany. CBM will take data in very high particle interactions rate of 107 MHz and thus fast and high granular detectors are required to cope up with the rate and multihit probability. With about 10 percent overall detector hit occupancy, each readout channel may see the hit rate of up to 200 KHz. For such a high density and high rate detector readout, a specialized ASIC STS/MUCH-XYTER is designed. This ASIC is made with dual gain so that it can be used for the multiple detectors of the CBM experiment e.g. Muon Chambers (MUCH) and Silicon Tracking Station (STS). This is a self-triggered hybrid ASIC consisting of 128 analog channels along with digital backend for reading out the data. Each channel along with preamplifier and shaping circuits also have a 5-bit flash ADC where all the 32 comparators of this ADC can be configured for a particular threshold setting. In this ASIC, low gain setting is called as MUCH mode. We have developed a test bench setup to test and calibrate this ASIC in low gain mode to use it with MUCH detectors. The major task of this test-bench is to optimize all the bias parameters of this ASIC and to calibrate all the ADC channels such that the ASIC performs as per our expectation. The present

paper focuses on the details of test-bench setup and the testing methodologies used to test and calibrate/trim the registers on this ASIC. The paper will be concluded with the basic test results of the ASIC after calibration.

A Bright-on-Dark, Dark-on-Bright Approach to Multi-lingual Scene Text Detection

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Detecting texts from natural scene images is currently becoming a popular trend in the field of information retrieval. Researchers find it interesting due to the challenges faced while processing an image. In this paper, a relatively simple but effective approach is proposed where bright texts on dark background and dark texts on bright background are detected in natural scene images. This approach is based on the fact that there is usually stark contrast between the background and foreground. Hence, K-means clustering algorithm is applied on the gray levels of the image where bright and dark gray level clusters are generated. Each of these clusters are then analyzed to extract the text components. This method proves to be robust compared to the existing methods, giving reasonably satisfactory results when evaluated on multi-lingual standard datasets like KAIST and MLe2e, and an in-house dataset of images having multi-lingual texts written in English, Bangla and Hindi.

Pig Breed Detection using Faster-RCNN

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In this paper, convolution neural network object detection technology has been used to detect pig breeds with high precision from images captured through a mobile camera. The pre-trained model is re-trained on several images of 6 different pure breed pigs obtained from organized farms. Faster- RCNN ResNet model has been used in transfer learning fashion for the above task. The training accuracy has been given as 100% and testing accuracy of this model is 91% with confidence level of 94%. From the results achieved, it is observed that this model has produced better result compared to detection accuracy on other data sets like dog database, flower database.

Black Bengal Goat Identification using Iris Images

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Animal identification is necessary for records, registration, and proof of ownership. The owner of few Black Bengal Goats can identify his goats by sight but it will create problem for larger number of goats as they are looking almost similar. A number of identification tools have been used for Black Bengal Goats like ear tag, tattoo, branding, RFID etc. The Tattoos are permanent identification marking but inconvenient to read after few months or years. Most of the farmers and breeders have used ear tags which contain a number for identification of particular goat but may be lost at time of grazing. Some organized farmers have placed RFID chips in tags but RFID reader is necessary to read the content of chips. In this paper, an effort has been made to identify individual Black Bengal Goat using their iris image like human. The eye images have been captured pre-processed, enhanced and irises have been segmented. The template has been generated from each segmented iris and stored in database. The matching has been performed among different segmented iris images from same goat. The matching has also been performed among iris images captured from different goats. It has been observed that the average hamming distance among iris images captured at different times from same goat are different from the average hamming distances among iris images from other goats. Finally, the matching threshold has been decided for identification of Black Bengal Goat.

Component level script classification benchmark with CNN on AUTNT dataset

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Script identification from camera images is a prerequisite for efficient end-to-end systems in multi-script environment. In recent times, due to wide usage of digitized multi-lingual documents and images, efficient script identifier becomes an inevitable module in computer vision and pattern recognition applications. In this paper, a component level multi-script identifier is designed based on CNN to set

the benchmark performance on publicly available AUTNT dataset. The model is evaluated using three different scripts viz. Bengali, Latin, and Devanagari. It yields reasonably high accuracy of 92.02% and 89.49% for document and scene component images respectively, and 92.51% for overall text components irrespective of image source. This result is first of its kind and it may be convincingly considered as a benchmark for component level script classification from the said dataset.

Identification of Diabetic Retinopathy Abnormalities using Machine Learning Algorithms

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The basic objective of the proposed work is to identify abnormalities caused by Diabetic Retinopathy in the human retina. We classified the retinal images into two categories; normal retina and abnormal retina which contains some signs of Diabetic Retinopathy. It occurs in many people who are suffering from diabetes. It is a painful disease and sometimes it leads to blindness. It happens when blood sugar levels are too high for long period of time and it can damage tiny blood vessels that provide blood to the retina. In this work, we detect these problems using two different supervised machine learning algorithms: Support Vector Machine (SVM) and k Nearest Neighbour algorithm. To train these two models, data has been collected from DIARETDB1, Standard Diabetic Retinopathy Database. These algorithms are used to build a model and their performances are compared with each other. The result is that the Support Vector Machine (SVM) gives the best accuracy of 96.6% with sensitivity and specificity of 0.66 and 0.95 respectively. Such type of model is very helpful in early detection and treatment of Diabetic Retinopathy.

Supervised Change Detection Technique on Remote Sensing Images using F-Distribution and MRF model

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Change detection is a powerful tool used to detect dissimilarities between two images of the same object taken after an interval of time. In the paper, we propose an algorithm for change detection in remote sensing images. This is a supervised

technique where we cluster the difference image to obtain approximate training data. Then, segment the difference image on the basis of the training dataset using Markov Random Fields (MRF). F-Distribution is used to reduce the segmented image into optimum number of clusters based on the inter-cluster intensities. Experimental results of this proposed method shows more encouraging output than other exiting change detection methods.

A new method to estimate Fractal Dimension of Color Images

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Fractal Dimension (FD) effectively quantifies the roughness of the image surface, which can be applied to many image processing applications. Though there exists a number of methods to estimate FD of gray scale images, limited work is done for the color images. In this paper, a new method is proposed to compute FD of color images in CIE L*a*b* (CIELAB) color space. Firstly, the color image is transformed into CIELAB space. Secondly, each of the L, a and b components of CIELAB space are partitioned into overlapped grids and nr value of each corresponding grid at different sizes are obtained using the distance between the maximum and minimum (L, a, b) triplets. Thirdly, nr values of the same sized grids are accumulated to obtain the Nr values. Finally, robust least squares regression (RLS) is applied to these Nr values to obtain the FD value. The performance of the proposed method is compared with three state-of-the-art methods using the generated fractal Brownian motion (FBM) image database and Brodatz database. Experimental results show that the proposed method is more accurate in estimating the FD of color images.

Sequence Characterization Of Glutamate Receptor Genes Of Rat A Vertebrate And Arabidopsis Thaliana A Plant

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iGluR gene family of a vertebrate, Rat and AtGLR gene family of a plant, Arabidopsis thaliana [4] perform some common functionalities in neuro-transmission, which have been compared quantitatively. Our attempt is based on the chemical properties of amino acids [6,7,8] comprising the primary protein sequences of the aforesaid genes. 19 AtGLR genes of length varying from 808 amino acid (aa) to 1039 aa and 16 iGluR genes length varying from 902aa to 1482 aa have been taken as data sets. Thus, we detected the commonalities (conserved elements) during the long evolution of plants and animals from a common ancestor [4]. Eight different conserved regions have been found based on individual amino acids. Two different conserved regions are also found, which are based on chemical groups of amino acids. We have tried too to find different possible patterns which are common throughout the data set taken. 9 such patterns have been found with size varying from 2 to 5 amino acids at different regions in each primary protein sequences. Phylogenetic trees of AtGLR and iGluR families have also been constructed. This approach is likely to shed light on the long course of evolution.

A New Lossless Secret Image Sharing Scheme for Gray Scale Images with Small Shadow Size

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The current paper offers a lossless (k, n)-threshold scheme with reduced shadow size using the algebraic properties of the polynomial ring $\mathbb{Z}_{251}[x]$ over the field $\mathbb{Z}_{251}$. Most of the schemes in Secret Image Sharing literature use a preprocessing step for transforming the secret image into a random image to avoid data leakage from the shares of the secret image. However, the efficiency of our proposed scheme is demonstrated by a security analysis and simulation results.

The estimation of inter-channel phase synchronization of EEG signals in patients with traumatic brain injury before and post the rehabilitation

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The identical inter-channel phase coherency of electroencephalogram (EEG) signals is determined for control volunteers during cognitive and motor tests. EEG signal phase is evaluated at the points of ridge its wavelet spectrogram. Inter-channel EEG phase coherency for patients with traumatic brain injury (TBI) is represented. Phase-connective pairs of EEG channels obtained from the results of EEG records of patients with TBI before and post the rehabilitation are considered.

Deep Neural Network for Multivariate Time Series Forecasting

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Recently, Deep Neural Network (DNN) architecture with adeep learning approach has become one of the robust techniques for time-series forecasting. Although DNNs provide fair forecasting results for the time-series prediction, still they are suffering from various challenges. Because most of the time-series data, especially, the financial time-series data are multi-dimensional, dynamic and nonlinear. Hence, to address these challenges, here, we have proposed a new deep learning model, Stacked Long Short-Term Memory (S-LSTM) model to forecast the multivariate time-series data. The proposed S-LSTM model is constructed by the stacking of multiple long short-term memories (LSTM) units. In this research work, we have used 6 different data normalization techniques to normalize the dataset as the preprocessing step of the deep learning methods. Here, to evaluate and analyze the performance of our proposed model S-LSTM, we have used the multivariate financial time-series data, such as stock market data. We have collected these data from two stock exchanges namely Bombay Stock Exchange (BSE) and New York Stock Exchange (NYSE). The experimental results show that the prediction performance of the S-LSTM model can be improved with the appropriate selection of the data normalization technique. The results also show that the prediction accuracy of the S-LSTM model is higher than the other well-known methods.

A Study On Information Diffusion In Online Social Networks

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Now days, Online Social Network (OSN) is very trendy in business, politics, and health care. This one can have the wider range of accessibility of Information Diffusion. The Online Social Network (OSN) is very significant as it provides interaction platform to the user across the globe. The impact joins both human attributes alongside community relationships. There are a group of individuals who has very strong connections to a range of social networks. These networks are capable of forwarding more information. So, it gives much better performance for single connections rather than multiple connections within a single network. Social influence plays a very important role in information diffusion. Thats why information diffusion is the methodology where information transmits through certain target nodes over time among them. In this paper, some methodologies related to information diffusion, features, limitations have been discussed.Delivering a detailed analysis, giving thoughtful social activities and providing users views are the main goals of this paper.

Multi-factor Authentication-based E-Exam Management System(EEMS)

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With the explosion of internet-based-technology like online examination system, a lot of manual tasks have been automated thereby saving time and effort. But, deployment of such automated system has made the process more vulnerable to various risks, such as condentiality loss, intrusion of critical data and impersonation. In this paper, we proposed an online exam system using multi-factor authentication implemented as three-tier architecture. It allows defining and setting up exams according to a tree-based exam structure. This system integrates a high text editor which allows teachers to set exams for different subjects. It automates scheduling, grading and reporting processes to reduce extra overheads of instructors. In preliminary comparison with other existing approaches, our system has a good potentiality to provide reliable sup- port on a larger scale and our conducted surveys also indicate that the system is user-friendly, reliable and highly available.

A Novel High-density Multi-layered Audio Steganography Technique in Hybrid Domain

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The work in this paper presents a novel data hiding technique with high density of payload data for transmission of sensitive message in a concealed form within a digital audio signal used as cover. To enhance security the payload message is embedded into discrete Fourier transformed coefficients of time domain audio samples, to make any potential hacking attempt harder. The proposed technique increases the density of transmitting message by inserting multiple bits of message data at multiple LSB layers, selected pseudo-randomly within the binary counterpart of each transformed frequency coefficient. Furthermore, a 160 bit message digest is inserted along with the message data to validate the integrity of the extracted message by the receiver. Thorough experimentation has been carried out to evaluate the effectiveness of this method taking different types of cover audio and message as input to various standard performance metrics.

A Multi-Layer Content Filtration Approach on Textual Data for Periodic Report Generation in a Post Disaster Scenario

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Data Filtration has been considered as a research area in various real-time applications like packet routing, data stream processing from various heterogeneous sources etc. Due to huge overhead of information in these real-time applications, filtration approaches have been designed and considered as significant feature that needs to be incorporated. In any disaster response situa-tion, the volunteers (doctors, nurses, police, army etc.) of various government or non-government organizations serve in affected regions in order to reduce number of fatalities. Besides, local group of people might also engage themselves in relief works along with the volunteers. The volunteers, local groups and victims of affected regions are capable of generating and exchanging / transferring situational data regarding resource requirements, number of fatalities etc. through their smart phones. The generated data are then dumped into Information Drop-boxes (IDBs) situated at various Shelter Points (SPs) when-ever mobile nodes come in contact with them. As a result, large volume of situational data might be accumulated at IDBs. This information

overhead might lead to two distinct issues that need to be addressed, a) data redundancy and b) data inconsistency. In order to deal with such issues, it is not only the unique objective to eliminate redundancies, noise etc. from messages, but also the information format must be made comprehensible to the policy makers. In the proposed work, such an approach has been adopted by designing a layered filtration approach in order to refine various contents of transferred messages i.e. Location, Message body and frequently changing information (number of fatalities etc.). The refined information can be reorganized date-time wise by constructing one or more sentences with an objective to produce periodic reports. From evaluation perspective, it has been observed that the proposed approach is much effective and can be incorporated as a feature for IDBs.

Categorization of Videos based on text using Multinomial Naive Bayes Classifier

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After the advent of the internet we are surrounded by a world lled with multimedia content ,especially video. Two type of videos every Indian loves and watches a lot are News and Cricket.News and cricket are two very different type of category of videos and thus helping to annotate and categorize these two type of videos will be very useful. This paper proposes a method to categorize videos based on the textual content in them and as the text in a Cricket Video is generally quite signicantly different from that of a News Video , the categorization of videos is done in two stages,the rst being Text Detection and Extraction ,where Edge Detection, Thresholding, Dilation, Contour Detection and Optical Character Recognitionare used to detect the part of Videos which has text in them and extract the text present in it.The second stage is that of Text Categorization, using Term Frequency and Inverse Document Frequency and applying Multinomial Naive Bayes Classier to classify the text into a category.

A New Function Mapping Approach in Defective Nanocrossbar Array using Unique Number Sequence

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The designs at nanoscale exhibit much higher defect rates than in conventional lithography based VLSI designs. It demands new defect tolerant schemes to achieve high yield at this scale. One of the most promising nanoscale computational architectures is the crossbar-based architecture. In order to realize various logic circuits using nanoscale crossbar arrays; different logic functions need to be mapped within these nanoscale crossbars containing defective crosspoints. In this work, we use a novel technique to find a proper assignment of different logic functions in the nanoscale crossbar arrays having defective crosspoints. Our proposed method is based on the generation and use of unique number sequence during function mapping. The unique sequence accelerate the matching of the functions and nanowires in an efficient way. Experimental results show that our algorithm provides satisfactory results in terms of success percentage of function mapping.

Identification of Differentially Expressed Genes using Deep Learning in Bioinformatics

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Bioinformatics data can be used for the ultimate prediction of diseases in different organisms. The microarray technology is a special form of 2D representation of genomic data characterised by an enormous number of genes across a handful of samples. The actual analysis of this data involves extraction or selection of the relevant genes from this huge amount of irrelevant and redundant data. These genes can be further used to predict classes of unknown samples. In this work, we have implemented two popular deep learning segmentation architectures, namely, SegNet and U-Net on the microarray dataset of colon cancer, which typically contains tumour and normal tissue samples, to extract culprit genes responsible for such difference. The performance of the reduced set formed from these genes has been compared across different classifiers using different existing methods of feature selection. It is found that both deep learning based approaches outperform the other methods.

Lastly, the biological significance of the genes has also been verified using ontological tools and the results are significant.

Tunneling Barrier Modulation in Negative Capacitance-TFET

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An analytical model for surface potential is developed in this paper for calculating Tunneling barrier width modulation of a ferroelectric gate negative capacitance tunneling FET (NC-TFET) device. The influence of using ferroelectric material as gate stack on surface potential is investigated and steep subthresold slope is indicated. However it is found that the improvement of drain current is rather limited at high drain bias indicating internal voltage amplification due to ferroelectric negative conductance effect useful for low bias. The underlying physics of the device is discussed and envisaged that coupling ferroelectric material will improve the device performance as switch.

Page Replacement Technique On The Basis Of Frequency Of Occurrence Of Pages

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The problem with the past generation computers was memory. Present day computers also face the problem of availability of memory both cache and primary memory in terms of cost and space. Age old algorithms like LRU, FIFO, and Optimal did exist though it was almost impossible to implement optimal algorithm practically. So, experimentation has been made in this paper where a new algorithm has been proposed and it is noticed to have better hit ratio than the existing ones. For this, a frequency based page indices mechanism have been proposed and it is seen that in many cases of reference string it gives the better result. We term this as Frequency based Page Replacement Mechanism.

An efficient Region of Interest detection and segmentation in MRI images using optimal ANFIS network

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The detection of tumour regions in Glioma brain images is a time consuming task. This paper discusses the algorithm for efficient detection of tumour using Optimal Adaptive Neuro - Fuzzy Inference system (OANFIS). The proposed methodology consists of five modules: pre-processing, feature extraction, feature selection, classification and segmentation. Initially, the database images are pre-processed with the help of median filter. Gray Level Co-occurrence Matrix (GLCM) features are extracted from both the images. To avoid the complexity, important features are selected using Crow Search Optimization (CSO). In the next step, the selected features are given to the ANFIS classifier to classify an image as normal or abnormal image. The ROI region of the abnormal images are separated with the help of Probabilistic Fuzzy C-means Clustering (PFCM). The performance of proposed methodology is analysed in terms of accuracy, sensitivity and specificity. The performance of proposed methodology is analysed in terms of evaluation metrics such as specificity, sensitivity and accuracy.

Fault-tolerant Implementation of Quantum-Arithmetic and Logical Unit (Q-ALU) using Clifford+T-group

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The quest of efficient quantum circuit is to achieve quantum supremacy in theory as well as in practice. The foremost obstacle is to protect cohesive time of extremely fragile quantum states from inherent noise. To address this issue, Quantum Error Correction Code (QECC) with fault-tolerant quantum circuit is most desirable. Aiming to contribute towards designing an efficient Quantum Information Processor (QIP), in this work we have shown the design of an important QIP module i.e. Arithmetic Logic Unit (ALU). The entire design has been made on top of quantum Clifford+T-group. In the design phase, initially we formulate a 1-bit design and then to make a generalized representation of the ALU, multiple smaller modules have been integrated. For ensuring improved features in this component, the design has been made fault-tolerant, circuit optimization rules are executed to minimize the design metrics and parallelism in high latency T gate is ensured. In way to check the functional correctness of our proposed design, several logical operations have been successfully tested over it.

Approximation of Fractional-order Integrator in Delta Domain

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Fractional-order system (FOS) is a topic of relevance among the researchers working in the field of system and control. This paper presents a methodology for realizing a fractional-order integrator (FOI) in discrete delta domain. Indirect methodology has been adopted for this work. At the first stage, Modified Oustaloup approximation method has been employed for approximating the FOI in domain. The later stage of the work capitalizes the unification property of the delta operator for discretizing the integer order counterpart of the original FOI. Necessary simulation results have been provided to analyze the efficacy of the discrete-time approximation scheme presented over here.

Multi Data Driven Validation of e-Document Using Concern Authentic Multi-Signature Combinations

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The idea raises a novel data security protocol for ensuring reliable online affirmation of e-documents with stronger compliance of authentication, integrity confidentiality, and non-repudiation scenarios. Initially the parent authority shares four secret signatures to the authorized client and stores them on server database. The protocol is initiated by server with hiding of four parent body signatures on the e-document image with each one hosted on a separate region. Critically, this hiding is dictated by self-derived hash functions on client id-number for precisely locating the concern region hosting the particular applicable signature. Importantly, this idea is implemented through hash values tracing the start indexes for circular sequencing of regions as well as signatures both. Next, this certified e-document is endorsed at the client end with segmented concealment of each shared signature on each separate region. Interestingly, here also similar region based circular sequencing of signatures are adopted with self-designed hash operations on client name, client date-of-birth and server issued session random challenge. Finally, this authenticated e-document is ratified by server with validation of all embedded signatures through those same hash functions to establish data authenticity cum legality of both parties. Additional enhancement is also addressed by fabricating signature bits on distinctly

transformed pixel byte elements of an image block and adopting standard deviation based block transformations to promote excellent robustness. Overall, this protocol clearly confirms superiority over other works both in terms of security principals and standardized evaluation of exhaustive simulation results from different angles.

Design of Ternary Content Addressable Memory using CNTFET

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This paper presents a ternary content-addressable memory cell based on carbon nanotube field-effect transistors (CNTFETs). The proposed ternary CAM cell can effectively reduce 14% search delay, 35% average power consumption with higher noise immunity in comparisons with recently presented CNTFET-based ternary CAM cell.

Improved multi-scale opening algorithm using fuzzy distance transform based geodesic path propagation

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Vessel tree segmentation from CT scan angiogram images of human brain is a challenging task. The complex geometry, interconnections and fusion with soft tissues and bones makes the segmentation process harder. The segmented cerebrovasculature plays major role in fast analysis of vascular geometry leading to effective diagnosis of the diseased cerebrovascular segment. The present work propose a geodesic path propagation based on fuzzy distance transform to improve the multi-scale opening algorithm for effective segmentation of carotid vessel with less user intervention. The geodesic path is estimated between a pair of vessel seeds given by the user. The points on the paths are used as the initial pure vessel seeds during the multi-scale opening of the vascular tree from other fused conjoint components(bone, soft tissue etc.)in a shared intensity space. We developed a 2-D/3-D user interface to mark user specified vessel/bone seeds or separators on the input images. Experiments on three patients CTA images show significant qualitative improvement in segmentation results with much lesser user intervention.

Voiced based railway station identication using LSTM approach

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An enormous research is going on Automatic Speech Recog- nition (ASR) in last decade. Human Computer Interaction (HCI) will become more ecient and hands free through voiced based commands. In our proposed work of speech recognition, we have taken a list of ten major railway stations in South Eastern Railway (SER) from Howrah (One major railway station in West Bengal, India) to Medinipur (A sta- tion in West Bengal, India). We have chosen the ten important stations where, most number of passengers travels through local train. The pas- sengers spent a huge amount of time in the long queue for collecting the tickets. We have created a small speech corpus where twenty people have uttered these stations ten times; a total of 2000 audio samples. We have done a prepocessing phase, followed by a Mel Frequency Cepstral Coef- cients (MFCC), MFCC and MFCC feature extraction method and nally a Long Short-Term Memory (LSTM) sequence classication has been used for correct identication of the station's name and obtained a highest training accuracy of 96.87% for the dierent hyperparameters discussed in section 5.

3-D IC: An Overview of Technologies, Design Methodology and Test Strategies

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The emergence of 3-D integration is significant in relation to technology scaling with reference to lower delay, less power consumption, higher band- width and greater performance. In this paper, we have presented a general survey on 3-D technologies, its merits over 2-D integration, demerits and applications. The major objective of this work is to provide a brief review of preeminent 3-D IC design techniques and testing mechanism which may enable the development of future effective design automation methods for efficient 3-D IC integration and its reduced design time.

Oh dear! It's just a Tool to Plan the Deployment of a Post-Disaster Network!

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In this paper, we present a software tool for planning the deployment of a rapid-deployable opportunistic network for post-disaster communication establishment in the absence of mobile and other conventional networks. Such a network may be used by Government Agencies and NGOs working for disaster management to coordinate their rescue-relief workers when there is complete or partial communication blackout. Having a rough knowledge on the affected area (through satellite imagery or otherwise), the location of the control station, and the maximum tolerable delay bound by the opportunistic (DTN) network, the proposed tool could provide with the required communication resources to achieve the desired goal and a deployment plan of the same so that obtained network has packet delivery delay within the desired delay bound.

A Reconfigurable Architecture to Implement Linear Transforms of Image Processing Applications!

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A reconfigurable architecture capable of implementing flow graph based computationally intensive image processing transforms is introduced. The conceptual design of the architecture is deduced using a graph theoretical approach. The graph theoretical model is transformed into a reconfigurable design. The design of the overall architecture as well as design of the processing element is implemented in VHDL using Xilinx Vivado. The architecture is synthesized. The result is presented in terms of size and timing behaviour. The processing elements inside the architecture is simulated by a test bench program executing two major operations to see the possibility of further improvement of the design. Future direction of the research is discussed.

Voting in a Watts-Strogatz small world network

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Social Network science and social interaction science is an interesting field of research in the current time. The bias of an individual to any subject is strongly dependent on the individuals social circle. This bias tends to shape based on what the individual experiences in the online world. This leaves a space that the social circle can alter bias of an individual.This paper tries to implement the majority voting model on the Watts-Strogatz small world network and analyze how the influence of the neighbors affects the choice of the voter. It also analyzes the flip in biases of individual actors that may lead to change in the entire small world network.

Transfer learning in skin lesion classification

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The number of patients diagnosed with Melanoma, a fatal type of skin cancer is increasing day-by-day. Convolutional Neural Network (CNN) has shown promising results in image classification problems. Transfer learning is, using the weights of already trained models on a different dataset, and using that model to classify images into respective classes. It is quite useful when there is lack of training data. Using a custom model, trained on cat-dog dataset, we got an classification sensitivity of 0.90.

Knowledge based Expert System for Diagnosis of Agricultural Crops

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Agricultural crops are the most essesntial entity to sustain human life. A huge chunk of these crops get damaged every year due to the infestation of several diseases, which poses a serious threat to global food security. Detecting these diseases at an early stage is a necessity in order to treat them and prevent any damage. This requires the need of someone skilled to diagnose the anomaly correctly and provide the methods of treatment. Expert Systems can easily help to detect these diseases and provide the appropriate methods of treatment to the user. The advancements in the fields of computer vision methodologies and deep learning have enabled the development of models that can accurately detect the diseases and pave the course for smartphone-enabled detection system. Utilizing a public datatset of 43429 healthy and diseases crop leaves accumulated in controlled condtions, we trained a deep convolutional neural network to recognise 14 types of crops and 38 types of illness (or absence of). The model that is trained attains the accuracy of 99.7% on a test set that is held-out. The model assists the expert system to correctly recognise the disease that the crop is suffering from and this approach to train models of deep learning on huge image datasets provides a comprehensible path towards more efficient crop disease identification and treatment on a universal scale.

Follicle Segmentation using K-means Clustering from Ultrasound Image of Ovary

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Detection of number, shape and size of follicles in the ovary can play an important role in diagnosis and monitoring of different diseases like infertility, PCOS (Polycystic Ovarian Syndrome), ovarian cancer etc. Now-a-days the identification of these characteristics of follicles is done manually by radiologists and doctors from the Ultrasound Images of ovaries. Sometimes manual analysis can be a tedious and error prone job. In this paper a method is proposed for automatic segmentation of follicles from Ultrasound Images using the K-means clustering technique.

Introduction of Fuzzy Logic Controller in a modified Phase Locked Frequency Divider leads to an exceptional noise rejection

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A frequency divider is commonly implemented using phase locked loop by placing a frequency multiplier into the feedback path of the loop. In this paper, a novel analog frequency divider is reported where a fuzzy logic controller is introduced in the loop to adjust the control voltage of the voltage controlled oscillator (VCO) using its human knowledge base. In addition, IQ VCO followed by a signal multiplier is used to replace frequency multiplier. This frequency divider is particularly configured for divide-by-two operation. In presence of additive white Gaussian noise (AWGN) in the input signal, the comparisons of simulation results of the proposed loop over the uncontrolled loop show that a phenomenal improvement in the divider output on parameters such as total harmonic distortion by nearly 100dBc, spurious free dynamic range by around 150dBc. This configuration can be further extended for divide-by-odd number as well.

Follicle Segmentation from ovarian USG image using Horizontal Window Filtering and Filled Convex Hull Technique

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Ultrasound imaging is the best medical imaging technology to observe and monitor the growth and physiological status of the follicles, most importantly the paramount or dominant follicle in the females ovary. But ultrasound images are always heavily poisoned by speckle noises although it is extensively used in infertility treatment. In this paper, a segmentation technique has been developed and discussed to completely remove the speckle noises and segment different follicles from ultrasound images. The proposed segmentation technique used a 20 pixel long window and standard deviation of the USG image for smoothing and despeckling the image. Further, morphological opening followed by morphological closing operations have been applied to the image for removing the paper and salt noise. Next, segmentation of the follicles is done by finding the active contours and filled convex hull from the intermediate USG image that contains only the follicles those are bright i.e. white in color with a black background. Follicles are properly classified and detected by applying a set of relevant parameters. Finally, a comparative study has been presented between the experimental results and inferences made by the experts

to validate the results towards determining the degree of accuracy of the proposed technique.

A Survey Report on Underwater Acoustic Channel Estimation of MIMO-OFDM System

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Underwater acoustic (UWA) channels are highly challenging in nature and from the past few decades, many researchers are investigating the efficient way of UWA channel estimation. Different approaches have been taken for UWA channel estimation, like; OFDM, Compressed Sensing, etc. In this paper, a survey is presented on various estimation techniques involved in the UWA channel. Work is presented in three different parts. The first part presents different challenges in the UWA channel. In the second part, works on MIMO-OFDM based UWA channels are presented. In the last part, a survey on compressed sensing based channel estimation of the UWA MIMO-OFDM system is presented. A performance comparison is given on the different channel estimation algorithms.

An effective hybrid statistical and learning based approach to confined domain of a web document from corpus

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Textual documents are unstructured by nature. In order to organized a large archive of these documents, it is required a way to identify these document by using some key information. Keyword extraction is one such important method for text summarization. Getting a suitable domain of document from a large archive of documents is one of prime challenge today. Categorization of unstructured documents faster retrieval, Preferences of individual based on their likings, information could be retrieve form an information hub. In this work Web document undergoes web noise elimination prior to keywords extraction using term frequency (tf) and inverse document frequency (idf) method to create document corpus. This corpus used to generate ontological representation of domain based on the keyword contain from the documents. This learning method produce domain representative document. Applying the multiclass classification technique classify the document corpus. An exhaustive testing is done for predicting domain of document and obtained an accuracy of 88-93%.

Evolution of E- Sensing Technology

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This is the era of automation, in which the real and the virtual world are fast converging. The established notions are being rapidly changed by the use of robotics, machine learning (ML) and artificial intelligence (AI). Automation can be found in normal day-to-day life applications, industries, space, and health care everywhere. In the zeal to achieve better sensing techniques and improved output results from machines, electronic or robotic forms of human body parts and organs are being developed. Robotic arm, electronic nose, electronic tongue, robotic moving fingers etc. are few such examples. E-sensing is garnering a huge interest due to its ability to mimic human behavior. Thus a detailed study into e-sensing technologies is the need of the hour. In this paper, a brief study on the recent works on e-sensing technology is presented. The current study sheds light upon the definition, classification, practical application of e-nose and e-tongue for different type of measurements.

Extraction of Leaf-Vein Parameters and Classification of Plants using Machine Learning

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The venation network present in the leaves of plants carries a fingerprint of the species and their analysis is likely to provide deep insights about the identity of the plants and the surrounding climate. Since photosynthesis has a direct correlation with the microfluidic in vein-networks, such information will be immensely useful to plant bi- ologists from agricultural and ecological perspective. Albeit research in leaf-venation patterns has recently received attention in computational botany, very little work is known that focuses on the extraction of suit- able features of the underlying vein network. In this paper, for the first time, we define certain graph-theoretic features of a leaf-vein network considering it as a planar graph, which can be extracted from the skele- tons of the leaf-images. We study venation patterns in several leaf-images for three different trees (Jackfruit, Mango, and Peepal) that are abun- dant in the Indian subcontinent. Our analysis on the extracted vein parameters based on K-means clustering and KN N-classification yields encouraging initial results.

Face Recognition using Siamese Network

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Face recognition has become very popular in biometrics for the last two decades especially after the availability of GPU based processing technology and ease of implementing deep learning methodologies.Still it is treated as computationally expensive when training database is large and efficiency is in stake when little data is available for training.An example is one shot learning in which prediction has to be made correctly given only a single image for training.Though human with good memory can recognise a face fairly in similar condition it is challenging for a machine to identify with so little data.In this paper we proposed a framework which leverages convolutional neural network in siamese architecture to solve the problem.This network learns a mapping of input image from image space to a compact 4096 dimensional vector space where distance among points ranks similarity. Once the model was trained with monitoring an optimisation function we can utilise its discriminating potential to generalise predicting power.

Vulnerability of Cloud: Analysis of XML Signature Wrapping Attack and Countermeasures

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Simple Object Access Protocol (SOAP) uses text supported Xtended Markup Language (XML) messaging configuration to interchange web encrypted information over a multitude of internet protocols such as SMTP, FTP, HTTP etc. SOAP is one of the backbone solutions to exchange data between cloud and cloud service users via the internet. Wide use of decentralized distributed cloud computing systems and rapidly increasing demand for cloud services result in a substantial increase in security vulnerabilities in the cloud. A comprehensive analysis of Signature wrapping attack of XML Data and its countermeasures to detect and prevent this web security threats have been analyzed in this paper. In the context of security vulnerabilities, we have discussed the use of Xpath Expression, ID referencing, relative Xpath referencing, Absolute Xpath Referencing, FastXPath Structure-based Referencing, and their weaknesses.

Individual Pig Recognition Based on Ear Images

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In this paper, individual light coloured pig (Yorkshire) has been recognized based on their ear images captured using mobile phones. The ears have been kept parallel to the light source and the images have been captured from the opposite side of light source. The auricular venation pattern from each captured ear image has been extracted, template has been generated and stored in a database. The templates of recaptured ear images have been matched with the stored templates of same pig using average Euclidean distance. The pig has been verified if average Euclidean distances of matching are less than 40. The unknown pig ear images have also been captured and the corresponding templates have been matched with all templates stored in database. The pig has been identified if Euclidean distance between any pair of template is less than 40.

IoT in Agriculture: Smart Farming using MQTT Protocol through Cost-effective Heterogeneous Sensors

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In Agriculture, the demand for better crops is increasing rapidly and seeks proper management in the development of crop production for better supply. The principle objective here is to implement the use of technology i.e. IOT & sensors to enhance the efficiency of the farming systems by providing farmers with the facility to utilize their time and interests in complete potential. This paper presents a custombuild cost-effective device through utilizing the notion of MQTT IoT protocol that transfers data through the network systems and collects reports about the soil condition. It takes into consideration several factors that affect the health and living of a plant. These factors include the criteria of pH, temperature & moisture for soil, light availability, air temperature & humidity to take into account the present conditions of the plant. Our IoT device for agriculture enables seamless data collection and availability to cloud even for challenged internet connection.

Contrast Enhancement Algorithm using Definite Integration Mathematical Method Trapezoidal Rule

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In this paper, we propose a novel contrast enhancement algorithm based on discrete integration mathematical Trapezoidal formula. It improves the contrast of the low contrast images. Various novel algorithms have been already proposed for contrast enhancement. But these methods are mainly depends on histogram equalization or modified histogram equalization. Our method is simple and easy to understand that only apply trapezoidal rule and it is clearly shown that it works very efficiently on low contrast images. In comparison to other different exiting algorithms, the proposed method works efficiently in case of different standard low contrast images.

High Speed Low Power CML Technique Based Frequency Divider in 180nm Technology

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A low power high speed CML (common mode logic) frequency divider has been implemented in 180nm CMOS technology. The PMOS varactors have been placed at the source of the cross-coupled transistors to improve the self oscillation frequency of dividers. With the tuning of PMOS load and the varactors, wide frequency range of 1GHz to 18GHz has been observed. Accordingly, 3mW power consumption has been observed.

Self Organising Map based Strategic Placement and Task Assignment for a Multi-agent System

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Strategic placement and task assignment for a multi-agent system are important research topic in various cooperative working environment. In this article, authors proposed a procedure to attend demands from various areas of a workspace by multi-agent system. Agents are trained through self organizing map (SOM) to locate the strategic position. Two modes of operations are proposed. One is operating multi-agent system from base camp through task assignment. Another is placing the multi-agent system to strategic location to address demands of attending task. Extensive simulations are presented to validate the proposed work through simulated environment and integrating real locations from google map. A comparative study is presented to highlight the eectiveness of the individual modes of operation.

Classification of Indian Languages through Audio

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Discrimination of different Indian languages is a very demanding job. This finds its importance in the domains of dialect identification, speech to text conversion as well as in other domains also. Indian languages vary in the point of view of irregularity, energy variation and also the number of times they pass through the Zero axis. These phenomenons can be best represented by Skewness based perceptual audio feature; Short Time Energy (STE) and Zero Crossing Rate (ZCR) based time domain audio features respectively. Hence the proposed approach relies on Skewness based perceptual feature; ZCR, STE based time domain features. For accurate study the characteristics of ZCR and STE, statistical features based on their co-occurrence matrices are considered. Supervised classifiers like Neural Network (NN), Random Forest and Nave Bayes have been used for classification purpose. Obtained classification accuracy has been compared with earlier research work to establish strength of the proposed feature set.

Neural Dynamics based Complete Coverage of Grid Environment by Mobile Robots

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In this work, a complete coverage of a grid cell-based environment by mobile robots is presented. The proposed paradigm consists of two biologically inspired neural network models. These allow the mobile robots to navigate through collision free path and overcome deadend situation. In this work, inter grid cell diagonal movement is restricted to enhance safety and prevent collision with obstacles. It also ensures inter robot collision free navigation. The simulation results have shown the effectiveness of the proposed method for a single mobile robot and a multiple mobile robots system. A comparative study is also presented which showcases improvement of the proposed work over the existing literature.

Analysis of Large-Scale Human Protein Sequences Using an Efficient Spark Based DBSCAN Algorithm

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The development of modern high throughput sequencing techniques has resulted an exponential growth in metagenomic sequence accumulation that could greatly enhances large-scale functional annotation. Processing of these large and redundant sequences have become a major challenge for researchers. Clustering by similarity, is one of the major step to reduce the redundancy of these enormous resources and analysis of such large biological sequences. The ngram feature representation, generally used in sequence clustering and classification, results high dimensional input spaces, for larger values of n. However, it becomes intractable to cluster such large-scale sequences by current algorithms due to the large number of dimensions. Efficiently designed, clustering approach can easily scale to handle large-scale sequences by utilizing the power of parallel computing with high-performance computing systems. In this work, we propose a spark-based DBSCAN algorithm to cluster large-scale human protein sequence data by exploring n-gram (n¡=3) features. Experimental results in human protein sequence data shows efficient speed-up in clustering and effective in reducing the redundant sequence (ranges from 31.9% to 48.7%) and more than 84% of non-singleton clusters are of high quality.

Solving Student Project Allocation with Preference through Weights

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Student project allocation is a common problem for many university departments. In this work, a solution is proposed for allocating projects to students with their preferences. No preference for the faculties were considered. Students with better academic performance were provided higher prospect for their preferences. The proposed approach has been implemented in Microsoft Excel, and applied to allocate projects to the final year students of Bachelor of Engineering in the North-Eastern Hill University. The simplicity and ease of the method, make it suitable for anyone to use in allocating projects.

Biomolecular Clusters Identification in Linear Time Complexity for Biological Networks

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Identification of biomolecular clusters from biological networks based on structures is critical task because the existing algorithmic approaches are required high computation and also not feasible for complex, large networks. Majority of these clustering techniques are real-time such as Louvain model which is considered as the fastest algorithm, utilized modularity maximization process for clusters or communities identification. Here we explained a faster, accurate and efficient algorithmic approach for biomolecular clusters identification considering the low running time as well as better cluster quality using network (graph) based traversal techniques. We also justified that this algorithm works on linear time complexity in order to generate firstly the initial cover and final cover after modularity maximization.

SeqPIP-2020: Sequence based Protein Interaction Prediction Contest 2020

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Computational Protein-protein interaction (PPI) prediction techniques can contribute greatly in reducing the time, cost and false-positive interactions compared with experimental approaches. The sequence is one of the key and primary level information of protein that plays a crucial role in PPI prediction. Several machine learning approach has been applied to exploit the characteristics of PPI datasets. However, these datasets greatly influence the performance of predicting models. So, care should be taken on both dataset curation as well as design of predictive models. Here, we summarize the results of the SeqPIP competition whose objective was to develop a comprehensive PPI predictive model from sequence information with high-quality bias-free interaction datasets. A training set of 2000 positive and 2000 negative interactions with sequences was given to each contestant. The methods were evaluated with three independent high-quality interaction test datasets.

Detecting Vulnerabilities of Web Application using Penetration Testing

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The number of web attacks is increasing gradually, mainly the popularity of web application in organization, school and colleges. For this reason the security of their sensitive information against attacker becomes very important for all organization and companies. In this paper we describe different type of web application attack like SQL injection , XSS attack, CSRF attack and Buffer overflow. Besides we discuss about different types of penetration tools for web applications. Penetration testing try to find the vulnerabilities of web application so that we can build a defence mechanism to deal with web attack.

New Features for Histogram Analysis: A Novel Approach to Jute Species Identification Using BPNN Classifier

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Manual identification or classification problem has always been a major challenge. It is very subjective and expert dependent. Moreover, the opinions may vary from expert to expert. As an alternative, several automated systems have been suggested. Classification using machine vision hybridized with other techniques is now a prime area of research. This paper suggests a technique for jute species identification using image processing hybridized with a back-propagation neural network. Histogram analysis using a set of new features is the foundation of this work. This set of new features is used as the inputs to a back-propagation neural network classifier. The RGB, YCbCr and Grey color spaces were considered to include both the chromatic and achromatic properties of the image. Histogram analysis using a new set of proposed features may be a novel approach in image processing and be the foundation of further study in machine vision. In practice, the proposed system will play a pivotal role both for the betterment of marginal farmers and as well as for the development of rural economy in India.

Survey Paper:Different Important Quantum Cryptographic Protocols

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Quantum Cryptography is a new approach for secured communication as it is impossible to copy data encoded in a quantum state. The quantum state will be destroyed when encoded data is read. In Quantum Cryptography random secret key is generated for encryption and decryption of messages. Quantum Key Distribution is the best-known example of Quantum cryptography. In this paper we have described the different Quantum Key Distribution protocols and their algorithms details.

Cultural & Banquet Dinner

Melodia di Fiesta: A colourful celebration of music and dance

Jalpaiguri Govt Engineering College is enriched by a group of quality students who have a great interest in indian culture as well as the western as they belong to different states and religion.Our college has two popular and active clubs, Music and Dance club.-Those are addressed by "Calliphony" and "Wavezz" respectively.These clubs regularly host various cultural events like Annual Music Fest, Annual Dance Fest and so on.We are going to host a cultural event "Melodía Y Ritmo", a beautiful and rich combination of music and dance, will be held on 13th jan, 2020.

India is home to many individuals from different and unique cultures and religions. Indian tradition, language, art and lifestyle are different from place to place within the nation. India is one of the most populated countries in the world with 28 States and 9 Union Territories, exhibiting different cultures and traditions.Besides our country also has a rich diversity in western culture.We also get inspirations from western countries, as those countries also have a colourful variety in culture.

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