

ICCI-2017

2017 International Conference on Computational Intelligence: Theories, Applications and Future Directions

December 6 - 8, 2017

Indian Institute of Technology Kanpur, India

BOOK OF ABSTRACTS

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Message from General Chair



Nishchal K. Verma
General Chair

It is an honor for me to welcome you all to “2017 International Conference on Computational Intelligence: Theories, Applications and Future Directions (ICCI-2017)” being held during December 6th – 8th, 2017 at Indian Institute of Technology Kanpur, India. This year the conference has attracted 326 research papers from prestigious institutions all over the country. It aims to provide insight into the cutting edge research work going on in the most dynamic area of technology in current time. The highlights of the conference will be thought-provoking keynote addresses, interesting tutorials, a number of oral sessions by participants from different institutions and streams. Apart from that, there are ample opportunities for fruitful interaction with brilliant minds from across the country. Computational Intelligence, with its set of biological and linguistic tools gives much more freedom in efficiently addressing complex and challenging real world problems.

We are sincerely grateful for the generous financial contributions of Computational Intelligent Society Chapter, IEEE UP Section, CSIR and SERB, DST, Govt. of India. Their benevolent assistance will translate directly in providing a productive and enjoyable conference environment for participant. I extend my sincere thanks to Prof. Manindra Agrawal, Officiating Director, IIT Kanpur for giving his support and to all the keynote speakers for agreeing to visit the institution. I am indebted to organizing committee members for lending their help, support, time and effort for this workshop and winter school. I would also like to express my special thanks to Prof. N. R. Pal and Dr. G. G. Dutta who have been a key source of encouragement and motivation for conducting this event. I, wholeheartedly thank the members of Intelligent Data Engineering and Automation (IDEA) Laboratory, Dept. of Electrical Engineering, IIT Kanpur for their full support in the conduction of the conference. I am grateful for all institutional and individual contributions alike.

We hope you all have a pleasant stay in Kanpur and a fruitful and memorable event, both technically and socially.

(Nishchal K. Verma)

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Program Schedule

Day 1 - December 6th, 2017

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|---------------|---|-------------------------|-------------------------|-----------------------------|---------------------------|------------------------------|
| 08:30 Onward | Registration Venue: Outreach Auditorium | | | | | |
| 09:30 - 10:00 | Inaugural Ceremony Chief Guest: Prof. Manindra Agrawal, Officiating Director, IIT Kanpur, India Venue: Outreach Auditorium | | | | | |
| 10:00 - 10:30 | Keynote Speech 1 Prof. Manindra Agrawal, Officiating Director, IIT Kanpur, India Venue: Outreach Auditorium Chair: Dr. Nshichal K. Verma, IIT Kanpur, India | | | | | |
| 10:30 - 10:45 | High Tea Venue: Outreach Auditorium | | | | | |
| 10:45 - 11:45 | Keynote Speech 2 Prof. Abbas Omar, Universit ätMagdeburg Venue: Outreach Auditorium Chair: Dr. Jagdish Bansal, South Asian University, New Delhi | | | | | |
| 11:45 - 13:00 | Session 1 | Session 2 | Session 3 | Session 4 | Session 5 | Session 6 |
| | Venue: Lecture Hall 8 | Venue: Lecture Hall 9 | Venue: Lecture Hall 10 | Venue: Lecture Hall 11 | Venue: Lecture Hall 12 | Venue: Lecture Hall 13 |
| | Chair: Dr. Jagdish Bansal | Chair: Dr. Debasis Sen | Chair: Dr. Lotika Singh | Chair: Prof. Narendra Kohli | Chair: Dr. Mangal Kothari | Chair: Dr. Kshitiz Maharshi |
| 11:45 - 12:10 | 86 | 133 | 121 | 78 | 181 | 236 |
| 12:10 - 12:35 | 90 | 115 | 154 | 209 | 194 | 244 |
| 12:35 - 13:00 | 210 | 132 | 224 | 190 | 241 | 307 |
| 13:00 - 14:00 | Lunch Venue: Outreach Auditorium | | | | | |
| 14:00 - 14:45 | Keynote Speech 3 Dr. G. G. Dutta, DRDO, India Venue: Outreach Auditorium Chair: Dr. Brajesh Varshney, KIT Kanpur | | | | | |
| 14:45 - 15:30 | Keynote Speech 4 Prof. N. R. Pal, ISI Kolkata, India Venue: Outreach Auditorium Chair: Dr. Sandeep Paul, DEI Dayalbagh, Agra, India | | | | | |
| 15:30 - 15:45 | Tea / Coffee Break | | | | | |
| 15:45 - 17:00 | Session 7 | Session 8 | Session 9 | Session 10 | Session 11 | Session 12 |
| | Venue: Lecture Hall 8 | Venue: Lecture Hall 9 | Venue: Lecture Hall 10 | Venue: Lecture Hall 11 | Venue: Lecture Hall 12 | Venue: Lecture Hall 13 |
| | Chair: Dr. Sandeep Paul | Chair: Dr. C Patvardhan | Chair: Dr. Lotika Singh | Chair: Dr. Kshitiz Maharshi | Chair: Dr. Jagdish Bansal | Chair: Dr. Rahul K. Sevakula |
| 15:45 - 16:10 | 242 | 193 | 310 | 169 | 217 | 116 |
| 16:10 - 16:35 | 146 | 324 | 301 | 148 | 289 | 165 |
| 16:35 - 17:00 | 321 | 179 | 213 | | 306 | 326 |
| 17:00 - 20:00 | Cultural Program Venue: Outreach Auditorium | | | | | |
| 20:00 Onward | Banquet Dinner Venue: Outreach Auditorium | | | | | |

Day 2 - December 7th, 2017

| | | | | | | |
|---------------|---|------------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|
| 08:00 - 09:00 | Breakfast Venue: Outreach Auditorium | | | | | |
| 09:00 Onward | Registration Venue: Outreach Auditorium | | | | | |
| 09:15 - 10:15 | Keynote Speech 5 Prof. S. C. Srivastava, IIT Kanpur, India Venue: Outreach Auditorium Chair: Dr. Nishchal K. Verma, IIT Kanpur, India | | | | | |
| 10:15 - 11:30 | Lecture 1 Dr. Pooja Agrawal, IIT Kanpur, India Venue: Outreach Auditorium Chair: Prof. A. K. Deb, IIT Kharagpur, India | | | | | |
| 11:30 - 11:45 | Tea / Coffee Break | | | | | |
| 11:45 - 13:25 | Session 13 | Session 14 | Session 15 | Session 16 | Session 17 | Session 18 |
| | Venue: Lecture Hall 8 | Venue: Lecture Hall 9 | Venue: Lecture Hall 10 | Venue: Lecture Hall 11 | Venue: Lecture Hall 12 | Venue: Lecture Hall 13 |
| | Chair: Prof. A. K. Deb | Chair: Dr. Kshitiz Maharshi | Chair: Dr. Anurag Singh | Chair: Dr. Suresh Singh | Chair: Dr. Narendra Kohli | Chair: Dr. Rajiv K Shakya |
| 11:45 - 12:10 | 83 | 4 | 262 | 202 | 158 | 222 |
| 12:10 - 12:35 | 219 | 99 | 272 | 299 | 102 | 228 |
| 12:35 - 13:00 | 200 | 145 | 278 | 101 | 142 | 208 |
| 13:00 - 13:25 | | 185 | 325 | | | |
| 13:25 - 14:30 | Lunch Venue: Outreach Auditorium | | | | | |
| 14:30 - 15:30 | Keynote Speech 6 Prof. Sandeep Shukla, IIT Kanpur, India Venue: Outreach Auditorium Chair: Prof. A. K. Deb, IIT Kharagpur, India | | | | | |
| 15:30 - 15:45 | Tea / Coffee Break | | | | | |
| 15:45 - 17:25 | Session 19 | Session 20 | Session 21 | Session 22 | Session 23 | Session 24 |
| | Venue: Lecture Hall 8 | Venue: Lecture Hall 9 | Venue: Lecture Hall 10 | Venue: Lecture Hall 11 | Venue: Lecture Hall 12 | Venue: Lecture Hall 13 |
| | Chair: Prof. A. K. Deb | Chair: Dr. Kshitiz Maharshi | Chair: Dr. Anurag Singh | Chair: Dr. Suresh Singh | Chair: Dr. Narendra Kohli | Chair: Dr. Renu Jain |
| 15:45 - 16:10 | 295 | 234 | 280 | 283 | 269 | 95 |
| 16:10 - 16:35 | 274 | 205 | 159 | 120 | 70 | 98 |
| 16:35 - 17:00 | 143 | 245 | 216 | 246 | 221 | 223 |
| 17:00 - 17:25 | 265 | 312 | 164 | 297 | 255 | 192 |
| 20:00 - 22:00 | Dinner Venue: Outreach Auditorium | | | | | |

Day 3 - December 8th, 2017

| | | | | | | |
|---------------|---|--------------------------------|-------------------------------------|--------------------------------|------------------------------------|---------------------------------|
| 08:00 - 09:00 | Breakfast Venue: Outreach Auditorium | | | | | |
| 09:00 Onward | Registration Venue: Outreach Auditorium | | | | | |
| 09:15 - 10:30 | Keynote Speech 7 Prof. A. K. Deb, IIT Kharagpur, India Venue: Outreach Auditorium Chair: Dr. Nishchal K. Verma, IIT Kanpur, India | | | | | |
| 10:30 - 10:45 | Tea / Coffee Break | | | | | |
| 10:45 - 13:25 | Session 25 | Session 26 | Session 27 | Session 28 | Session 29 | Session 30 |
| | Venue: Lecture Hall 8 | Venue: Lecture Hall 9 | Venue: Lecture Hall 10 | Venue: Lecture Hall 11 | Venue: Lecture Hall 12 | Venue: Lecture Hall 13 |
| | Chair: Dr. Renu Jain | Chair: Dr. Anurag Singh | Chair: Dr. Rahul K. Sevakula | Chair: Dr. Suresh Singh | Chair: Dr. M Balasubbareddy | Chair: Dr. Pooja Agrawal |
| 10:45 - 11:10 | 254 | 195 | 264 | 230 | 268 | 96 |
| 11:10 - 11:35 | 314 | 196 | 243 | 232 | 290 | 233 |
| 11:35 - 11:45 | Tea / Coffee Break | | | | | |
| 11:45 - 12:10 | 129 | 261 | 249 | 259 | 72 | 140 |
| 12:10 - 12:35 | 273 | 311 | 285 | 270 | 318 | 153 |
| 12:35 - 13:00 | 226 | 319 | 239 | 114 | 257 | 286 |
| 13:00 - 13:25 | 149 | 151 | 235 | 315 | 247 | 237 |
| 13:25 - 14:30 | Lunch Venue: Outreach Auditorium | | | | | |
| 14:30 Onward | Joyride | | | | | |

Technical Sessions: December 6, 2017

Oral Session 1: 11:45 – 13:00

Paper ID: 86

Hybrid Approach for Predicting and Recommending Links in Social Networks

Shashi Prakash Tripathi (Centre of Computer Education, IPS, University of Allahabad, India); Rahul Kumar Yadav (Centre of Computer Education, IPS, University of Allahabad, India); Abhay Kumar Rai (Centre of Computer Education, IPS, University of Allahabad, India); Rajiv Ranjan Tewari (Centre of Computer Education, IPS, University of Allahabad, India)

The popularity of online social networks (OSNs) like Hi5, Myspace, Facebook, and LinkedIn is increasing day by day, as they allow their users to share content. OSNs recommend new friends to their users based on either local or global features of the network. Local feature based approaches do not exploit the whole network structure. On the other hand global approaches detect the overall path structure in a network, being computationally less efficient for huge size social networks. In this paper, we define a hybrid node similarity measure that captures local graph feature by measuring proximity between nodes and it also exploits global feature, weighting paths that connect any two nodes in the network. We perform experimental comparison of the proposed approach against existing recommendation algorithms using synthetic and real data sets. Our experimental results show that the proposed algorithm outperforms other approaches in terms of efficiency and accuracy.

Paper ID: 90

Online Partitioning of Large Graphs for Improving Scalability in Recommender Systems

Vinit Koshti (NIIT University, Rajasthan, India); NVS Abhilash (NIIT University, Rajasthan, India); Karanjit Singh Gill (NIIT University, Rajasthan, India); Nikhil Nair (NIIT University, Rajasthan, India); Mahima B. Christian (NIIT University, Rajasthan, India); Prosenjit Gupta (NIIT University, Rajasthan, India)

All around the world people are using Social Media to create large online social networks and the sizes of these networks are continuously increasing. It is estimated that by the year 2018, 2.44 billion people will be using social networks. The growing desire and demand of social networks is not just removing our communication barrier, it is also changing the way we think and do things. The people we “trust” or “are close to” in our social network continuously shape our views about different things. This trust based relationship can be harnessed to recommend items to users. In this paper, we aim to tackle the problem of scalability in online recommender systems using an online graph partitioning algorithm.

Paper ID: 210

Fuzzy Rough Set Based Feature Selection with Improved Seed Population in PSO and IDS

Tarun Maini (Electrical Engineering, IIT (BHU), Varanasi); Abhishek Kumar (Electrical Engineering, IIT (BHU); Varanasi), Rakesh Kumar Misra (Electrical Engineering, IIT (BHU), Varanasi); Devender Singh (Electrical Engineering, IIT (BHU), Varanasi)

In this paper fuzzy lower approximation based fuzzy rough set is used for feature selection. A distributed sampling (DS) based initialization method is introduced to pick better seed population, in Particle Swarm Optimization (PSO) and Intelligent Dynamic Swarm (IDS). PSO and IDS is used for simultaneously selecting the appropriate feature subset. Fitness function for these computation is fuzzy rough dependency measure. Using the proposed initialization, while using PSO and IDS, improvement in size of selected subset of features with improved classification accuracy is also demonstrated.

Oral Session 2: 11:45 – 13:00

Paper ID: 133

Multimodal Biometric Authentication System using Palm print, Hand Shape and Geometry

Gaurav Jaswal(NIT Hamirpur, India); Amit Kaul(NIT Hamirpur, India); Ravinder Nath(NIT Hamirpur, India)

Initially, a palm ROI has been segmented on the basis of fingers base points. However, the ROI images are not well aligned and reduce the matching performance. To better align them, L-K Tracking based palm image alignment method has been presented. Then, poor contrast ROI images are enhanced using modified CLAHE algorithm. Further, local key points of aligned ROI images are extracted using Block-SIFT descriptor. Secondly, a set of novel geometrical and shape features have been computed from Palmer region of hand image. All the three set of features are first concatenated using feature level fusion and then, the highly uncorrelated features are selected from the fused feature set using sub-pattern PCA. In order to handle robust matching, a high-performance Linear SVM is used to match training and test images. The proposed system is tested on largest publicly available CASIA Palm print database collected from 312 subjects, 8 images each from both hands.

Paper ID: 115

A Review of Post-Processing Algorithms in Direct Imaging of Exoplanets

Dhairya Deven Vayada (High School Student)

Direct imaging involves the use of coronagraphs to block the light from the star in order to observe exoplanetary systems. Various factors, such as image deterioration by turbulence in

Earth's atmosphere, small angular separation between the planets and the star, as well as the high contrast ratio between them makes direct imaging a challenging method to detect exoplanets. Post-processing algorithms serve a quintessential role by reducing the background noise and hence, drastically improve detectability. With rapid progress being made in terms of imaging capabilities, such as the proposed introduction of the Wide-Field Infrared Survey Telescope (WFIRST), a comprehensive review of the algorithms and post-processing strategies would allow direct imaging to be adaptive to the progress and consequently, improve the rate of detection. In this study, the critical analysis of three algorithms – the non-principal component analysis (non-PCA) based LOCI algorithm [10]; the PCA based PynPoint [2]; and the robust PCA based LLSG algorithm [9] is conducted. Furthermore, the effectiveness of these algorithms is discussed in various imaging conditions. Prospects of the interrelation of computer vision and astronomy are briefly discussed.

Paper ID: 132

Dynamic Texture Recognition from Multi-Offset Temporal Intensity Co-occurrence Matrices with Local Pattern Matching

Seba Susan (Department of Information Technology, Delhi Technological University); Minni Mittal (Department of Information Technology, Delhi Technological University); Srishti Bansal (Department of Information Technology, Delhi Technological University); Prachi Agrawal (Department of Information Technology, Delhi Technological University)

In this paper, we propose dynamic texture recognition from video snippets by constructing temporal intensity co-occurrence histograms for feature representation and learning. The pairwise intensity co-occurrence frequencies are summarized from every pixel position, between every pair of sequential frames in the video separated by a certain time lapse or offset distance. A 256x256 gray-scale intensity co-occurrence matrix is thus constructed for every offset distance. Twenty frame offset distances from $d=1, 2, \dots, 20$ are used for the computation, that yields twenty 256x256 temporal co-occurrence matrices from a single video. The twenty 2D histograms so formed are individually converted to complete probability distributions whose elements sum up to one, and then each histogram is converted to a 1D feature vector. The twenty 1D feature vectors represent local patterns that are concatenated to form a unique ID pattern that is matched using the ensemble of bagged decision trees classifier. Alternatively, a 20x20 grid of distance classifiers is substituted to find matches between the local patterns followed by the summation of distances from all the grids. The recognition rate achieved in our experiments is found superior to the state-of-the-art, when tested on the raw, unprocessed and unsegmented videos of the benchmark Dyntex++ dataset.

Oral Session 3: 11:45 – 13:00

Paper ID: 121

Lateral-Directional Aerodynamic parameter Estimation using Neuro-Fuzzy based Method

Ajit Kumar (Indian Institute of Technology Kanpur); Ajoy Kanti Ghosh (Indian Institute of Technology Kanpur)

In this paper, lateral-directional aerodynamic parameter estimation has been achieved by Neuro-Fuzzy based, ANFIS-Delta method. ANFIS-Delta method has been applied on Hansa-3 research aircraft data. The noise resistant performance of the presented method is demonstrated through the estimation in presence white Gaussian noise of different degree in the simulated flight data. The estimated aerodynamic parameters are compared with standard wind tunnel parameters.

Paper ID: 154

A Privacy Preserving Twin Support Vector Machine Classifier for Vertical Partitioned Data

Pritam Anand(South Asian University, New Delhi); Jay Pratap Pandey(South Asian University, New Delhi); Reshma Rastogi(South Asian University, New Delhi); Suresh Chandra(Ex-Faculty, Department of Mathematics, Indian Institute of Technology Delhi, India)

In this paper, a novel privacy preserving binary classifier termed as Privacy Preservation Twin Support Vector Machine (PPTWSVM) has been proposed. The PPTWSVM formulation is motivated by the Privacy Preserving Support Vector Machine (PPSVM) formulations of Mangasarian and Wild and Twin Support Vector Machine (TWSVM) formulation of Jayadeva et al.. Similar to PPSVM, PPTWSVM also employs the random kernel technique for preserving the privacy of participating entities which are holding the different feature columns of the representing data. An extensive numerical implementation on UCI benchmark datasets confirms that PPTWSVM is faster than PPSVM in the training phase and owns better generalization ability.

Paper ID: 224

IAAS Trust Framework: Security Tool Based on Standards & Certifications

Dr, Meenu Dawe(Faculty of Engineering and Technology Jagan Nath University, Jaipur, India); Archana B Saxena(Department of Information Technology JIMS (Jagan Institute of Management Studies, Delhi, India)

The admiration and acceptance of cloud computing by masses has fuelled the concern to look into the critical issues faced by technology to make it a seamless and trusty solution of information systems, communication and information security. Two challenges that are hampering the success of this technology are: Security and Trust. When security is assured trust will forte and security lapse will definitely have negative impact on trust. In this paper, a novel trust model that is based on security coverage through standards and certifications. To address these issues author have kept a twofold aim for this paper: Firstly logged all the factors that are considered imperative for IAAS security and verify how provider is assuring

security related to these factor. Second is to present a “Trust Framework” that will calculate trustworthiness of cloud provider.

Oral Session 4: 11:45 – 13:00

Paper ID: 78

Iris Data Classification Using Modified Fuzzy C Means

Ms. Nisha Singh (Research Scholar, Rama University); Dr. Vivek Srivastava (Associate Professor, Rama University); Mrs. Komal (Assistant Professor, Rama University)

In the field of real environment, there is a big challenge of clubbing the data according to their working techniques or behavior. Fuzzy clustering techniques can be used where the data belongs to more than one class or bucket decided based on no. of features. It means the decision to classify them in any bucket is to be done by applying some similarity measurements. According to this the data points of any data set can belong to more than one class, even having different membership function value corresponding to different class. Fuzzy clustering technique is comprising of two very dissimilar data types as fuzzy data and usual (crisp) data. It is a kind of function working on probabilistic mode of evaluating the values. Where the whole process is done without training of values to that system i.e. using unsupervised model. In this paper we proposed the modified fuzzy c-means using iris flower data to be clustered followed by proper usage of validation techniques classification entropy (CE) and partition coefficient (PC).

Paper ID: 209

A Hybrid GA-PSO Algorithm to Solve Traveling Salesman Problem

Indresh Kumar Gupta (Dept: Computer Science & Engineering, Harcourt Butler Technical University - Kanpur, India); Samiya Shakil (Dept: Computer Science & Engineering, Harcourt Butler Technical University - Kanpur, India); Sadiya Shakil (Dept: Computer Science & Engineering, Harcourt Butler Technical University - Kanpur, India)

Heuristic search techniques are powerful tool to find optimal for traveling salesman problem (TSP). TSP is recognized as NP-hard problem. Application of TSP is found in many areas such as semiconductor manufacturing, logistics and transportation. This paper focus to develop a heuristic technique for TSP by combining two popular optimization method genetic algorithm (GA) and particle swarm optimization (PSO). In hybrid GA-PSO new individuals are created through GA operators - crossover and mutation as well as mechanism of PSO. Hybrid GA-PSO performance has examine against GA and PSO for 10 standard TSPs with respect to find optimal and computational time. Computational results exhibit hybrid GA-PSO has significant advancement over GA and PSO.

Paper ID: 190

Fuzzy Inference Network with Mamdani Fuzzy Inference System

Nishchal K. Verma(Indian Institute of Technology Kanpur, India); Vikas Singh(IIT Kanpur); Shreedharkumar D. Rajurkar(Indian Institute of Technology Kanpur, India); Mohd Aqib(IIT Kanpur)

In the modern era, the amount of data generated is increasing at an exponential rate. The generated data has both numeric as well as linguistic form. Learning or extracting relevant information from these types of data is a major challenge for researchers. In this paper, we have proposed a generic architecture of a network built from Mamdani fuzzy inference system as its basic building blocks and it tries to learn the information from data. Each node of the network acts as a complete Mamdani fuzzy inference system mapping numeric as well as linguistic information of the data from input to output in terms of linguistic rule based inference. Parameters of the input fuzzy membership functions appearing in the premise parts and output fuzzy membership functions appearing in consequent parts of the rules in the fuzzy rule base of each node in the network constitute overall parameters of the network.

Oral Session 5: 11:45 – 13:00

Paper ID: 181

Evaluation of Classifiers for detection of Authorship Attribution

Dr.Smita Nirakhi (Assistant Professor, Shri. Ramdeobaba College of Engineering and Management, Nagpur)

Authorship Attribution is the challenging and promising research field of Digital forensics. It determines the plausible author of a text message written by an author by investigating other documents written by that author. Analysis of online messages is helpful to examine the text content in order to draw conclusion about attribution of authorship. Forensics analysis of online messages involves analyzing long fraud documents, terrorists secret communication, Suicide letters, threatening mails, emails, blog posts also short texts such as SMS text messages, Twitter streams or Face book status updates to check the authenticity and identify fraudulence. This paper evaluates the performance of various classifiers for Authorship Attribution of Online messages using proposed wordprint approach. Data Mining Classification techniques selected for performing the task of authorship attribution are SVM, K-NN, and Naïve bayes.

Paper ID: 194

Performance Analysis of Uncertain K-Means Clustering Algorithm using Different Distance Metrics

Swati Aggarwal (Department of Computer Engineering, Netaji Subhas Institute of Technology, Delhi, India); Nitika Agarwal (Department of Computer Engineering, Netaji

Subhas Institute of Technology, Delhi, India); Monal Jain (Department of Computer Engineering, Netaji Subhas Institute of Technology, Delhi, India)

Real world data generally deals with inconsistency. The Uncertain K-means (UK-means) clustering algorithm, a modification of k-means handles uncertain objects whose positions are represented by probability density functions (pdfs). Various techniques have been developed to enhance the performance of UK-means clustering algorithm but they are all centered on two major factors: choosing initial cluster centers and determining the number of clusters. This paper proposes that the measure of "closeness" is also a critical factor in deciding the quality of clusters. In this paper, the authors study the performance of UK-means clustering algorithm on four different distance functions using Haberman's survival dataset. The analysis is performed on the basis of Davies-Bouldin index and purity values.

Paper ID: 241

Query Morphing: A Proximity-based Data Exploration for Query Reformulation

Jay Patel (Computer Engineering Department, National Institute of Technology, Kurukshetra, India); Vikram Singh (Computer Engineering Department, National Institute of Technology, Kurukshetra, India)

With the increase of information technology, multiple terabytes of structured and unstructured data are generated on daily basis through various sources, such as sensors, lab simulations, social media, web blogs, etc. Due to big data occurrences acquisition of relevant information is getting complex processing task. These data are often stored and kept in the vast schema and thus formulating data retrieval requires a fundamental understanding of the schema and content. A discovery-oriented search mechanism delivers good results here, as user can stepwise explore the database and stop when the result content and quality meet. In this, a naïve user often transforms data request in order to discover relevant items; morphing is a historical approach for generation of various transformation of input. We proposed 'Query Morphing', an approach for query reformulation based on data exploration. Various design issues and implementation constraints of proposed approach are also listed.

Oral Session 6: 11:45 – 13:00

Paper ID: 236

Investigation of RBF kernelized ANFIS for Fault Diagnosis in Wireless Sensor Networks

Rakesh Ranjan Swain (National Institute of Technology Rourkela, India); Tirtharaj Dash (Birla Institute of Technology and Science Pilani, Goa Campus, India); Pabitra Mohan Khilar (National Institute of Technology Rourkela, India)

Wireless sensor networks (WSN) are often inaccessible to human. The occurrence of sensor node failure in WSN is inevitable. A failure may lead to faulty readings which in turn may cause economic and physical damages to the environment. In this work, a thorough investigation has been conducted on the application of adaptive neuro-fuzzy inference system

(ANFIS) for automated fault diagnosis in WSN. Further, a kernelized version of ANFIS has also been studied for the discussed problem. To avoid the model's undesired biases towards a specific type of failure, oversampling has been done for multiple version of the ANFIS model. This study would serve as a guideline for the community towards the application of fuzzy inference approaches for fault diagnosis in WSN.

Paper ID: 244

On Adaptive control for AGV with vision sensor as an unknown nonlinear system

Pankaj Mishra (Indian Institute of Technology Kanpur, India); Pooja Agrawal(Indian Institute of Technology Kanpur, India); Narendra K. Dhar (Indian Institute of Technology Kanpur, India); Nishchal K. Verma (Indian Institute of Technology Kanpur, India)

Adaptive control using neural network provides a real-time systematic approach to achieve or maintain a desired level of control system performance when dynamics are unknown. The paper proposes a novel approach for designing of an adaptive controller with input as relative pixel density from a fuzzy system for automated guided vehicle with vision sensor. The fuzzy system computes relative pixel density from vision sensor data while minimizing uncertainties due to illumination, occlusion and obscure images. It provides a methodology to apply an advanced nonlinear intelligent control technique for vision based path tracking problem. The proposed strategy has been applied for path tracking problem on an indigenously developed vehicle. The results obtained show the efficiency of proposed approach and ease of applying different control technique for vision sensor based plant.

Paper ID: 307

A Modified Extreme Learning ANFIS for Higher Dimensional Regression Problems

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Extreme learning adaptive neuro fuzzy inference system (ELANFIS) is a new learning machine which integrates reduction of computational complexity of extreme learning machine (ELM) concept to ANFIS. ELANFIS uses Takagi Sugeno Kang (TSK) fuzzy inference system like ANFIS which gives accurate models. Grid partitioning is used in both ANFIS and ELANFIS which has the disadvantage of curse of dimensionality. In this paper a modified extreme learning ANFIS using Sub-Clustering for input space partitioning is proposed for higher dimensional regression problems. In the proposed structure, Sub-clustering is used for input space partitioning of the network. The cluster centers are used to obtain the premise parameters of the ELANFIS, such that it satisfies the constraints for obtaining distinguishable membership functions. Performance of the modified ELANFIS is compared with ANFIS and ELANFIS for real world higher dimensional regression problems. The modified ELANFIS overcomes the curse of dimensionality with better interpretability compared to ANFIS and ELANFIS.

Oral Session 7: 15:45 – 17:00

Paper ID: 242

Rainfall Prediction Using Fusion of Machine Learning and Forecasting Techniques

Urmay Shah (Nirma University, India); Sanjay Garg (Nirma University, India); Neha Sisodiya (Nirma University, India); Nitant Dube, (ISRO SAC Ahmedabad); Shashikant Sharma (ISRO SAC Ahmedabad)

The main objective of the paper is to provide the insights of Climate to the clients e.g. agriculturists, Researcher etc, from various businesses to comprehend the significance of different changes in climate and atmosphere parameters like precipitation, temperature and so on. The forecast of precipitation is one of the significant investigations in meteorological science. In this, an endeavor is made to a couple of factual procedures and machine learning systems for the forecast and estimation of meteorological parameters and in view of that estimation and prediction of precipitation is done. We have considered daily observations for the experimental purpose. Validation is performed to assess the accuracy of forecasting Model. The examination demonstrates that ARIMA and Neural Network works best to forecast meteorological parameters, and Random Forest model gives best classification accuracy in comparison to other machine learning algorithms for forecasting precipitation for next season.

Paper ID: 146

Multimodal Data Fusion and Prediction of Emotional Dimensions using Deep Neural Network

Dhruv Bhandari (Dayalbagh Educational Institute, Agra, India); Sandeep Paul (Dayalbagh Educational Institute, Agra, India); Apurva Narayan (University of Waterloo, Waterloo, Canada)

This paper proposes a novel deep neural network model to handle multimodal data. The proposed model seamlessly facilitates fusion of multimodal inputs and provides the dimensional reduction of the input feature space. The architecture employs modified stacked autoencoder in conjunction with multi-layer perceptron based regression model. Two variants of architecture are proposed and experiments have been performed on the multimodal benchmark data (RECOLA) to study the impact of multimodality as against a single modality. Experiments are also conducted to illustrate the effect of way of presenting the multimodal data – sequential or concatenated. The results obtained are encouraging. The proposed approach is computationally less expensive than the existing approaches and the performance is better or at par with the other techniques.

Paper ID: 321

Simultaneous Structure and Parameter Learning of Convolutional Neural Network

Soniya (Dayalbagh Educational Institute, Agra, India); Sandeep Paul (Dayalbagh Educational Institute, Agra, India); Lotika Singh (Dayalbagh Educational Institute, Agra, India)

This paper provides a solution to select a suitable architecture of convolutional neural network (CNN). A hybrid evolutionary gradient descent (HyEGD) approach is proposed to automatically evolve the architecture of CNN. The evolution of structure is done using compact genetic algorithm (CGA) by optimizing the number of filters in each layer, and simultaneously, the associated weight parameters are tuned by stochastic gradient descent (SGD). This brings forth an effective way to search the solution space seamlessly integrating both exploration, spearheaded by CGA, and the exploitation, naturally done by SGD. Moreover, using HyEGD approach, the user specified architecture can also be evolved trading-off between two objectives- network performance on one side and network size on the other side. Experiments to illustrate the salient features of the HyEGD approach are performed on two benchmark problems: COIL-20 dataset and MNIST dataset. The results clearly highlight the powerful capability of generating architectures based on the required performance and size of network.

Oral Session 8: 15:45 – 17:00

Paper ID: 193

MULTI-LAYER CLASSIFICATION APPROACH FOR ONLINE HANDWRITTEN GUJARATI CHARACTER RECOGNITION

Vishal A. Naik (Department of Computer Science, Veer Narmad South Gujarat University Surat, Gujarat, India); Apurva A. Desai (Department of Computer Science, Veer Narmad South Gujarat University, Surat, Gujarat, India)

In this paper, the authors present a multi-layer classification approach for online handwritten character recognition for the Gujarati characters. The Gujarati language consists of many confusing characters which lead to misclassification. Multi-layer classification technique is used to increase the accuracy of confusing characters. In the first layer of classification, SVM classifier with the polynomial kernel is used with all training data. If first layer classifier returns a character which can be confused with some characters than in the second layer, SVM with the linear kernel is used with confusing characters' training data. A hybrid feature set consisting zoning features and dominant point based normalized chain code feature is used in both layer of classification. The system is trained using a data set of 2000 samples and tested by 200 different writers. The authors have achieved an average accuracy of 94.13% with an average processing time of 0.103 seconds per stroke.

Paper ID: 324

Automatic ECG Signals Recognition Based on Time Domain Features Extraction using Fiducial Mean Square Algorithm

VIJENDRA V (Center for PG Studies, Visvesvaraya Technological University, BELAGAVI); MEGHANA KULKARNI (Center for PG Studies, Visvesvaraya Technological University, BELAGAVI)

Prototyping of ECG correlation using beat morphology which involves Automatic beat classification is essential for the critical conditioned patients suffering from heart attacks. There are various pattern recognition for the automatic diagnostics of ECG beat abnormalities. The ECG signals are used to recognize heart related diseases. The proposed method defines the time domain feature extraction using fiducial mean square algorithm. The Butterworth filter is used to enhance quality of ECG signals by removing baseline interference. The 1D-Lift DWT is applied on ECG signals to convert time domain into frequency domain signals. The adaptive Threshold technique is used to remove low amplitude ECG signals to identify peaks of ECG signals.

Paper ID: 179

Emotion Classification from Facial Expressions using Cascaded Regression Trees and SVM

Manjot Singh Bilkhu (Motilal Nehru National Institute of Technology Allahabad); Samarth Gupta (Motilal Nehru National Institute of Technology Allahabad); Vinay Kumar Srivastava (Motilal Nehru National Institute of Technology Allahabad)

Developing a robust automated system that can perform facial expression recognition is rather difficult. A system that performs these operations accurately and in real time would be a major step forward in achieving reliable human-computer interaction. In this paper a new robust real-time algorithm is applied to face analysis to accurately predict emotions using facial expressions. A new facial pose estimation based facial expression recognition system is introduced in this paper. A cascade of linear regressors is used to detect and track facial landmarks which will be used as features to train a classification algorithm. The landmark detector has been made to be robust to changes in the alignment of the faces. Support vector machine is used to classify emotions into one of the six emotions.

Oral Session 9: 15:45 – 17:00

Paper ID: 310

Fault Detection of Anti-friction Bearing using AdaBoost Decision Tree

Sangram S Patil (PhD Research scholar, CoE-CNDS, VJTI Mumbai); Vikas M Phalle (Associate Professor, Mechanical Engineering Dept., VJTI Mumbai)

In this paper Decision Tree (DT) based AdaBoost technique is used for Anti-friction Bearing (AFB) fault detection. Time domain feature extracted from raw vibration signal and randomized lasso based feature ranking technique is used to make feature sets. Top 8 features are selected to create training/ testing feature sets for classification. The influence on classification efficiency with various combination of estimators and feature sets is studied for normal DT and AdaBoost DT. The result shows that, classification accuracy significantly

increased with AdaBoost DT by increasing estimators and features than normal DT. It indicate that the AdaBoost DT technique could efficaciously differentiate different bearing conditions of AFB.

Paper ID: 301

Development of parsimonious orthonormal basis function models using particle swarm optimisation

Lalu Seban (National Institute of Technology, Silchar); Binoy K. Roy (National Institute of Technology, Silchar)

Orthonormal basis function (OBF) models have several advantages and recently find applications in model based and fault tolerant controllers, due to its computational efficiency, consistency, linearity, and parsimonious nature of parameters. OBF models use a priori knowledge of system dynamics in the form of dominant poles to reduce the model order. The OBF model accuracy improves and becomes more parsimonious as the estimate of poles used in the OBF filters are closer to the system dynamics. The optimal class of OBF model is also selected from the knowledge of the nature of dominant poles. The available methods are mainly based on simple step response or graphical analysis and are dependent on process characteristics. In this paper an optimisation based approach is proposed and then validated for different processes for estimating the dominant poles of the process from a broad input-output identification data and found independent of process characteristics. The method also discussed an iterative approach to separately compute process time delay and further improve the estimation of dominant poles. It can be further extended to develop the approximate first order plus time delay (FOPTD) or second order plus time delay (SOPTD) model of the process.

Paper ID: 213

Butterfly Constrained Optimizer for Constrained optimization problems

Abhishek Kumar (IIT-BHU, India), Varanasi; Tarun Maini (IIT-BHU, India); R. K. Misra (IIT-BHU, India); Devender Singh (IIT-BHU, India)

An extension of the new optimization algorithm, Butterfly Optimizer (BO) for the constrained optimization problem is discussed in this paper. This version of BO is called Butterfly Constrained Optimizer (BCO) which mimics the mate-locating behavior of male butterflies and their behavior towards sun-spots. Two main mate-locating behavior, perching and patrolling are used to update the location of male butterflies (trial solutions) towards the feasible reason of search space to optimize the problem without violating any constraints. In this paper, five benchmarks constrained optimization problem are considered to analyze the performance of BCO, and the benchmark results are compared with well-known state-of-art constrained algorithms. Experimental results show that the comparative performance of BCO concerning the optimization capability, efficiency and accuracy are better than other.

Oral Session 10: 15:45 – 17:00

Paper ID: 169

TelNEClus: Telugu Named Entity Clustering using Semantic Similarity

SaiKiranmai Gorla (Birla Institute of Technology and Science Pilani, Hyderabad Campus); Aditya Chandrashekhar (Birla Institute of Technology and Science Pilani, Hyderabad Campus); N L Bhanu Murthy (Birla Institute of Technology and Science Pilani, Hyderabad Campus); Aruna Malapati (Birla Institute of Technology and Science Pilani, Hyderabad Campus)

Semantic similarity plays an important role in many of Information Retrieval (IR) applications. Most IR methodologies represent the documents using Vector Space Model (VSM) traditionally known as Bag of Word hypothesis. The main disadvantage is sequential order of words is lost and does not capture the structure in phrases, sentences, paragraphs, etc. In this paper, we have attempted to cluster Named Entities (NEs) extracted from Telugu corpus based on semantic similarity. We contend that for this sort of work, more suited VSMs is Distributional hypothesis which usually applied for measuring word similarity using word-context matrix. In the word-context matrix the row vector is words given in the corpus here it is proper noun as most of NE are proper noun and column vector is context such as windows of words, grammatical information etc. The Row Vector in word-context matrix is constructed in two ways with two different features sets: The first way is to represent each NE with unique Row Vector (Row Vector1) without considering different occurrences in a corpus and second way is to represent each NE with set of Row Vectors (Row Vector2) considering different occurrences in a corpus. For Row Vector1 representation classical similarity functions like Cosine, Scalar product, Jaccard etc. can be utilized, but for Row Vector2 representation we have generalized similarity functions to Sum-of-Sum and Sum-of-Max. Experimentally, we demonstrated that Row Vector2 representation enhance the clustering results.

Paper ID: 101

Multi-Objective OPF problem analysis with Practical constraints in the presence of FACTS devices using NSHCSA

Dr M Balasubbareddy (Chaitanya Bharathi Institute of Technology, Hyderabad)

This paper presents a new hybrid cuckoo search algorithm (HCSA) for solving the Optimal Power Flow (OPF) in power systems. In this the conventional Cuckoo Search Algorithm (CSA) is combined along with Genetic Algorithm (GA) to improve the effectiveness of solution. Multi-objective optimal power flow solution is obtained with satisfying equality and inequality constraints along with additional constraints of ramp-rate limit and Prohibited Operating Zone limits (POZ) using proposed Non-dominated Sorting Hybrid Cuckoo Search Algorithm (NSHCSA) algorithm. Fuzzy decision making tool is used to pick the selected solution than the best solution as per the system operator requirements. The proposed NSHCSA with TCSC, SSSC, and IPFC is tested on Himmelblau function and IEEE 14 bus system and corresponding results are analyzed.

Paper ID: 148

A Unified TOPSIS approach to MADM problems in interval-valued intuitionistic fuzzy environment

Samir Kumar (Department of Mathematics, Acharya Jagadish Chandra Bose College, Kolkata, India); Animesh Biswas (Department of Mathematics, University of Kalyani, India)

In this paper TOPSIS is extended in interval-valued intuitionistic fuzzy settings using mathematical programming and normalized hamming distance between two intuitionistic fuzzy sets with three parameter characterization. The two formulae giving lower and upper bounds of intervals for relative closeness coefficients of alternatives are generated on solving two linear fractional programming models. A fuzzy preference relation as possibility degree matrix is formed using pairwise comparisons of intervals of closeness coefficients and used to estimate the optimal degrees for ultimate ordering of alternatives. A numerical example with two distinct forms demonstrates the validity and effectiveness of the presented approach.

Oral Session 11: 15:45 – 17:00

Paper ID: 217

Domain Independent Sentiment Analysis in Malayalam

Kasthoori V(Sree Chitra Thirunal College of Engineering, Trivandrum, India); Soniya B (Sree Chitra Thirunal College of Engineering, Trivandrum, India); Jayan V(Centre for Development of Advanced Computing, Trivandrum,, India)

This paper is focused on the research in domain independent Sentiment Analysis in Malayalam language. A sentence level sentiment analysis using Machine Learning method and Fuzzy Logic is used for the work. Using ART classifier the dataset is trained and monograms in the dataset are divided into 8 classes and assigned a score. When the system accepts the input text, monograms in the text is used to find the domain of the text. After identifying the domain by comparing the trained data, the system assigns the scores to the sentences based on the scores of the pre-trained data. The overall score is calculated by adding up the individual scores and identifies whether the text is having positive or negative sentiments. By using fuzzy logic the polarity of the input is calculated. Since there is no standardized dataset in Malayalam for Sentiment Analysis, the training data is collected from the Malayalam online newspaper. In short, system identifies the domain of input text and then finds the sentiment and its polarity.

Paper ID: 289

People Counting With Overhead Camera Using Fuzzy Based Detector

Nishchal K. Verma (Indian Institute of Technology Kanpur, India); Raghav Dev (Indian Institute of Technology Kanpur); Seetaram Maurya (Indian Institute of Technology Kanpur); Narendra K. Dhar (Indian Institute of Technology Kanpur); Pooja Agrawal (Indian Institute of Technology Kanpur, India)

This paper presents a novel fuzzy based detector for overhead people counting in real-time using RGB camera. The approach, firstly, extract the foreground from the subsequent frames using popular background subtraction method. Connected Component Analysis (CCA) is used to evaluate major axis, minor axis, area, and centroid for every blob in foregrounds. Using these properties for each blob a detection parameter is evaluated. A membership value by a trained Gaussian Membership Function (GMF) is assigned to this detection parameter which decide whether the blob is of a human being or not. Next, a novel centroid based tracking algorithm is proposed for the counting operation. The proposed detector and counter are simple and fast. Several real time experiments have been performed for the validation of the proposed approach. The results shows that approach is better than some of the state of the art algorithms and it is precise enough to be used in real-time environment.

Paper ID: 306

Modified Extended Kalman Filter using correlations between measurement parameters

Ramanan Sekar (Sri Sivasubramaniya Nadar College of Engineering); Sai Shankar N (Sri Sivasubramaniya Nadar College of Engineering); Shiva Shankar B (Sri Sivasubramaniya Nadar College of Engineering); P V Manivannan (Indian Institute of Technology Madras)

We mathematically analyze the correlations that arise between measurement parameters. This is done by understanding the geometrical transformations that a data point undergoes when correlations are determined between normally distributed measurement parameters. We use this understanding to develop a new algorithm for the discrete Kalman Filter. The analysis and methodology adopted in this work can be extended to the derivatives of Kalman Filter, resulting in similar improvements. The effectiveness of this method is verified through simulation of mobile robot mapping problem with an Extended Kalman Filter and the results are presented.

Oral Session 12: 15:45 – 17:00

Paper ID: 116

Segmentation and Border Detection of Melanoma Lesions using Convolutional Neural Network and SVM

Ashwin Jadhav (VIT University); Arun Ghontale (VIT University); Vimal Shrivastava (KIIT University)

Melanoma is the most lethal form of skin cancer caused when skin is exposed to intense UV rays. Estimates suggests that the deaths tolls are more than 50,000 with 3 million and more reports of it yearly. However, early diagnosis of malignant melanoma significantly curbs the mortality rate. Several computer-aided diagnosis systems have been proposed in assisting detection of malignant melanoma in its earlier stages. These systems help in early detection and earlier diagnosis of many symptoms which results in better and accurate treatment. However, the challenge starts from the first step of implementation of such systems which is

melanoma lesion detection in the image. In this paper, the problem of automatic detection of melanoma lesion on skin images is presented based on the concept of Deep Learning. The result of the study shows that deep learning using CNN is able to detect the melanoma lesion effectively.

Paper ID: 165

Image processing methods for Automated Assessment of Sperm DNA Integrity

Banu Rekha B (PSG College of Technology, India); Vidya Lakshmi S (PSG College of Technology, India)

Infertility is a rising concern across the world and it is estimated to affect approximately 15% of the couples. Male fertility is highly related to the sperm quality. Sperm is a specialized cell and the fertilization potential of a sperm cell is largely dependent on the sperm DNA integrity. There are a set of seminal analyses but none of these are capable of detecting DNA damage in sperm cells. The aim of this study is to develop a novel image processing technique for automated, cost effective and rapid assessment of sperm cell DNA damage for addressing infertility issues. The images of sperm cells were subjected to K means clustering to segment the core and halo parts of the sperm cell. Based on the diameter differences, assessment was made on the number of sperm cells with small, medium, big and no halo. A set of ten, real time semen samples were collected for this work and the results are suggestive of the potential of this method for rapid identification of degraded sperm cells.

Paper ID: 326

Differential Evolution based Matched Wavelet for Differential Protection of Transformer

Arpita Roy (IIT BHU, Varanasi); Devender Singh (IIT BHU, Varanasi); R.K.Misra (IIT BHU, Varanasi)

The work proposes a matched wavelet method for detection and discrimination of inrush and fault waveform in

Power transformers. The method rests on the concept that if analysing wavelet is specialized to have shape matching with the waveform being analysed (fault or inrush) its discrimination ability can improve drastically. The matched wavelet for inrush and fault waveforms are developed using Differential Evolution (DE) algorithm. It is established that the proposed method has sub-cycle (nearly half-cycle) discrimination ability. The method was tested by generating waveforms for all the angles to test its discrimination ability.

Technical Sessions: December 7, 2017

Oral Session 13: 11:45 – 13:25

Paper ID: 83

Modified Back propagation neural network for facial expression classification using principal component analysis and Ridgelet transform

RAMACHANDRAN VEDANTHAM (ACHARYA NAGARJUA UNIVERSITY); Lavanya Settipalli (Vignan's University); Srinivasa Reddy Edara (ACHARYA NAGARJUA UNIVERSITY)

This article proposes a Human Emotion Classification model using Ridgelet Transformation based emotion image features and with back propagation Artificial Neural Network. Ridgelet transformation method was applied to face images around the points of interest area. Principal Component Analysis technique was used for pre-processing phase in feature extraction from emotion contained images. The proposed model has two important phases that are fine mixed to make the entire system optimal. The first step is to select the image representation that extracts the important features of image using PCA and then applied Ridgelet transform to get the fine-tuned features from the obtained Eigen features. The second step is a meticulously modified back-propagation artificial neural network classifier which includes two parameters such as anxiety and confidence, for selecting a subset of typical conclusive visual topographies from the set of latent structures. The combination of

these two procedures enabled rapid learning and there by computational swiftness in classifying the facial emotions.

Paper ID: 219

Analysis and Classification of Discriminative Region in Cognitive Functional MRI data

J. Siva Ramakrishna (Institute of Aeronautical Engineering, India); Hariharan Ramasangu (M. S. Ramaiah University of Applied Sciences, India)

Feature engineering techniques such as feature selection and extraction dominate the process of cognitive state learning. Extraction of relevant features from high-dimensional multi-way functional MRI (fMRI) data is essential for the classification of a cognitive task. The dimensionality of fMRI influences the analysis of brain data. fMRI data is arranged as a number of voxels, Region of Interests (ROI), and snapshots. Extraction of a specific pattern of interest within the noisy components is a challenging task. In this paper, a tensor gradient-based feature extraction technique decomposes the multi-way fMRI data into a number of components. Voxel time series data from different ROIs has been used to find the region of discrimination. Clustering based maximum margin feature selection method has been proposed to select the minimum number of voxels as attributes. The proposed techniques provide a better learning accuracy for the StarPlus fMRI data.

Paper ID: 200

A Local Information based Fuzzy C-means for Brain MRI Segmentation

Anu Mangla (Ph.D pusuimg, Punjab University, India), Dr. Chandan singh (Ph.D, Punjab University, India)

Segmentation of brain tissues from magnetic resonance images (MRI) is crucial for quantitative analysis of brain images. The fuzzy C-means (FCM) algorithm has proven to be an efficient approach for brain MRI segmentation. However, accurate segmentation results are hard to find due to the presence of noise. In this paper, we apply most commonly used local denoising filters to preprocess the image for obtaining better segmentation results. Then we quantitatively compared various FCM based state-of-the-art segmentation approaches with the proposed methods using Jaccard similarity (JS) on both the synthetic and clinical images. The comparison results demonstrate that the proposed methods can produce better segmentation accuracy and has stronger ability of denoising.

Oral Session 14: 11:45 – 13:25

Paper ID: 4

Development of computer program for en-masse retraction of six maxillary anterior teeth

Abhishek M. Thote (Research Scholar, Department of Mechanical Engineering, Visvesvaraya National Institute of Technology, Nagpur, Maharashtra, India); Rashmi V. Uddanwadiker (Assistant Professor, Department of Mechanical Engineering, Visvesvaraya National Institute of Technology, Nagpur, Maharashtra, India); Krishna Sharma (Assistant Professor, Department of Orthodontics, Sharad Pawar Dental College, Wardha, Maharashtra, India); Sunita Shrivastava (Professor, Department of Orthodontics, Sharad Pawar Dental College, Wardha, Maharashtra, India)

The objective of this study was to develop a computer program to estimate an optimum force system to achieve en-masse retraction of six maxillary anterior teeth in labial orthodontics. Methods: First, a set of equations was developed based on mathematical computation. Then, the computer program based on mathematical computation was developed to estimate force parameters. The verification of force system obtained through computer program was accomplished by three-dimensional finite element analysis (FEA). Results: In FEA, it was clear that the desired en-masse retraction of six maxillary anterior teeth was achieved from the vectors of nodal displacements as well as the position of undeformed and deformed models. In this way, the computer program was verified with FEA. Conclusions: The developed computer program accurately estimates required force system. This increases the efficiency of orthodontic treatment by shortening treatment time.

Paper ID: 99

3D Bio-Plotted Tricalcium phosphate/Zirconia Composite Scaffolds to heal large size bone defects

Pranav S. Sapkal (Research Scholar, Department of Mechanical Engineering, Visvesvaraya National Institute of Technology, Nagpur, Maharashtra, India); Abhaykumar M. Kuthe (Professor, Department of Mechanical Engineering, Visvesvaraya National Institute of Technology, Nagpur, Maharashtra, India); Shantanu Mathankar (B.Tech Student, Department of Biochemical Engineering & Biotechnology, Indian Institute of Technology, Delhi, India); Akash A. Deshmukh (Research Scholar, Department of Physics, RTM Nagpur University, India)

β -TCP-Zirconia scaffolds with different architectures were fabricated by means of 3D-Bioplotting in order to enhance the mechanical and in-vitro ability of the scaffold to heal large size bone defects. In the present study scaffold architecture with different strand orientations (0° - 90°, 0° - 45° - 135° - 180°, 0° - 108° - 216° and 0° - 72° - 144° - 36° - 108°) were fabricated, characterized and evaluated for mechanical strength and cell proliferation ability. Methods: The sintered samples were characterized by X-Ray Diffraction, Scanning Electron Microscopy, Uniaxial Compression Tests, Fourier transform infrared spectroscopy and cell proliferation by XTT assay using MG-63 human osteosarcoma cell line. Results: It was revealed that all samples maintained their structure and functional groups after sintering. Also, it was found that the architecture with (0° - 72° - 144° - 36° - 108°) strand orientation had the best strength and cell proliferation ability.

Paper ID: 145

High Dimensional Data Classification using PSO and Bat Algorithm

Viplove Divyasheesh (Invertis University, Bareilly, UP, India); Anil Pandey (Invertis University, Bareilly, UP, India)

Features optimization/minimization becomes necessary in machine learning and data mining field to improve the classification accuracy in less amount of time. However, features minimization is a difficult and challenging task due to large search space. Generally, a 100 features datasets have over 10^{30} features. Therefore, a search algorithm which converges at global optima in less amount of time is needed to tackle this problem. Hence, a modified binary particle swarm optimization and binary BAT algorithms are proposed for dimensionality reduction while support vector machine is used for classification purpose. Both the approach converges at global optima in less amount of time and is clearly shown in Table I.

Paper ID: 185

A Type-2 Fuzzy Systems approach for Clustering based Identification of a T-S Regression Mode A

Homanga Bharadhwaj (IIT Kanpur); Vikas Singh (IIT Kanpur); Nishchal K. Verma (IIT Kanpur)

The use of clustering for structure identification in T-S fuzzy models has been demonstrated to be very effective. More so, in recent times fuzzy c-regression models that use Type 2 Fuzzy clustering have been demonstrated to yield remarkable results. In this paper, a modified framework for the fuzzy c-regression model is developed and an innovative Gaussian shaped hyperplane membership function is proposed. Interval Type 2 fuzzy c-means is used for estimating the coefficients of the upper and lower hyperplanes. The novelty of our method lies in the fact that defuzzification of model output has been delayed until the very end, before which repeated iterations of Karnik Mendel Algorithm and Kalman Filter are used for optimizing the consequent parameters. The results obtained on the benchmark problems are better than the state of the art, as demonstrated in the paper.

Oral Session 15: 11:45 – 13:25

Paper ID: 262

DDAM: Detecting DDoS Attacks using Machine learning Approach

Narasimha Mallikarjunan Kambaraj (Thiagarajar College of Engineering); Mercy Shalinie S (Thiagarajar College of Engineering); Sundarakantham K (Thiagarajar College of Engineering); Bhuvaneshwaran A (Thiagarajar college of Engineering)

Dealing the Distributed Denial of Service (DDoS) attack is a continuing challenge in the field of network security. An Intrusion Detection System (IDS) is one of the solution to detect the DDoS attack. The IDS system should always be updated with the attack disincentive to

preserve the network security service. In this paper, we propose a new approach for anomaly detection using machine learning to secure the network and to determine the attack patterns. The major contribution is to use the Naive Bayes algorithm as a classifier for detecting and compare its performance with the existing classifiers like Random Forest and J48 algorithm. The experimental results on the real time dataset confirm that the proposed machine learning approach can effectively detect network anomalies with high detection rate and low false positive rate.

Paper ID: 272

FORECASTING PROFITABILITY IN EQUITY TRADES USING RANDOM FOREST, SUPPORT VECTOR MACHINE AND XGBOOST

Ritesh Ghosh (Engineer, Cisco Video Technologies India Pvt Ltd, India); Priyanka Purkayastha (Lead Consultant, BT e-Serv India Pvt Ltd, India)

There has been enormous number of research on applying machine learning to forecast direct price value as well as direction of equity and derivative instruments in stock markets worldwide. Many of the proposed models also considers the effect of transaction costs, which is an important factor for intraday trading. Most of the models examines the forecasting of price or direction of the underlying instrument only in the next time unit. Considering stock market instrument's underlying values as time series data points, predicting the value or direction for only the immediate data point is not justified. There has been also a lack of studies inspecting the predictability of profit over transaction costs for certain time duration ahead. This experimental research tries to predict the profitability over and above the transaction cost within the window of next few time units for an equity instrument traded in National Stock Exchange in India. The underlying machine learning approaches used to perform the experiment are non-linear supervised algorithms like Random Forest, Support Vector Machine and Extreme Gradient Boosting (xgboost). Extensive research has been made to derive the independent variables to perform the experiment from direct price data points of underlying equity instrument. The experimental research suggests that xgboost algorithm outperforms the other classification methods in terms of predicting the profitability from trading of the underlying instrument.

Paper ID: 278

Community Detection using Node Attributes: A Non-Negative Matrix Factorization Approach

Pranav Nerurkar (Dept. of CE & IT, VJTI, Mumbai); Madhav Chandane (Dept. of CE & IT, VJTI, Mumbai); Sunil Bhirud (Dept. of CE & IT, VJTI, Mumbai)

Community Detection uses graph topology and ignores node attributes while decomposing the network into coarse grained descriptions. Popular algorithms that proliferate in the literature highlight important aspects of the network by detecting modules either by using the modularity maximizing approach or through information theoretic approaches. Each of these

techniques have a different optimization criteria and objective function and hence lead to different community structures. In the last few years, a hybrid category of algorithms were proposed that jointly model network topology and node attributes to detect communities in the network. There are significant challenges to this line of study as additional information has to be factored in but at the same time efficiency constraints of time and space have to be respected. In this paper, a variant of the BIGCLAM model is implemented for detecting communities in graphs. It uses the existing conceptual framework of Affiliate Graph Models and modifies it to consider attributes and not community affiliations as the basis for creating a bipartite graph for partitioning. A mathematical model of this novel approach is provided as well as experimental results on data have been presented to justify the use of this technique.

Oral Session 16: 11:45 – 13:25

Paper ID: 202

Genetic Algorithm based optimization of Ant Colony Controller for Fractional Order Systems

Ambreesh Kumar (M. Tech., EC Department, Mewar University) , Varun Upadhyaya (B.E, Division of Instrumentation & Control Engineering, NSIT), Ayush Singh (B.E, Division of Instrumentation & Control Engineering, NSIT) , Paras Pandey (B.E, Division of Instrumentation & Control Engineering, NSIT) , Rajneesh Sharma (Ph. D., POSTDOC, Division of Instrumentation & Control Engineering, NSIT)

Finding appropriate initial parameter values for Ant Colony Optimization (ACO) is a research gap that has limited usage of ACO as an optimization technique. Conventionally, parameters for ACO are initiated by a trial and error procedure. We propose to use Genetic Algorithm (GA) for finding optimal initial ACO parameters for control of fractional order systems. This leads to an efficient and reliable ACO controller with quicker convergence. Proposed GA-ACO approach uses a nested GA with ACO for fractional PID controller tuning by minimizing a multi- objective function. We simulate our proposed approach on five different fractional order systems and compare its performance against: a) ACO based and b) GA based fractional order controller. Simulation results shows that our GA-ACO approach outclasses ACO and GA fractional controllers in terms of better transient response (rise time, peak overshoot) and steady state response (settling time, ITAE), with a higher computational complexity.

Paper ID: 299

Prediction of the State of Grinding Materials in Run Time using Genetic Operator

Sonali Sen (Department of Computer Science, St. Xavier's College, Kolkata, India) , Arup Kumar Bhaumik (RCCIIT, Kolkata, West Bengal, India) , Jaya Sil (Department of Computer Science, IEST, Shibpur, W.B., India)

The process of comminution is nondeterministic in nature and so deriving out a designated size range on crushing by fixing the parameters of the mill is not possible. Loss of materials

in huge amount is an obvious phenomenon due to under sizing of materials in transit. The aim of the paper is to predict the state of grinding of the particles during run time of the ball mill where input is the mix of solid materials fed into the ball mill. The acoustic sensors have been used to capture audio signals at different running conditions of the ball mill and processed to develop the prediction model. In the proposed work we apply crossover, selection and mutation operators of Genetic Algorithm (GA) to simulate information exchange and diversity in particle size distribution while crashing of the particles. Crossover operation is performed on each two consecutive acoustic segments and the offsprings are mutated. Offsprings are evaluated using the proposed fitness function and the selected one predicts the next segment. The algorithm continues for different desired grinded particle size obtained after a fixed time interval and the information are stored in a database. At the time of testing we start the material grinding procedure with the trained controlled parameters and the mill operation has been stopped automatically after a certain time when the target particle size has been generated. The proposed method achieves significant improvement in prediction performance compared with the previous work and outcomes are verified with the experimental results.

Oral Session 17: 11:45 – 13:25

Paper ID: 158

Digital image Restoration of Historical Devanagri Manuscripts

Nidhi Dubey (GLA University, India)

We live in a world where lots of manuscripts were written in earlier times. There are lots of historical manuscripts which are in deteriorated form. There is a need to restore these manuscripts in order to preserve our cultural heritage and ancient knowledge for future generation. Our focus is to restore the manuscripts that have been deteriorated because of age. These manuscripts got crushed, turned yellowish and got torn. There are some existing techniques for background deterioration but very less work is done on foreground restoration. Our focus is to restore the foreground of manuscript by completing the incomplete characters in a torn places of manuscript through restoration techniques and for performing background restoration, we have used in built otsu binarization thresholding method. The image processing methods are applied on document images for text, foreground restoration, background restoration and these deteriorated manuscript images.

Paper ID: 102

Classification of Hand Movement Stages for Brain Computer Interface Using Convolutional Neural Network

*Kriti Singhal (ABV-Indian Institute of Information Technology and Management, Gwalior);
Evi Agarwal (ABV-Indian Institute of Information Technology and Management, Gwalior);
Arpit Yadav (ABV-Indian Institute of Information Technology and Management, Gwalior);
Anuraj Singh (ABV-Indian Institute of Information Technology and Management, Gwalior)*

In this paper a deep learning based control algorithm for a fully functional, real-time prosthetic limb is presented to provide motor rehabilitation and restoration. The proposed scheme detects six different events related to hand movement during a task of grasping and lifting an object, using electroencephalographs (EEG). These six events represent the six sequential stages of a grasp and lift action like hand starts moving, starts lifting the object etc. This method mainly aims at increasing the classification performance of BCI applications by incorporating Convolutional Neural Network (CNN) and low pass filtering based learning approaches on electroencephalography recordings.

Paper ID: 142

Neural Net Optimization by Weight-Entropy Monitoring

Seba Susan (Department of Information Technology, Delhi Technological University); Rohit Ranjan (Department of Information Technology, Delhi Technological University); Udyant Taluja (Department of Information Technology, Delhi Technological University); Shivang Rai (Department of Information Technology, Delhi Technological University); Pranav Agarwal (Department of Information Technology, Delhi Technological University)

A novel technique of monitoring the entropy of network weights is proposed for optimizing the Multi-Layer Perceptron neural network classifier. The set of weights associated with the input of every perceptron are normalized to a probability distribution, and the entropy of weights is computed for the whole network using chain rule. The synaptic weights being initially random start converging to definite values in epoch training. The stopping criterion for the gradient-based Back-Propagation (BP) is defined by the stabilization of the entropy of weights over a time window, even though the cost function continues to steadily decline. In the case of evolutionary algorithm based network optimization, the point of convergence is interpreted as the position at which the entropy of weights is minimum that corresponds to the most uneven network weight distribution. The entropy used in our experiment is the non-extensive entropy with Gaussian gain that is non-additive when used in a summation. Experimental results indicate a quicker convergence of the optimization process in both instances, with the high accuracies of classification maintained. The network-weight-entropy based monitoring of both the gradient-based Back-Propagation and the gradient-free Particle Swarm Optimization algorithms is successfully tested on benchmark datasets from the UCI repository.

Oral Session 18: 11:45 – 13:25

Paper ID: 222

An Empirical Comparison of Intelligent Controllers for the Ball and Beam System

S. Raghvendra Rao (M S Ramaiah University of Applied Sciences, Bengaluru); Raghavendra V. Kulkarni (M S Ramaiah University of Applied Sciences, Bengaluru)

Proportional, integral and derivative (PID) and fuzzy logic controller (FLC) are remarkably successful. Metaheuristics, such as particle swarm optimization (PSO) are becoming popular in tuning PID parameters of control systems. Details of the development and the comparison of computationally intelligent controllers have been presented in this paper. A PSO-based PID controller (PSO-PIDC) and an FLC for the ball and beam system have been developed. Physical and mathematical models of the ball and beam system constructed for the empirical investigation have been presented. Further, PSO-FLC, a hybrid controller of PSO-PIDC and FLC has been proposed. The offline tuning precision of the PSO-PIDC and the online tuning capability of the FLC have been combined in the PSO-FLC. The comparative performance analysis shows that the PSO-FLC stabilizes the ball and beam system quicker than the other two controllers. This underscores its suitability for real-time dynamic control applications.

Paper ID: 228

Health Monitoring of Main Battle Tank Engine Using Mamdani Type Fuzzy Model

Gaurav Saraswat (IIT Kanpur, India); Seetaram Maurya (IIT Kanpur, India); Nishchal K. Verma (Indian Institute of Technology Kanpur, India)

Condition based monitoring has been developed to reduce the maintenance cost as also to enhance the effective operational life of the machine. Prognosis and Health monitoring is a two-pronged approach that enable us to achieve this objective by continuous monitoring of critical parameters affecting operability of the machine and effective prediction of residual life of the critical components. Prognosis is a key factor for effective logistic supply chain management that can ensure optimum utilization of available resources. Models based on ARIMA and Fuzzy Logic are used in this paper to forecast the degradation data of oil pressure of diesel engine of Main Battle Tank. The forecast data is then used to calculate the residual life of the engine. The ultimate aim of the paper is to suggest the better of the two models for forecasting based on experimental study using oil pressure degradation data.

Paper ID: 208

Aerodynamic Parameter Estimation Using TS Fuzzy Systems from Flight Data

Dhan Jeet Singh(Department of Electrical Engineering, Indian Institute of Technology Kanpur); Nishchal K. Verma (Department of Electrical Engineering, Indian Institute of Technology Kanpur); A K Ghosh(Department of Aerospace Engineering, Indian Institute of Technology Kanpur); Jitu Sanwale(Aircraft Upgrade Research and Design Centre, Hindustan Aeronautics Limited, Nashik); Appasaheb Malagaudanvar(Aircraft Upgrade Research and Design Centre, Hindustan Aeronautics Limited, Nashik)

This paper presents a methodology for aerodynamic modeling and parameter estimation of the aircraft using Takagi Sugeno (TS) fuzzy model. The aerodynamic model has multifold applications starting from design development to maintenance, development of flight control laws, capability enhancement and aircraft upgrade activities, etc. The aerodynamic modeling of modern aircraft is very difficult due to high degree of nonlinearity and cross coupling effects. The fuzzy logic based TS model proves as efficient approach to model the modern aircraft in presence of nonlinearity and cross coupling. In TS fuzzy logic system the nonlinear

dynamics of the aircraft are modeled based on fuzzy IF-THEN rules and each rule represents the locally linearized dynamics of the aircraft. The concept is demonstrated by using the recorded flight data of ATAS aircraft for modeling and estimation of yawing moment stability and control derivatives. The premise parameters of the model are obtained by Gustafson and Kessel (G-K) clustering algorithms. The rule consequent parameters are estimated by weighted least square method. Stability and control derivative coefficients are estimated by max product composition from fuzzy basis function with consequent parameters of all the fuzzy rules. Based on training data set the model is developed and by using separate test data set model is validated. The fivefold cross validation test for mean square error between model estimated yawing moment coefficients and actual yawing moment coefficients shows well suited modeling capability of the proposed TS fuzzy model.

Oral Session 19: 15:45 – 17:25

Paper ID: 295

A new computational approach to identify essential genes in bacterial organisms using Machine learning

Ankur Singhal (ABV-Indian Institute of Information Technology, Gwalior); Devasheesh Roy (ABV-Indian Institute of Information Technology, Gwalior); Somit Mittal (ABV-Indian Institute of Information Technology, Gwalior); Joydip Dhar (ABV-Indian Institute of Information Technology, Gwalior); Anuraj Singh (ABV-Indian Institute of Information Technology, Gwalior)

Essential genes are those genes of an organism that are required for growth to a fertile adult and pivotal for the survival of an organism. In this study, a new computational approach based on Machine learning method is designed, which can constructively project essential genes by integrating a broad variety of features. A set of 15 bacterial organisms as reference species have been used which have characterized essential genes. By applying 'Extreme Gradient Boosting (XGBoost)' for *Bacillus Subtilis* 168, the classification model resulted with the average AUC value of 0.9649 through tenfold cross-validation test. Further applying this new model to a distantly related organism- *Salmonella enterica* serovar Typhimurium LT2- resulted in a very definitive AUC value of 0.8608. To assess the stability and consistency of the proposed classifier, a different set of target organisms comprised of *Escherichia coli* MG1655 and *Streptococcus sanguinis* SK36 and another classifier based on PCR method was implemented. The performance for the model based on Principal component regression (PCR) method for both set of target organisms, resulted in lower AUC values. It shows that the newly designed feature-integrated approach based on XGBoost method results in better predictive accuracy to identify essential genes.

Paper ID: 274

Design of a Miniaturized Microstrip Patch Antenna for Triple-Band Operation in X, Ku and K band with Band-Notch Characteristics

Shailendra Dhakad(dept of EEE , BITS Pilani - Goa, India); Umesh Dwivedi(Amity University Rajasthan, India)

The paper proposes a novel compact microstrip patch antenna with high radiation efficiency and directivity alongwith an effective wide bandwidth of operation. The antenna designs are simulated and their performance are analyzed for different parameters like Return loss (S11), Voltage Standing Wave Ratio (VSWR), Current Distribution, and Farfield Radiation Plot on CST (Computer Simulation Technology Microwave Studio) software for a tri-frequency band operation in the X band (8-12 GHz), the Ku band (12-18 GHz) and the K-band (18-27 GHz) as per the specified IEEE standards.

Paper ID: 143

A New Heuristic for Degree-Constrained Minimum Spanning Tree Problem

Kavita Singh (National Institute of Technology Raipur); Shyam Sundar (National Institute of Technology Raipur)

The degree-constrained minimum spanning tree (DCMST) problem seeks a spanning tree T of minimum cost on a given connected, weighted and undirected complete graph in such a way that the degree of each vertex in T should not exceed d , where d is a positive integer. The DCMST is a NP-Hard problem for $d \geq 2$. This paper presents a new problem-specific heuristic (Heu_DCMST). Heu_DCMST first builds a feasible degree-constrained spanning tree (T) with the help of problem-specific knowledge of the DCMST problem, then it further tries to reduce the cost of T through edge-exchange. On a number of TSP benchmark instances, the proposed Heu_DCMST has been compared with the heuristic proposed by Boldon et al. [3] and demonstrates its effectiveness.

Paper ID: 265

SURF-MSER based 3D Mapping using RGB-D Camera on Automated Vehicle

AquibMustafa (Indian Institute of Technology Kanpur, India)

3D Map generation of unknown environment is one of the challenging task in the field of localization and mapping. Navigation of automated vehicles in unstructured environment faces such problem. This paper presents 3D Map generation with use of RGB-D camera placed on rotating platform mounted on vehicle. This arrangement enables 360 degree field of view for successive capturing of frames. SURFMSER algorithm is proposed in this paper for feature detection and matching between the frames. The RANSAC and RANSAC-ICP algorithm are further implemented for estimation of transformation matrix between frames for point cloud generation. Loop closure detection is then performed with K-Dimensional tree to establish complete 360 degree scene of environment. The developed 3D Map of environment is globally optimized with the use of sparse bundle adjustment algorithm. Results obtained for two different lab setup have been shown which demonstrate the effectiveness of proposed algorithm.

Oral Session 20: 15:45 – 17:25

Paper ID: 234

Feature learning using Stacked Autoencoder for Shared and Multimodal Fusion of Medical Images

Vikas Singh (Indian Institute of Technology, Kanpur); Nishchal K. Verma (Indian Institute of Technology Kanpur); Zeeshan Ul Islam (Visvesvaraya National Institute of Technology, Nagpur); Yan Cui (University of Tennessee Health Science Center, USA)

In recent years, deep learning has become a powerful tool for medical image analysis mainly because of their ability to automatically extract high-quality features from large training data. The current methods used for multiple modalities are mostly conventional machine learning, in which people use the handcrafted features which are a very difficult for the large training data. Deep learning which an advancement in the machine learning automatically is extract relevant features from the data. In this paper, we have used deep learning model for the multimodal data. The basic building blocks of the network are stacked autoencoder for the multiple modalities. The performance of deep learning based models with and without multimodal fusion and shared learning was compared. The results indicate that the use of multimodal fusion and shared learning help to improve deep learning based medical image analysis. Keywords: Machine learning, Multimodal learning, Deep learning, Autoencoder, Classification, Shared Learning

Paper ID: 205

Event Triggered Control for Trajectory Tracking by Robotic Manipulator

Ankur Kamboj (MNNIT Allahabad); Narendra Kumar Dhar (IIT Kanpur); Nishchal K. Verma (IIT Kanpur)

A day-by-day increase in applications of robotic manipulators has led to an era when a variety of tasks are expected with a consumption of least possible resources. One recent application is in cyber-physical space. Resource limitation is a problem, particularly when working in a cyber-physical architecture. With this in mind, aperiodic control techniques were introduced and developed upon. This was based on the fact that there always exists some redundancy in control signal generation which can be avoided. In this paper, we have introduced an event-triggered control technique for trajectory tracking by robotic manipulators. This technique is superior to a uniform-interval controller as control computations are done only at instances when the system needs attention. This event-triggered approach is applied to a learning-based incremental PID controller to demonstrate the simplicity in application. Simulation results show the effectiveness of the proposed methodology for trajectory tracking.

Paper ID: 245

Evaluation of Security Metrics for System Security Analysis

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One of the important phases of computer system security is to evaluate its security level. Increase in technology has brought more sophisticated intrusions with which the network security has become more challenging. Even though we know it is not practical to build a perfect secure system, it is important to quantitatively evaluate the security level of the system to protect it against many attacks. In many situations of security analysis, it is necessary to obtain the probability of success in an intrusion system. In order to evaluate the security measure, the SMC (semi-markov chain) is converted into DTMC (Discrete Time Markov Chain). Then the resulting DTMC is analyzed and the probability of the attacker success is computed based on mathematical theorems. The progression of an attacker over time is computed. The DTMC mathematical model is analytically solved to calculate the desirable quantitative security metrics, such as mean time to security failure and steady-state security. The proposed method shows a systematic application of the stochastic modeling techniques and concepts, which can be used frequently in the area of dependability evaluation, for attack process modeling and attack forecasting.

Paper ID: 312

Object Detection and Recognition using Small labeled Datasets

Akhilesh Raj (Indian Institute of Technology Kanpur, India); Nishchal K. Verma (Indian Institute of Technology Kanpur, India); Kanishk Gandhi (Indian Institute of Technology Kanpur, India)

Object detection and recognition is a vibrant research area in the computer vision community. Several methods that came into scenario of object detection and recognition are expensive. This paper proposes another methodology for the same. We use Selective Search algorithm for providing region proposals where there is good chance of finding the object. The method is based on segmenting and eventually merging regions with good similarities. In this paper, we also propose a method for object recognition with a small labeled dataset for training. We use effective methods of unsupervised pre-training to effectively train the network. This paper tries to recognize objects using Convolutional Neural Networks which are pre-trained using a sparse-autoencoder. The region proposals for the objects are forwarded to a Convolutional Neural Network for feature extraction and finally into a fully connected layer for classification.

Oral Session 21: 15:45 – 17:25

Paper ID: 280

A Comparative Analysis of Community Detection Algorithms on Social Networks

Pranav Nerurkar (Dept. of CE & IT, VJTI, Mumbai); Madhav Chandane (Dept. of CE & IT, VJTI, Mumbai); Sunil Bhirud (Dept. of CE & IT, VJTI, Mumbai)

Social networks display community structures of interest which have to be uncovered to understand the latent relationships present in them. These networks are composed of loosely connected small clusters whose structure is more convenient for analysis. Graph clustering algorithms have been developed to identify communities in real or artificial networks using structural characteristics of the network. Determining the efficiency of such techniques with respect to accuracy and computational time is an open question in the absence of a ground truth labels for the underlying communities as is seen in most real world situations. In this study, performance of eight state of the art graph clustering algorithms are demonstrated on small egocentric graphs, obtained from Facebook. The results are used for objective evaluation and a critical discussion is presented.

Paper ID: 159

Analysis of Weather Data Using Forecasting Algorithms

S.Poornima (SRM University, Chennai, India); Dr.M.Pushpalatha (Professor/CSE,SRM University, Chennai, India); J.Sujit Shankar(SRM University, Chennai)

Predictive analytics is the current focus not only on business applications, but also it emerges in all types of applications which involves in prediction of future outcomes. This results in the development of various prediction algorithms under the domain of machine learning, data mining and forecasting. This paper focus on analysis of the data pattern and its behavior using univariate forecasting model. Temperature is taken as the univariate observation from weather dataset and the forecast value is predicted using forecasting algorithms. The predicted forecast value is compared with real time data from which it is observed that level component plays a major role than trend and seasonal component in real time data and the predicted forecast value does not depend on size of the dataset.

Paper ID: 216

K-Data Depth Based Clustering Algorithm

Dr. Ishwar Baidari (Dept. of Computer Science, Karnatak University, Dharwad, Karnataka); Channamma Patil (Dept. of Computer Science, Karnatak University, Dharwad, Karnataka)

In this paper, we proposed a new data clustering algorithm based on data depth. In the proposed algorithm the centroids of the K-clusters are calculated using Mahalanobis data depth method. The performance of the algorithm called K-Data Depth Based Clustering Algorithm (K-DBCA) is evaluated in R using datasets defined in the mlbench package of R and from UCI Machine Learning Repository, yields good clustering results and is robust to noises. In addition, it detect coherent clusters after the data sets are affine transformed without changing a parameter. It is also tested for face recognition which yields better accuracy.

Paper ID: 164

Discovering topics, emotions, and exploratory analysis on Demonetization in India

*Mitodru Niyog (Government College of Engineering & Ceramic Technology, Kolkata, India);
Asim K. Pal (IIM Calcutta, India)*

Social media platforms contain great wealth of information which provides us opportunities explore hidden patterns, and understand people's satisfaction with what they are discussing. As one showcase, in this paper, we summarize the data set of Twitter messages related to recent demonetization of all Rs.500 and Rs.1000 notes in India and explore insights from Twitter's data. Our proposed system automatically extracts the popular latent topics in conversations discussed via LDA based topic model and also identifies the correlated topics across different categories. It also discovers people's opinions expressed through their tweets related to the event under consideration via the emotion analyzer. The system also employs an intuitive and informative visualization to show the uncovered insight. We use an evaluation measure, NMI, to select the best LDA models. The results show that the tool can be effectively used to extract discussion topics and summarize them for further manual analysis.

Oral Session 22: 15:45 – 17:25

Paper ID: 283

A Computational Intelligence Approach for Cancer Detection using Artificial Immune System

Nipun Suradkar (VJTI, Mumbai); Mihirraj Dixit (VJTI, Mumbai); Faruk Kazi (VJTI, Mumbai)

Artificial Immune System (AIS) is inspired by nature organic and biological immune system. These systems are exceptionally intelligent and computationally accurate. Thus they are able to handle massive amount of data in very short period of time. This paper initially proposes the algorithm and then describes the implementation of the proposed model for anomaly detection on the Wisconsin cancer dataset. The basic idea behind this research is to develop an AIS, which generates and procreates antibodies that can successfully ascertain the behavior of the system and detect the congenital and foreign anomalies (antigens). A new computational intelligence approach has been adopted to diagnose and improve the accuracy of the model. Various statistical and machine learning techniques like gradient descent, non-negative matrix factorization, cosine similarity rule, L 2 optimization reduce the complexity of a model. They train the model faster and reduce overfitting.

Paper ID: 120

Prediction of Blood Flow and Blood Pressure in Stenosed Coronary Arteries Using CFD

Pooja Jhunjhunwala (Visvesvaraya National Institute of Technology); Pramod Padol (Visvesvaraya National Institute of Technology); Shashikant Thombre (Visvesvaraya National Institute of Technology)

The main objective of this work is to assess the blood pressure and blood flow rate in stenosed coronary artery using CFD and develop a mathematical model to predict stenosis severity. Correlations for blood pressure and blood flow rate with area stenosis (AS) are included in this study. A healthy artery model and 15 coronary stenosis in three different stenosed models are analysed. The hemodynamic parameters computed through CFD are used to determine blood pressure and flow rate in stenosed models during systole and diastole. It is observed that stenosis severity is critical for % AS > 80%. CFD results are then mapped by standard curve fitting techniques to develop a mathematical model. A good and significant correlation between blood pressure and % area stenosis as well as between blood flow rate and % area stenosis is found. The developed mathematical model can be used as a easy to use and handy quantitative tool for preliminary diagnosis of Coronary Artery Disease by clinicians.

Paper ID: 246

Event Triggered Sliding Mode Control based Trajectory Tracking in a Cyber-Physical Space

Aniket K. Kar (IIT Kanpur); Narendra Kumar Dhar (IIT Kanpur); Nishchal K. Verma (IIT Kanpur)

Time triggered controllers have been developed for many trajectory tracking applications. The efficiency of controller plays an important role along with the accuracy of the tracking. Hence an event triggered sliding mode controller in a cyber-physical space is proposed in this paper. Event triggered approach reduces control efforts of the system as the control actions are generated only at specific occurrence of events and thereby reduces load on the communication network. The designed event triggered approach in a cyber-physical space is supported by the communication protocol to prevent system malfunctioning by delayed data packets. The developed controller along with the communication protocol is implemented for an automated guided vehicle model. The results obtained from event triggered approach are compared with time triggered controller. The results show the efficiency of the developed controller.

Paper ID: 297

Locational Marginal Price and Particle Swarm Optimization based Optimal Sizing and Placement of FACTS Device

SHIVAM VERMA (MAHARAJA AGRASEN INSTITUTE OF TECHNOLOGY); SARTHAK BHATIA (MAHARAJA AGRASEN INSTITUTE OF TECHNOLOGY); KHUSHBOO VERMA (AMBEDKAR INSTITUTE OF ADVANCED COMMUNICATION TECHNOLOGIES AND RESEARCH); ASIF IQBAL (PIRO Technologies Private Limited)

In this paper an approach for optimally sizing and placement of FACTS device is proposed. Transmission congestion cost is used to find the optimal location for FACTS placement while particle swarm optimization is used for the optimal sizing of FACTS device. The optimal size of the FACTS device is found by formulating a new objective which contains transmission congestion cost and real power losses of the network associated with a weight factor.

Simulation is carried out on IEEE 30 bus test system and results are compared for LMPs, Transmission Congestion Cost, and voltage profile of the network. The results thus obtained are very promising and can be used as a pricing strategy in deregulated environment.

Oral Session 23: 15:45 – 17:25

Paper ID: 221

Path Planning for Multiple Mobile Robots by Priority Assignment

Ram Kishan Dewangan(ABV – Indian Institute of Information Technology and Management, Gwalior, India); Anupam Shukla(ABV – Indian Institute of Information Technology and Management, Gwalior, India); W. Wilfred Godfrey(ABV – Indian Institute of Information Technology and Management, Gwalior, India);

Priority assignment in the multi robot path planning becomes a key challenge in the present situation. The motivation for the priority assignment is to utilize the search space for all the robots and minimize the overall path length. When the number of robots increases, the complexity also increases for the same search space. This paper gives the idea about how to assign the priority and choose the best minimum path length. The simulation results show the output performed and success rate of the robots.

Paper ID: 70

PCA and PLS Regression Used for ECG Signal Forecasting

Sarita Kansal (Medi-Caps Institute of Technology and Management, Indore, M.P., India); Prashant P. Bansod (Shri Govindram Sakseria Institute of Technology and Science, Indore, M.P., India); Abhay Kumar (Devi Ahilya University, Indore, M.P., India)

In multivariate analysis, dimension reduction is one of the major requirements when the number of independent variables is large and highly correlated. In such scenario, the Principal Component Analysis (PCA) and Partial Least Square (PLS) multidimensional reduction techniques are used to handle large number of variables in a better way. In this work, PCA and PLS regression are applied to forecast the ECG signals. The features of ECG signals are being extracted using DWT. These features are used in PCA and PLS regression for forecasting the heart rate of ECG signals. The performance of PCA and PLS techniques in regression are compared. The results are presented for ten records of ECG signals and it shows that, the variance of response variable is better defined by PLS regression with less number of components compared to PCA. Whereas the variance of predictor variables is better defined by PCA technique using small number of components compared to PLS, but the high forecasting accuracy is achieved by PLS regression method compared to PCA regression. It is evaluated by the measurement parameters R squared and Mean Square Error (MSE) for in-sample and out-of-sample data. It is observed that the multi-dimensional reduction technique PLS regression is more suitable than PCA regression for forecasting the heart rate of biomedical signal ECG.

Paper ID: 269

Rotation Invariant Descriptor for Disparate Images using Line Segments

Piyush Sahoo (IIT Kanpur); Teena Sharma (IIT Kanpur); Pooja Agrawal (IIT Kanpur); Nishchal K. Verma (IIT Kanpur)

In recent years, computer vision applications have extended to a very wide range, which in turn encompasses a large variety of situational images and videos. This paper modifies the Duality Descriptor (DUDE), which uses line point duality that provides simple consistent method of feature extraction. DUDE descriptor works very well for disparate image pairs, often outperforming most other methods with significantly less computation expenses. However, DUDE descriptor is not invariant to scale and rotation changes to the image, which is often vital for image processing in real time scenarios. This paper modifies the existing DUDE descriptor, making it invariant to rotation to a certain degree. The experiment has been performed for some real-time images of objects to show the viability of the proposed descriptor. Herein, multi-layered neural network is also used to verify the results in terms of percentage accuracy.

Paper ID: 255

Smartphone based Ubiquitous Data Sensing and Analysis for Personalized Preventive Care: A Conceptual Framework

Saurabh Singh Thakur (IIT Kharagpur); Ram Babu Roy (IIT Kharagpur)

The burden of chronic diseases is rising and it is causing increase in mortality rate, morbidity rate, and healthcare cost. To shift from sick care to preventive care is inevitable. The concept of eHealth is buzzing around for a considerable time but it is not utilized in preventive care. It inspires us to do a literature survey of some recent seminal research papers on ubiquitous data sensing and behavioral interventions to promote personal wellness. As the outcome of this survey, the research challenges and opportunities in this domain are presented. The possible research objective and research questions are enlisted which establish the future research direction in this field. Based on the knowledge gained from the survey analysis, a novel personalized behavior feedback-cum-intervention framework using smartphone based data sensing is presented.

Oral Session 24: 15:45 – 17:25

Paper ID: 95

Coarse Moving Object Segmentation Using Mixture of Gaussians on Block Motion Vectors

Manish Okade (Department of Electronics and Communication Engineering, National Institute of Technology (NIT), Rourkela, India); Gaurav M. Patel (Bhabha Atomic Research Center (BARC), Mumbai, India); Prabir K. Biswas (Department of Electronics and Electrical Communication Engineering, Indian Institute of Technology (IIT), Kharagpur, India)

This paper presents a novel coarse moving object segmentation method using mixture of gaussians on block motion vectors available in the compressed video bitstream. The block motion vectors are pre-processed by vector median filtering to minimize the effect of outlier motion vectors. The outliers occur in the bitstream due to noise as well as due to the encoder's priority on rate distortion optimization. The proposed method then models the orientation information of the block motion vectors using mixture of gaussians followed by an online approximation for model update. Evaluation of the gaussians is carried out to ascertain which of them correspond to the foreground objects by checking its variance. Since the variance of the moving object is expected to remain larger than the background, such motion vectors are identified by an ordering process. Experimental validation is carried out using block motion vectors obtained via Exhaustive Search Motion Estimation as well as motion vectors obtained from H.264 compressed video's to support our claim. Moving camera case is also considered by performing global motion estimation and compensation followed by application of the proposed segmentation method. Comparative analysis is carried out with existing compressed domain moving object segmentation methods to establish the proposed method.

Paper ID: 98

Analysis of transfer and residual learning for detecting plant diseases using images of leaves

Mr. Ines Khandelwal (Student, BITS Pilani, Department of Computer Science and Information Systems, Pilani Campus) ; Dr. Sundaresan Raman (Assistant Professor, BITS Pilani, Department of Computer Science and Information Systems, Pilani Campus.)

The study of plant diseases is critical for alleviating the problem of food security all over the world. The most critical step in mitigating this problem is the correct and appropriate timely identification of the disease. The first step in identification of a disease is visual inspection. The massive scale of this problem and lack of professionals creates a need for a automated accurate visual inspection technique. Recent advances in the field of Computer Vision, primarily through techniques such as use of Convolutional Neural Networks and Deep Learning have generated impressive results in the field of image classification and object recognition. In this paper, we address the problem of detecting plant diseases using images of leaves using different state of the art approaches. We use the Plant Village dataset comprising of 86,198 images of 25 crops across 57 classes (healthy and specific diseases). The images are of high quality and have been taken manually under appropriate lighting conditions. On this dataset, our model is able to attain a significantly high average accuracy of 99.374 % using transfer learning on state of the art models trained on the ILSVRC 2012 dataset having 1.2 million images across 1000 classes.

Paper ID: 192

An efficient approach for image haze removal in outdoor environment

Himanshu Dua (IIT Roorkee); Teena Sharma (IIT Kanpur); Pooja Agrawal (IIT Kanpur); Nishchal K. Verma (IIT Kanpur)

Computer vision applications in outdoor environment are mainly affected by factors such as pollution, clouds, shadow, haze, fog etc. Herein, an algorithm for real-time haze detection and removal in image has been implemented. For this purpose, the Dark Channel Prior technique is used which is efficient method for haze removal and also contains information about the level of haze in the image. Initially, Visibility Index of image frame is estimated to determine whether image is hazy or not using haze detection model. Thereafter, hazy images are processed with haze removal model to enhance the image visibility. The haze removal model uses guided filter to accelerate the process. Non hazy images do not require to process with haze removal model. The algorithm has been tested for four datasets i.e. non hazy, slightly hazy, medium hazy and heavily hazy. The proposed algorithm is performing well and also able to tackle the halo effects at some extent..

Paper ID: 223

Reduced Switching Loss Model of DPWM Based MPDTC of NPC Fed Induction Drive

Shivani Patidar (UIT RGPV, India)

In this paper model predictive control of three level inverter fed induction drive is investigated. The induction drive is fed with a space vector modulated three level neutral point clamped topology .The method proposes the prediction of the next voltage vector for the switching of the inverter. The voltage vector is selected from the prediction horizon and then the output is worked on the cost minimization function. The objective function based on the proposed scheme employs the discontinuous SVPWM which significantly reduces the switching loss by effectively using the zero switching discontinuities. The scheme shows a significant improvement in the torque, speed, switching loss and improved THD characteristics. The model predictive direct torque control method is a improved scheme that gives efficient controlling action to the drives industry improving the reliability.

Technical Sessions: December 8, 2017

Oral Session 25: 10:45 – 13:25

Paper ID: 254

Fuzzy Set Theoretic Similarity Measure for Finger Vein Image Retrieval

*Rose Bindu Joseph P (School of advanced sciences, VIT University, Vellore, India);
Devarasan Ezhilmaran(School of advanced sciences, VIT University, Vellore, India)*

Finger vein recognition is explored extensively in the modern era as a competent biometric. The uncertainties and ambiguities in finger vein image retrieval can be handled more efficiently using fuzzy theory based techniques. In this paper, a fuzzy set theory based image

retrieval is proposed for finger vein images. After assigning fuzzy membership values to grey level histogram of images, the images similar to the query image are retrieved from the database based on a fuzzy similarity measure using Einstein T norm. Performance of the proposed method is evaluated in terms of recall and precision rates.

Paper ID: 314

Development Of A Hybrid Algorithm Using Swarm Algorithms And Implementing It On Images To Detect The Health Of An Apple

Dr.Lavika Goel (BITS Pilani);Faizan Mushtaq (BITS Pilani);Charu Tak (BITS Pilani)

There has been increasing research in developing newer optimization techniques that could scale to multiple number of problems. In this scenario, we try to develop a hybrid metaheuristic algorithm taking help of the algorithms like MFO[1], GSA[2] and Tabu Search[3] whose random initialization and subsequent exploration of the search space help us in effective convergence and finding the most optimal solution obtained. We tested our hybrid

algorithm on standard 20 benchmark functions which showed very promising results, we also put to use our hybrid algorithm in improving the segmentation of apples in which is then used to classify apples into desired classes and detect the health of the product by various classification algorithms. Keywords: Swarm Algorithms, Moth Flame Optimization, Segmentation, K-

Means

Paper ID: 129

Batch Mode Active Learning Based Superpixel Library Generation for Very High Resolution Aerial Image Classification

Rajeswari Balasubramaniam (INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY); SRIVALSAN NAMBOODIRI (INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY); Rama Rao Nidamanuri (INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY); Gorthi R.K.Sai Subrahmanyam (INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI)

In this paper we propose an active learning based object training library generation for a multi-classifier Object Oriented Image Analysis (OOIA) system. Here an optimised training library of objects (superpixels) is generated based on a batch mode Active Learning (AL) approach. A softmax classifier is used as a detector in this method which helps in determining the right samples to be chosen for library updation. Also we construct a multi-classifier system with max-voting decision for pixel level classification. This algorithm was applied on 3 different very high resolution airborne datasets, each with varying complexity in terms of variations in geographical context, sensors, illumination and view angles. Our method empirically outperforms the traditional OOIA by producing equivalent accuracy with a training library with reduced number of samples. Even on the most heterogeneous dataset its performance in terms of accuracy is around double the performance of the traditional method.

Paper ID: 273

Approximation and Updation of Betweenness Centrality in Dynamic Complex Networks

Anurag Singh (NIT Delhi)

A large network is frequently evolves in nature, hence, it is necessary to update the betweenness centrality efficiently. It is hard to find a network with static size. To calculate, betweenness centrality for the evolving network is a non-trivial task due to high complexity. The betweenness centrality of all the nodes should be recomputed. Brendes proposed an algorithm for calculating updated betweenness centrality for the static networks with complexity, $O(nm)$. A method \$QUBE\$ was proposed which efficiently reduces the search space by finding candidate set of nodes and compute the betweenness centrality of the candidate nodes whose betweenness centrality need to be updated when any edge/node is inserted/deleted in the network. We have proposed a new algorithm which updates the betweenness centrality. It is found that the time complexity of proposed algorithm is lower than the existing algorithms.

Paper ID: 226

Trajectory tracking of Quad rotor UAV using Fractional Order PID controller

Heera Lal Maurya(IIT Kanpur); L Behera(IIT Kanpur); Nishchal K. Verma(IIT Kanpur)

Many real dynamic systems are better characterized using non integer order dynamic model. The concept of fractional calculus has tremendous potential to control the systems behavior. The quad- rotor control problem presents a test bed for developing and testing new control design methodologies. Fractional order controllers are being widely used to achieve robust performance of nonlinear system. These approaches provide greater flexibility in designing of controllers for non- linear time varying systems, systems with large time delay and systems which can not be modeled perfectly. In this paper fractional order PID control approach for position control of quad-rotor UAV is proposed. The dynamic model of quad-rotor is formulated using Newton Euler's approach. The performance of designed fractional order PID approach has been successfully analyzed through simulations of trajectory tracking. The genetic algorithm(GA)has been used to obtain optimal parameters of fractional order PID controller for the desired system specifications.

Paper ID: 140

Personalized Automation of Electrical and Electronic Devices Using Sensors and Artificial Intelligence- 'The Intelligizer System'

Anish Batra (Department of Information Technology, Maharaja Surajmal Institute of Technology); Guneet Singh Sethi (Department of Information Technology, Maharaja Surajmal Institute of Technology); Dr. Suman Mann (Department of Information Technology, Maharaja Surajmal Institute of Technology)

This project is an initiative to automate the functions of any environment. The basis of this project is gaining experience about each device in the environment through both ideal and personalized scenarios. The system consists of various modes. The AI system runs an algorithm which creates a mixture of both scenarios giving personalization to the user and saving electricity via the judicious use of the devices. The system is wireless and can work with or without the use of the internet. The communication is based on radio transceivers and Wi-Fi. The brain or a microprocessor controls and communicates with all devices through the microcontroller. The controller sends sensor values to the processor like what we sense, is sent to the brain for detection. Then the microprocessor sends back the action or the function of the device analogous to our brain sending actions to our limbs to operate. Wherein, the decision is taken intelligently using Artificial Neural Networks in AI mode, sensors in Ideal mode and user values in user Mode. Therefore, the system continues to function even if the sensors are rendered useless. Thus, a complete and intelligent system is formed which can operate in various environments such as homes, offices, streets, etc. The accuracy of AI system is 84.37%

The electricity consumption was reduced by 16.07% after a month's deployment.

Oral Session 26: 10:45 – 13:25

Paper ID: 195

Reasoning for Uncertainty and Rough Set based Approach for an Efficient Biometric Identification: An Application Scenario

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In the theory of knowledge discovery, two fundamental concepts are classification and categories. Some of the specific categories may be definable inside one set of knowledge but they may be undefinable into another knowledge base. This paper contains significant rough membership functional properties, which are utilized in approximation reasoning of an uncertain and vague concept in a knowledge base. In this paper, we have employed the Indicator Function and performed the reasoning for uncertainty, specifically for the rough membership properties of union and intersection. Along with this, we have utilized Rough set theory and proposed an approach for an efficient biometric identification. The complexity and efficiency analysis of our proposed approach is also presented in this paper.

Paper ID: 196

An Optimization of Phi-function for Convex Polygons

Anit N. (NIT Puducherry), Narendran Rajagopalan (NIT Puducherry)

Cutting and packing (C&P) problems have gained the attention of geometrical researchers for the past few decades given its applications in a wide variety of industries. Phi-function is a popular tool used in solving these problems. Phi-function for convex polygons is explored in detail in this work. After analysis of the existing equations, it was found that the function yielded same output for different input sets of varying separation among convex polygons. The reason for this anomaly was found and a mitigation strategy is also suggested. Consequently a more accurate phi-function for convex polygons is proposed that addresses the above case and gives better result.

Paper ID: 261

Multimodal Medical Image Fusion Based on Fuzzy Sets with Orthogonal Teaching Learning Based Optimization

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The objective of image fusion for medical images is to combine multiple images acquired from different bases into a single image appropriate for better diagnosis. Most of the state-of-the-art image fusing techniques are based on non-fuzzy sets, and the fused image so obtained lags with complementary information. Fuzzy sets are strong-minded to be more appropriate for medical image processing as more hesitations are considered compared with non-fuzzy sets. In this paper, a procedure for efficiently fusing multimodal medical images is presented. In the proposed method, images are initially converted into intuitionistic fuzzy images (IFIs), and a new objective function called intuitionistic fuzzy entropy (IFE) is employed to attain the finest value of the parameter in membership and non-membership functions. Next, the IFIs are compared using the fitness function, entropy. Then, orthogonal teaching learning based optimization (OTLBO) is introduced to optimize fusion coefficients, which will be changed under teaching phase, and learner phase of OTLBO, so that the weighted coefficients can be automatically adjusted according to fitness function. Finally, the fused image is achieved using optimal coefficients. Simulations on several pairs of multimodal medical images are performed and matched with the current fusion approaches. The dominance of the proposed technique is presented and is justified. Fused image quality is also verified with various quality metrics, such as spatial frequency (SF), entropy (E), feature mutual information (FMI), and computation time (CT).

Paper ID: 311

COMPARISON OF GA, ACSA & PSO FOR OPTIMAL ALLOCATION AND SIZING OF DG's IN DISTRIBUTION NETWORK

S. Vijender Reddy (Assistant professor(c), Department of Electrical Engineering, University College of Engineering (A), Osmania University, Hyderabad, Telangana- India); Dr. M. Manjula, Professor (Department of Electrical Engineering, University College of Engineering (A), Osmania University, Hyderabad, Telangana- India)

The aim of this paper is optimal allocation and sizing of Distributed Generation (DG) in distribution network to reduce losses and improving voltages at each bus of network. The Genetic Algorithm (GA), Ant Colony Search Algorithm (ACSA) and Particle Swarm Optimization (PSO) are the Artificial Intelligent (AI) techniques. These Artificial Intelligent techniques are applied in distribution network for optimal allocation and sizing of Distributed Generation (DG). The GA, ACSA and PSO are implemented on MATLAB software. The optimal allocation and sizing of DG's are applied on IEEE-85 bus distributed network. In this paper 10 DG's are allocated on IEEE-85 bus distribution network using GA, ACSA and PSO. The performances of GA, ACSA and PSO are compared.

Paper ID: 319

Inspection repair based availability optimization of distribution system using Bare Bones Particle Swarm optimization

Dr. Aditya Tiwary (Associate Professor, Electrical & Electronics Engineering Department, Institute of Engineering & Science, IPS Academy, Indore)

Maintenance is the crucial part for any engineering systems. The performance of engineering systems can be improved by proper maintenance at proper interval of time. In view of the above, in this paper Bare Bones Particle Swarm optimization (BBPSO) based technique is developed for optimizing inspection and repair based availability of distribution systems. The technique is proposed for evaluating the optimum time duration between two inspections for each feeder section of the distribution system with respect to cost function. The result obtained by BBPSO is compared with results of different variants of PSO such as basic Particle Swarm optimization (PSO), Evolutionary Particle Swarm optimization (EPSO) and Adaptive Particle Swarm optimization (APSO). The developed algorithm has been implemented on radial and meshed distribution systems.

Paper ID: 151

Computational Intelligence for Localization of Mobile Wireless Sensor Networks

Vaishali R. Kulkarni (Department of Computer Science and Engineering, M S Ramaiah University of Applied Sciences, Bengaluru, India); Veena Desai (Department of Electronics and Communication Engineering, KLS Gogte Institute of Technology, Belagavi, India)

The localization of mobile nodes in wireless sensor networks has been formulated as a concave optimization problem. The same has been approached through biologically-inspired firefly algorithm (FA) and the artificial bee colony (ABC) algorithm. In the proposed method, a mobile node approximates its distance from multiple anchor nodes. The distance and the coordinates of the anchors are the parameters used by FA and ABC algorithms for the accurate estimation of the location by minimizing the suitably defined localization error. The localization method used here is iterative and it works in a distributed fashion. A comparison of the performances of FA and ABC algorithms in terms of localization accuracy and computation time has been presented. FA exhibits higher accuracy of localization while ABC is quicker.

Oral Session 27: 10:45 – 13:25

Paper ID: 264

Solving Rubik's Cube Using Graph Theory

Chanchal Khemani (Veermata Jijabai Technological Institute, Mumbai); Jay Doshi (Veermata Jijabai Technological Institute, Mumbai); Juhi Duseja (Veermata Jijabai Technological Institute, Mumbai); Krapi Shah (Veermata Jijabai Technological Institute, Mumbai); Sandeep Udmale (Veermata Jijabai Technological Institute, Mumbai); Vijay Sambhe (Veermata Jijabai Technological Institute, Mumbai)

The most common application of graph theory is search problems. Using graph theory this project aims to solve one such NP Hard problem i.e. finding a path for a Rubik's cube to reach the solved state from a scrambled one. Rubik's cube is amongst one of the fascinating puzzles and solving them has been a challenge given its vast search space of 43 quintillion. This paper aims at demonstrating the application and performance of traditional search algorithms like breadth first search, depth first search, and bidirectional search and proposes a new approach to find the solution by integrating them. The proposed algorithm makes use of the fact that the God's number for a 3x3x3 Rubik's cube is 20 i.e. the fact that any cube scramble within the 43 quintillion states can be solved within a max of 20 moves.

Paper ID: 285

Multiobjective Virtual Machine Selection for Task Scheduling in Cloud Computing

Ketaki Naik (Department of Computer Science & Engineering, Sathyabama University, Chennai, India); G. Meera Gandhi (Department of Computer Science & Engineering, Sathyabama University, Chennai, India)

In the cloud Infrastructure as a Service (IaaS) environment, selecting the Virtual Machines (VM) from different data centers, with multiple objectives like reduction in response time, minimization in cost and energy consumption, is a complex issue due to heterogeneity of the services in terms of resources and technology. The existing solutions are computationally intensive; rely heavily on obtaining single trade-off solution by aggregating multiple objectives in a priori fashion which inversely affects the quality of solution. This article describes the new hybrid multiobjective heuristic algorithm based on Non-Dominated Sorting Genetic Algorithm- II (NSGA-II) and Gravitational Search Algorithm (GSA) called as NSGA-II & GSA to facilitate selection of VM for scheduling of an application. The simulation results show that the proposed algorithm outperforms and fulfils the prescribed objective as compared to other multiobjective scheduling algorithm.

Paper ID: 249

Railway Corridor Monitoring using Deep Drone Vision

Sushanth Ikshwaku (B.M.S College of Engineering); Amrutha Srinivasan (B.M.S College of Engineering); Ashley Varghese (Embedded Systems and Robotics, TCS Research); Jayavardhana Gubbi (Embedded Systems and Robotics, TCS Research)

The emergence of low cost commercial drones fitted with a camera are ideal platforms for remotely monitoring critical assets such as railway corridor. The proposed system employs drones to automate and make the process efficient. In this paper, a railway monitoring system capable of detection and classification of various railway related infrastructure such as lines, ballast, anchors, sleepers and fasteners using visual images captured by a drone is proposed. The first stage of classification uses a deep network that helps in qualifying the presence of track in a given frame. The second stage helps in classification of objects within a frame for further analysis. Two different deep architectures are used in classification of railway infrastructure - the first for offline analysis that uses transfer learning using a pre-trained GoogLeNet model and the second approach that uses a new architecture for embedded implementation. Transfer learning results in an overall f-score of 89% and the new architecture results in an overall f-score of 81% with at least 10x reduction in parameters.

Paper ID: 233

Multi-faced Object Recognition in an Image for Inventory Counting

Teena Sharma (IIT Kanpur); Shreedharkumar D. Rajurkar (IIT Kanpur); Nikhil Molangur (IIT Bhubaneswar); Nishchal K. Verma (IIT Kanpur); Al Salour (The BOEING Company, St. Louis, USA)

Herein, an approach is presented to count objects in an image with different viewpoints. The multiple views of prototype have been used to get the viewpoint invariance in Speeded Up Robust Feature. For each view, presence of multiple instances in the scene image is investigated by matching the SURF features. If matches present, localization of instance is done in scene by generating a bounding box using homography. False matches are removed by computing correlation coefficient between transformed prototype and region of interest in scene. Different views of same prototype leads to multiple bounding boxes representing same object instance in scene. A supervised learning approach is used for classification of bounding boxes representing same instance. Hence, bounding boxes are grouped. Finally, a single bounding box which best describes an instance is chosen. The proposed algorithm is able to count objects for different viewpoints with better accuracy in multiple cases.

Paper ID: 237

Detection of Dust Deposition using Convolutional Neural Network for Heritage Images

Teena Sharma (IIT Kanpur); Pooja Agrawal (IIT Kanpur); Nishchal K. Verma (IIT Kanpur)

This paper presents a vision-based approach for heritage image classification and condition monitoring to preserve the historical facts. The proposed approach uses Convolutional Neural Network for classification. The approach interprets the heritage condition in terms of dust level. Initially, real-time scene image is pre-processed using image processing operators such as dilation, erosion, region filling and binarization. Resultant image is segmented and

enclosed by bounding boxes. The enclosed segments fed to CNN for classification. The proposed approach also provides the dust level in image by comparison of probability score of the classified image with ideal one. The dust is interpreted as gaussian noise in the image. The dust level, greater than an acceptable tolerance level, generates a notification for heritage maintenance. Results show that the proposed approach is able to classify the heritage image in presence of noise.

Paper ID: 235

Convolutional Neural Network with Stacked Autoencoder for Kernel Initialization

Vikas Singh (IIT Kanpur); Anirudh Swaminathan (National Institute of Technology Trichy, India) ; Nishchal K. Verma (Indian Institute of Technology Kanpur, India)

In recent years, Convolutional neural networks have gained popularity in the area of image processing, machine translation, speech recognition, object detection and many other tasks. The data generated in all these areas are very large and there are a large number of samples along with a large number of attributes. Areas like Bioinformatics have a large amount of data, but face the problem of a small number of samples with a large number of attributes. In all these applications, initialization plays a better role for better generalization of the network. In this paper, we have proposed a new initialization method in which the weights learned by each Autoencoder hidden layer acts as the initial kernel (filter) weight of each Convolutional neural network layer. The result of the proposed method is compared with random initialization of the kernel weights. The results show that the proposed method performs comparably to random initialization.

Oral Session 28: 10:45 – 13:25

Paper ID: 230

Face Image Super-resolution using Differential Evolutionary Algorithm

Shyam Singh Rajput (Multimedia and Information Security Research Group, ABV- Indian Institute of Information Technology & Management, Gwalior, India); K. V. Arya (Multimedia and Information Security Research Group, ABV- Indian Institute of Information Technology & Management, Gwalior, India); Vijay Kumar Bohat (Multimedia and Information Security Research Group, ABV- Indian Institute of Information Technology & Management, Gwalior, India)

Image resolution enhancement plays the vital role in many real-world applications. In this work, a novel attempt toward the enhancement of the quality and resolution of the input low-resolution images using evolutionary algorithms has been made. The proposed image super-resolution (ISR) framework utilizes the Differential Evolution (DE) algorithm for minimizing least square estimation problem to obtaining the optimal reconstruction weights. To show the effectiveness of the proposed ISR framework experiments are performed on widely used public FEI dataset. The simulation results exhibits that the proposed framework outperformed the two very popular methods.

Paper ID: 232

Noise Robust Low-Resolution Face Recognition using SIFT Features

K. V. Arya (Multimedia and Information Security Research Group, ABV- Indian Institute of Information Technology & Management, Gwalior, India); Shyam Singh Rajput (Multimedia and Information Security Research Group, ABV- Indian Institute of Information Technology & Management, Gwalior, India); Shambhavi Upadhyay (Manipal University, Karnataka, India)

In many everyday life applications the captured images are of blurry, noisy, and small in size can be called as low-resolution images which makes the task of face recognition very challenging. To minimize this problem in this a new scale invariant feature transformation (SIFT) descriptors based noise robust low-resolution face recognition model is developed in this work. Due to the robustness of the SIFT descriptors against blur, in this work SIFT features are utilized for the purpose of features extraction and matching. The results obtained from the experiments performed on two public JAFFE and ORL face databases show that the proposed face recognition model works better than the existing algorithms for low-resolution face images.

Paper ID: 259

Low-dose CT Image Reconstruction using Complex Diffusion Regularization

Kavkirat Kaur (Thapar University, Patiala, INDIA); Shailendra Tiwari (Thapar University, Patiala, INDIA)

The Computed Tomography (CT) is considered as a significant imaging tool for the clinical diagnosis. Due to the low-dose radiation in the CT, the projection data is highly affected by the Gaussian noise. Thus, there is a demand of a framework that can eliminate the noise and provide high-quality images. This paper presents a new statistical image reconstruction algorithm by proposing a suitable regularization method. The proposed framework is the combination of two basic terms namely data fidelity and regularization. Minimizing the log likelihood gives data fidelity term, which represents the distribution of noise in low dose X-Ray CT images. Maximum likelihood expectation minimization algorithm is introduced as a data-fidelity term. The ill-posedness problem of data fidelity term is overcome with the help of complex diffusion filter. It is introduced as regularization term into the proposed framework that minimizes the noise without blurring edges and preserving the fine structure information into the reconstructed image. The proposed model has been evaluated on both simulated and real standard thorax phantoms. The final results are compared with the other standard methods and it is analyzed that the proposed model has many desirable properties such as better noise robustness, less computational cost, enhanced denoising effect.

Paper ID: 270

MatConvNet based Fast Method for Cervical MR Images Classification

Gyanendra Kumar Verma (NIT Kurukshetra); Ankur Kaushal (NIT Kurukshetra)

The Deep Convolutional Neural Network (CNN) has been successfully used to obtain high level representation in various applications of computer vision problems. However, in the field of medical imaging there are not sufficient images available to train a deep CNN. Therefore, we have used a pre-trained deep CNN model for classification of cervical cancer MR images. In this paper, we have proposed MatConvNetbased CNN model to extract features from pre-trained CNN for classification. The vgg-f architecture deployed to extract the image features. We have evaluated our proposed system with benchmark cervical cancer database obtained from TCIA (Tumor Cancer Imaging Archive). We got the promising result with 98.9% accuracy that is beyond the methods reported in the literature.

Paper ID: 114

Periocular & Fingerprints Biometrics Recognition using Watermarking in an ICA

Nirgish Kumar (Research Scholar, Faculty of Engineering, Rama University, Kanpur); Dr. Vivek Srivastava (Dean, Faculty of Engineering, Rama University, Kanpur); Mrs. Komal A.P (Faculty of Engineering, Rama University, Kanpur)

Periocular & Biometrics provides a secure method of authentication and identification Unique identifiers include fingerprints, earlobe geometry hand geometry, retina and voice waves iris patterns, DNA, and signatures. In this paper we utilize Digital watermarking for people in general water stamping, clients of the substance are approved to recognize the watermark. It is the way toward concealing the mystery information behind any two pictures. This paper contains procedure of DCT is the one of pressure method for concealing the pictures behind cover pictures and mystery picture and to expand the nature of the pictures of retina and fingerprint pictures determination utilizing MATLAB. The steganographic watermarking is the procedure, where content clients are uninformed of the nearness of watermark. The legitimacy procedure and controlled by a client and coordinated into a database give another measurement of security against extortion, distortion, and duplication. As a result of moral programmers now a days a vast gap in system security.

Paper ID: 315

Dimensionality Reduction Based Breast Cancer Classification Using Machine Learning

Kuhu Gupta (Department of Information Technology, National Institute of Technology,Raipur); Rekh Ram Janghel (Department of Information Technology, National Institute of Technology,Raipur)

In the field of medical science, achieving accurate diagnosis of disease before its treatment is a significant obstacle. A lot of tests are available which not only complicates the diagnostic process but also finds difficulty in deriving results. Therefore, computational diagnostic techniques must be introduced with the support of artificial intelligence and machine learning. Breast cancer, being one of the second leading cause of deaths in women worldwide, demands terminal diagnosis with the higher degree of accuracy. In this proposed work, the primary purpose is to establish and contrast the integrated approaches involving dimensionality reduction, feature ranking, fuzzy logic and neural networks for the diagnostic evaluation of breast cancer namely, benign and malignant. However, the adopted approach

has been successful in giving the optimal performance to a greater extent, but a maximum accuracy of 96.58% is obtained by the use of principal component analysis and back propagation neural network.

Oral Session 29: 10:45 – 13:25

Paper ID: 268

Auto-encoding Convolutional Representations for realtime eye-gaze detection

Tharun Reddy (Indian Institute of Technology Kanpur); Prof Laxmidhar Behera (IIT Kanpur)

Several real life applications like driver drowsiness detection systems, lie-detector systems (Eye-accessing cues) are based on gaze direction of human eyes. Estimated Gaze-direction is an indication of user's region of focus in space. In this work, we present a real time eye-gaze detection pipeline on Eye-Chimera database. Facial landmarks are used to detect face regions accurately, and we do provide a custom modification of Viola-Jones algorithm for eye region localization. The obtained eye-regions dataset is fed to CNN models for training. Further, the obtained CNN features from the trained models have been fused using an auto-encoder. This idea is not much explored in the literature which was much recommended in the AlexNet paper by Krizhevsky et al. 2012. Results demonstrate statistically significant ($p < 0.01$) improved classification performance than the recently proposed methods on this database.

Paper ID: 290

Hausdorff distance based Binary Search Tree multiclass decomposition algorithm

Rahul K Sevakula (IBM India); Nishchal K. Verma (Indian Institute of Technology Kanpur, India)

Multiclass decomposition algorithms are the means by which binary classification algorithms like Support Vector Machine are used for multiclass classification problems. The popular multiclass decomposition algorithms like one against one (OAO), one against all (OAA) etc. perform the decomposition in a naive manner. This paper presents a novel heuristic based decomposition algorithm that takes the Hausdorff distance between two classes to decide the decomposition. The presented algorithm has been evaluated and compared against OAO and OAA methods across 9 datasets. The comparison shows that presented method not only provides comparable performance, but also in most cases can classify the test samples with fewer average number of support vectors; thus leading to faster test performance.

Paper ID: 72

Motion Direction Code - A Novel Feature for Hand Gesture Recognition

Bhumika Pathak (GLA University); Anand Jalal (GLA University)

Hand movements make the most important aspect in identifying a hand gesture. We present a novel feature for analyzing the trajectory of the hand while performing the gesture. The proposed feature, called the Motion Direction Code (MDC) returns a unique code which

represents, in sequence, the direction of the hand motion while performing a hand gesture. Since the directions of hand motion are retained even if gesture is performed by different users, it ensures user independence. This feature combined with other hand shape features provides efficient results for a user independent system for hand gesture recognition in Indian Sign Language.

Paper ID: 318

Human Fall Detection System over IMU sensors using tri-axial accelerometer

Shubham Ranakoti (PEC University of Technology); Shagneet Arora (PEC University of Technology)

A sudden increase in the number of deaths over the past few years by slipping and falling, especially that of patients in the hospitals and aged people at homes is a serious concern and calls for the need of an autonomous system for detection of fall and alerting caretaker in case of emergency. We propose an algorithm which derives features from an input stream of data sensed from inertial measurement unit sensors and use them in learning of our system and further, providing it with the capability of classifying a sequence into either fall or activity of daily living sequence implemented using support vector machine, one of the machine learning algorithm. We propose a space and time efficient system, minimizing its cost by using only 3-axial accelerometer as sensor. Choice of type and number of features along with their operational complexity is a crucial factor in our system. Performance analysis is done by first training our system and then testing its accuracy in classifying test sequences using machine learning algorithm.

Paper ID: 257

A Virtual Reality Therapy for Autism Spectrum Disorder

T.Manju(Assistant Professor, Department of Information Technology, Thiagarajar College of Engineering, Madurai); Dr.S.Padmavathy (Associate Professor, Department of Computer Science and Engineering, Thiagarajar College of Engineering, Madurai); Dr.D.Tamilselvi(Assistant Professor, Department of Information Technology, Thiagarajar College of Engineering, Madurai)

Virtual reality is a technology that simulates real environment into artificial which allows user to interact with the particular virtual environment. Virtual environment gives sensory experience includes sight, touch, hearing, and smell. The immersive environment will be similar to the real world in order to create a lifelike experience. Its applications include Education, Medicine, Military, aerospace, etc. Autism Spectrum Disorder is a neuro - developmental disorder that deficits in social communication and social interaction. It can be identified by repetitive patterns of behavior, interests or activities. To overcome this various conventional therapies are available. But it does not produce positive or better results. So we proposed a novel therapy using virtual reality to enhance the social skills, emotions and attention of the Autism child. The virtual environment is designed in such a way that to train the autistic child so that they will come out from attention lack, interaction lack and lack in emotion identification. This virtual environment includes color lights and sounds to measure

the attention grasping. It is analyzed using head movements. It also includes avatars to increase social interactions by just traveling along with that avatar. It is measured by facial expression recognition. It also includes logical and analytical training to increase their skill set. The proposed novel virtual reality therapy produces positive results over repetition at each level of tasks.

Paper ID: 247

Automatic ECG Signals Recognition based on Time Domain Features Extraction using fiducial mean square Algorithm

*VIJENDRA V (Center for PG Studies, Visvesvaraya Technological University, BELAGAVI);
MEGHANA KULKARNI (Center for PG Studies, Visvesvaraya Technological University,
BELAGAVI)*

Prototyping of ECG correlation using beat morphology which involves Automatic beat classification is essential for the critical conditioned patients suffering from heart attacks. There are various pattern recognition for the automatic diagnostics of ECG beat abnormalities. The ECG signals are used to recognize heart related diseases. The proposed method defines the time domain feature Extraction using fiducial mean Square Algorithm uses PhysioNet database as source as well Clinical data for Comparison. The butter worth filter is used to enhance quality of ECG signals by removing baseline interference. The 1D-Lift DWT is applied on ECG signals to convert time domain into frequency domain signals. The adaptive Threshold technique is used to remove low amplitude ECG signals to identify peaks of ECG signals. The inverse DWT is used to convert spatial domain to time-frequency domain.

Oral Session 30: 10:45 – 13:25

Paper ID: 96

Fog Computing based autonomic security approach to Internet of Things applications

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Internet of Things (IoT) security continues to be a serious problem as the number of connected devices massively increasing day by day. Autonomic security approaches are required for IoT applications to handle the exponentially growing attacks generated from the increasing number of connected devices. With the limited computational and storage capabilities of IoT devices, it is difficult to implement autonomic capability at each devices. Hence fog computing can be used to provide autonomic security characteristics to IoT applications. The proposed fog computing based security approach has (1)Attack forecasting Module based on Gaussian process regression model (2)Attack detection module using cognitive approach and correlation analysis (3)Fuzzy based incident response module to

handle the attacks. The experimental results proves the effectiveness of the proposed approach in terms of detection accuracy and detection time.

Paper ID: 243

Improved EMD Local Energy with SVM for Fault Diagnosis in Air Compressor

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The data generated from the machines are generally non-linear and non stationary in nature. Extracting relevant information from the data plays a major role for the fault diagnosis. This paper propose feature extraction technique using improved Empirical Mode Decomposition local energy. Relevancy of feature is examined by correlation method. Support vector machine is used for classification of features. The proposed approach is compared with full signal energy using Hilbert transform on EMD. Improved Empirical Mode Decomposition is used for decomposing acoustic signal into intrinsic mode function in lesser time compare to conventional EMD. Acoustic signals are acquired from most sensitive position of air compressor. Although acoustic signal based machine health monitoring has not been applied to same extent as vibration signal. In this paper acoustic signal has been used because of its advantage. The experimental results show the acceptable levels of average accuracy.

Paper ID: 149

Self-Adaptive Frequent Pattern Growth based Dynamic Fuzzy Particle Swarm Optimization for Web Document Clustering

RAJA VARMA PAMBA (MAHATMA GANDHI UNIVERSITY, LBS INSTITUTE OF TECHNOLOGY FOR WOMEN); ELIZABETH SHERLY(IITMK); KIRAN MOHAN(OPP)

Web documents being dynamic and vague, any system to cluster these documents needs to be self-adaptive to these dynamic situations. For this the system requires the capability of capturing dynamicity. Dynamicity takes into account any changes happening in the search space. If any new potential solution arises the system needs to identify and reinitialize the particle lists to the newly updated potential solutions. The traditional particle swarm optimization fails in accounts of convergence speed and maintaining diversity. The experimental results for the proposed algorithm shows that frequent pattern growth based dynamic fuzzy particle swarm optimization algorithm performs better than existing conventional approaches in matters of convergence speed and in maintaining diversity.

Paper ID: 153

A Feature Reduced Discretized Random Forest Model for Oral Bioavailability Data Classification

Priyanka Shit (Indian Institute of Technology (ISM) Dhanbad); Haider Banka (Indian Institute of Technology (ISM) Dhanbad)

Oral bioavailability is the measurement of the fraction of admissible drug which reaches the site of action in unchanged form. It is one of the principal pharmacokinetic properties and can be predicted in an early phase of drug discovery and development process. Various computational methods have been used for predicting oral bioavailability of a drug candidate in the literature, which select most effective drug candidates from the huge set of the compounds to reduce the cost factor of clinical trials. In this study, we have classified chemical compounds into high (Fractional Absorption $F\% \geq 50$) and low (Fractional Absorption $F\% < 50$) oral bioavailability values using physicochemical properties. Here, the main aim is to improve the performance of oral bioavailability classification models. In order to achieve this, we have preprocessed oral bioavailable data using Pearson correlation and subset selection as feature reduction methods and data discretization using Binning. Discretization is one of the popular data preprocessing technique, which maps continuous data points into discrete values for easy data visualization and improves the performance of classification model. The effectiveness of feature reduction with discretization method for oral bioavailable data has been represented in terms of performance matrices like accuracy percentage, sensitivity, specificity, and precision. Based on the comparative analysis of the performance of various classification models like artificial neural network (ANN), Bayesian classifier and support vector machine (SVM) and k-nearest neighbor (KNN) with feature reduced discretized random forest model, we conclude that our proposed model gives better performance over the other compared models.

Paper ID: 286

Detection of Trust Environment for a Smart Devices Using Machine Learning Algorithms

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Smart Credit Card devices differ from predictable computer systems in different aspects of the system and not under an only frontier. The processor, Input Output devices, data, programs and network may be controlled by different, and aggressive, parties. Key words: DDoS Flooding Attack, Application Layer, Intrusion Prevention System, Smart Card devices

Paper ID: 239

Behavioral Analysis of Recent Ransomwares and Prediction of Future Attacks by Polymorphic and Metamorphic Ransomware

Navneet Kaur Popli (Research Scholar, Tilak Maharashtra Vidyapeeth, Pune); Dr. Anup Girdhar (CEO, Founder, Sedulity Solutions and Technologies)

Attackers understand that data, files, networks and all digital resources are a key factor in the regular working and growth of any business. And because these digital resources are so dear to the business, the best and quickest way to earn big money is to hold all these resources at ransom. Thus are born ransomware- malwares which normally encrypt all your important files and ask for money to provide you with the decryption key. In this paper, we do an analytical study of the behaviors of the recent ransomwares that have attacked businesses and individuals alike. After that, we predict the future types of ransomwares which can be created easily by using available toolkits. We also predict the impact and the threat they can cause and how difficult it would be to detect them after they employ all the mentioned stealth techniques.

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