ABSTRACTS (ICIIP 2013)

TRACK 1–Image Processing

Session 1   *Bio-Medical Imaging*

1569817727   **Automated Heart Diseases Detection Using PCG Signals**
Amandeep Cheema, Mandeep Singh

Abstract - Phonocardiogram (PCG) signals carry immense information about the functioning of the heart. The analysis ofPCG can be useful to detect various diseased conditions of heart.In this paper, a method for detection of arrhythmia using PCGsignals and further classification of arrhythmia into Bradycardia and Tachycardia is proposed. This study also deals with the detection of murmurs without cumbersome method of Electrocardiogram (ECG) gating. The proposed method for detection of diseases using PCG is cost efficient and can be implemented using latest electronic stethoscopes.

1569799261   **Enhanced Local Binary Pattern for Chest X-ray Classification**
Weichieh Wong; Ahmad Adel Abu-Shareha; Muhammad Fermi Pasha; Mandava Rajeswari

Abstract - The Local Binary Pattern (LBP) descriptor encodes the complementary information of the spatial patterns and intensity variations in a local image neighborhood. The richness of this multidimensional information offers many possible variations to the encoding process. Taking advantage of this, several variants of the LBP have been proposed. This work attempts to further optimize the discriminative power of the LBP specifically for the medical image classification task. It proposes an LBP variant that takes into account the salient edge features that are found particularly in chest X-ray images. In addition, it introduces a semi-global histogram to replace the commonly used global histogram which normally represents the spatial distribution of the generated codes in the LBP encoding process. The proposed LBP variant has been applied to the task of classifying X-rays of the Image CLEFmed 2009 dataset into different chest categories. Experimental results show that while reducing the computational load the proposed LBP variant achieved an accuracy of 99.19% as compared to the best reported LBP based results of 98.73%, in classifying chest x-ray images of the ImageCLEFmed 2009 dataset.

1569794961   **Meta-analysis of Functional Neuroimaging Data**
Manisha Chawla, Krishna P. Miyapuram

Abstract - Functional neuroimaging offers huge amounts of data that require computational tools to help extract useful information about brain function. The ever increasing number of neuroimaging studies (above 5000 in 2012 alone) suggests the need for a meta-analysis of these findings. Meta-analysis is aimed at increasing the power and reliability of findings from individual studies. Currently, two methods of meta-analyses are the most popular in brain imaging literature. Thecoordinate based meta-analysis (CBMA) which refers to the maximum likelihood of brain activation based on a universal three-dimensional coordinate system. The image based met analysis (IBMA) which considers the effect sizes from different studies to increase statistical power ignoring theinter-study consistency requirements. This technique is, however, suitable to account for inter–subject variability either pooled over studies or including the inter-study variability.While the coordinate based meta-analysis is easily found through published literature, the image based analysis requiresthe

statistical parametric maps available. These Data mining techniques applied in brain imaging is often termed as the newparadigm in cognitive neuroscience. We here discuss in detail about the available analysis methods.

1569790063   **Evolutionary Approach and Spline Interpolation for Contrast Enhancement**
Abishek Gupta, Ajesh Nag, JatenSavani, S. Natarajan

Abstract - In this paper, image contrast enhancement techniques are explored and two novel approaches are proposed.The first approach uses a Super Resolution based Convolution kernel in Lab colour space, which is optimized using Genetic Algorithms, for the evolutionary generation of the kernel values. The employed fitness function tends to provide a balance between contrast and naturalness of images. The second approach is called Spline Interpolation which works by fitting a continuous three dimensional curve through (0,0,0), the current pixel's RGB value and (255,255,255). These methods are compared with standard techniques on a database of bio-medical images and general images. The results indicate that the proposed methodsovercome the drawbacks of existing methods.

1569793109   **An Imaging Study to Assess Displacement Between Brachytherapy Applicator and Chestwall During Simultaneous Thermobrachytherapy of Cancer**
Divya Priya Chukkala M, Kavitha Arunachalam, Oana I. Craciunescu, Paolo Maccarini, Paul R. Stauffer, Jaime L Schlorff

Abstract - A conformal surface applicator was developed for simultaneous radiation and hyperthermia treatment of superficial cancer. A preclinical volunteer study was carried outto assess the displacement between the high dose rate (HDR)brachytherapy applicator and the chest wall (CW) of mastectomy volunteers using magnetic resonance imaging (MRI) technique.Image processing algorithms were developed to pre-process 3DMRI data of each volunteer and identify brachytherapy tube positions and CW treatment area. Processed MRI image series ofindividual volunteer acquired every 15 minutes for 90 minuteswere aligned using image registration technique. 3D cathetercoordinate positions extracted for the treatment area from theprocessed 30 and 60 minute MRI data were compared withbaseline measurements. Displacement of the brachytherapy tubesfrom the CW surface measured for 2 cm spaced array of 15brachytherapy tubes was used to assess applicator positioning errors during simultaneous thermobrachy therapy of superficial cancer. Preclinical results on the displacement between the TBSA and CW were measured for a mastectomy volunteer with 72x280mm treatment area. Image processing algorithms developed forMRI data analysis were incorporated into a user-friendly graphical user interface (GUI) to analyze remaining volunteerMR data quantitatively for 3D displacement of the TBSA brachytherapy catheters between the 30 and 60 min scans.

1569790743   **Optimization of SVM Classifier Using Firefly Algorithm**
Adwitya Sharma, Amat Zaidi, Radhika Singh, Shailesh Jain, Anita Sahoo

Abstract - Classification is one of the main areas of study today, due to increased emphasis on developing technologies that resemble human behavior. With advancements in the study of Artificial Intelligence, Supervised Machine Learning has always gained attention due to simulating behavior with that to the humans. For this, many classification techniques have been proposed out of which classifying the data with Support Vector Machine (SVM) has made a significant contribution in the field of classification. However, the researchers are skeptic about the performance of

SVM due to problems like over-fitting, pair-wise classification and regularization of parameters. For such regularization, a set of algorithms called, the Meta-heuristic algorithms can reach a solution by iteratively updating the candidate solution and finding an optimal solution to a problem, by optimizing the objective function. In this paper, the parameters of SVM are optimized with the help of Firefly algorithm (FFA), which by evaluating its performance, is deduced to outperform the performance of other meta-heuristic algorithms named Particle Swarm Optimization (PSO) and Accelerated PSO (APSO). Experiments have been conducted on a variety of datasets, collected from the UCI repository.

1569815523 **Detection of Presence of Parasites in Human RBC in Case of Diagnosing Malaria Using Image Processing**
Pranati Rakshit, Kriti Bhowmik

Abstract -Malaria is the commonest protozoal infestation inhuman being residing in nearly 3 billion victims across 107countries and 1-3 million deaths per year round the globe. Thedisease is generally diagnosed by examining properly stained peripheral blood smear as the malarial parasite particularly invades red blood corpuscles (RBC) of the circulatory system. For this reason, proper analysis of RBC is the most confirmatory diagnosis of malaria. Here in this paper, correct identification of presence of malarial parasite within RBC has been detected andseverity of the disease is measured by analyzing the stage (i.e. Ring trophozoite, Merozoite, Schizontetc) of Plasmodium sp., the malarial parasite using different image processing tools and techniques. After several pre-processing activities, area of the infested corpuscle is calculated and Sobel Edge detection method is used to find the boundary of the corpuscles. Then Harris corner points are used to formulate a metric that can determine the severity of the disease. The purpose of this paper is to highlight this medico-technical aspect only.

1569816203 **Design and ASIC Implementation of Image Segmentation Algorithm for Autonomous MAV Navigation**
Shankardas Deepti Bharat, Abdul Imran Rasheed, Viswanath K. Reddy

Abstract - Over the past few years, Micro Air Vehicle has gained prominence due to its widespread applications in the fieldof military and civilian applications. Images captured by onboard cameras on a MAV need to be processed in real time and for this purpose segmentation algorithm is used. On board processing of images is a major challenging task as it involves deciphering images and performing the required operations.In this work, a new image segmentation algorithm has been built using morphological operations, thresholding, edge detection and merging. A detailed analysis has been carried out for choice of appropriate segmentation techniques for design and field-programmable gate array implementation of image segmentation. Software reference model for image segmentation using edge-based segmentation and region-based segmentation has been developed. The proposed image segmentation algorithm has 17% improvement in Peak Signal-to-Noise Ratio values compared to exiting algorithms. The design consumes power of 0.322W and operates at a maximum frequency of 152.26 MHz in FPGA. Implementation in application-specific integrated circuit occupies less area and power and the working frequency is 188.68MHz nearly 23.9 percent more than FPGA. The designed algorithm can be extended to include video segmentation and the two color segmentation implementation carried out in this workcan also be extended to color image segmentation.

Session 2   *Content-Based Image Retrieval*

1569799721   **Semantic Image Retrieval System Based on Object Relationships**

Shashank Shivakumar, Nikhil Goel, Ananthanarayana V.S., Cilson Cyriac, P Rajaram

Abstract - Semantic-based image retrieval has recently become popular as an avenue to improve retrieval accuracy. The "semantic gap" between the visual features and the high-levelsemantic features could be narrowed down by utilizing this kindof retrieval method. However, most of the current methods of semantic-based image retrieval utilize visual semantic featuresand do not consider spatial relationships. We build a system for content-based image retrieval from image collections on the web and tackle the challenges of distinguishing between images that contain similar objects, inorder to capture the semantic meaning of a search query. Inorder to do so, we utilize a combination of segmentation into objects as well as the relationships of these objects with each other.

1569800449   **Automatic Image Annotation Using Synthesis of Complementary Features**

Sreekumar K, Anjusha B, Rahul R Nair

Abstract - Image annotation is the process of assigning meaningful keywords to an image. In automatic image annotation, this process is executed automatically by checking the semantics of the image. The semantics contained in an image is interpreted by extracting some high level and low-level image features. This work implements a system that automatically annotates colour images using a special feature extraction mechanism, which can be very effectively used for image sequence recognition or classification. This special feature is driven out by combining, three features under research, namely, Histogram of Oriented Gradients (HOG), Speeded Up Robust Features (SURF) and a color feature based on HSV Color structure. Thus, we formed a synthesized feature descriptor, which essentially describes three aspects visual perception, the color, shape, and points of interest. The proposed system follows a hybrid approach, which first trains a specific set of data, and annotation is performed using fuzzy KNN classification. In our experiment, it has been observed thatthe system has good accuracy and high potential in textual description of digital photographic images.

1569778041   **Offline Signature Verification System Using Grid and Tree Based Feature Extraction**

Amit Kishore Shukla, Manoj Wairya

Abstract - The objective of this paper is to process the hand written signature and verify it. For verifying the signatures of a particular person, we have taken 10 samples of Genuine Signature, signed by that person on a piece of paper. Further, we scanned the paper containing the set of signatures. Now we have extracted each of the genuine signatures of the person and stored it in separate file of the format.bmp. The extraction of the signatures in the last step has been in minimum area to provide accurate area of the signing of signature. We could have matched the signature of each person with the other signature but usually it is almost impossible to produce exactly thesame set of signatures. We would verify the signatures on the following parameters allowing a percentage of error in it. Permissible boundary, Hand pressure, Euclidian distance, Center of cylinder generated from minimum spanning tree, Delaunay triangulation of the signature, Angle between base line and center of gravity. But before implementing these features we have to preprocess the image.

There are various reasons of image preprocessing. Main among them being reduce noise in the image take only set of valid points. Resizing of the image, thinning of the image, Binarization of the image, Edge Detection.

1569813173   **Content Based Retrival of Malaria Positive Images From a Clinical Database**
Somen Ghosh, Ajay Ghosh

Abstract - Modern hospitals are attempting to create a database of patients' diagnostic history that also contains multiple images taken during different clinical tests. This has lead to a demand for easy retrieval of images matching a query condition so that this database can be used as a clinical decision support system. This paper presents, an efficient technique for retrieval of malaria positive images from a clinical image database, that match a query condition mentioned in text or as another malaria positive image. The proposed method identifies the presence of malaria by identifying the presence of chromatindots within RBCs. The algorithm utilizes 4-connected labeled region maps to analyze and modify the image, i.e., delete unwanted artifacts, etc. These are also used to count RBCs.Alternative methods for identifying chromatin dots within theRBCs are also presented. Precision and recall efficiency of the algorithm was also studied.

1569800151   **Image Retrieval System Using Block-Based Statistical Features**
Deepika Shukla

Abstract - This paper presents a color image retrieval system based on the statistical features of block-partitioned image. Ahuman perception based HSV quantization has been utilized forcolor histogram generation. First, an image is divided into several non-overlapping blocks. Then, the first and second moments of each block are extracted at the first stage. In order to reduce the feature vector dimension, statistical moments are then applied over extracted block feature vectors. The overall FV size of the proposed feature extraction technique is 18, which is independent of the block size chosen. The dissimilarity between two images is measured using Euclidean distance. In this paper, WANG image test database has been used to demonstrate the retrieval accuracy of the proposed system.

1569819471   **Comparison of Methods of Deriving Priorities in AHP**
Vishal Gupta, Mukesh Kumar Rohil

Abstract - Multi Criteria Decision Making (MCDM) is a process of structuring `and solving decision and planning problems which involves multiple criteria. Analytic Hierarchy Process (AHP) is one of the most popular analytic MCDM techniques for complex decision making problems. This technique requires forming of ratio-scale matrices for criteria as well as alternatives for each criterion. This ratio scale matrix isused to assign priority weights (and thus ranking) to the compared corresponding objects in the matrix. Prof. Satty proved that these weights correspond to the principal eigenvectorof an inconsistent matrix. Mainly, there exist threemethods of finding this priority vector of a ratio scale matrix:"by sum", "by geometric mean", and "by square". This paper presents the results of exhaustive comparison of these three methods on the ratio scale matrices of order 3x3, 4x4, and 5x5.The performance of the three methods is analyzed with respect to the minimum violation and total deviation metrics. Results show that for low order matrices (of order 3x3 and "to some extent" oforder 4x4) it does not matter much that which method is used for generating the priority vector. In fact, we can use the computationally cheapest one. But for higher order matrices, it certainly matters.

1569815943   **Semantic and Content-Based Medical Image Retrieval for Lung Cancer Diagnosis with the Inclusion of Expert Knowledge and Proven Pathology**

Preeti Aggarwal, Renu Vig, H. K. Sardana

Abstract - This paper involves the analysis and experimentation of chest CT scan data for the detection and diagnosis of lung cancer. In lung cancer computer-aided diagnosis (CAD) systems, having an accurate ground truth is critical and time consuming. The contribution of this work includes the development of lung nodule database with proven pathologyusing content based image retrieval (CBIR) and algorithms for detection and classification of nodules. A study and analysis of 246 patients have been carried out for the detection of benign, malignant as well as metastasis nodules. The whole research work has been carried out using Lung Image Database Consortium (LIDC) database by National Cancer Institute (NCI), USA and achieved an average precision of 92.8% and mean average precision of 82% at recall 0.1. Finally, the validations have been carried out with the PGIMER, Chandigarh test cases and achieved an average precision of 88%. Experimental studies show that the proposed parameters and analysis improves the semantic performance while reducing the computational complexity, reading and analyzing all slices by physicians and retrieval time.

1569815923   **General Regression Neural Network Based Image Watermarking Scheme Using Fractional DCT-II Transform**

Rajesh Mehta; Navin Rajpal

Abstract - A novel gray scale image watermarking scheme in frequency domain is proposed through the combination of image features, extracted using fractional discrete Cosine transform (DFrCT) with general regression neural network (GRNN). The watermark is a binary image which is embedded into the output obtained by trained GRNN based on the relationship between the low frequency (LF) DFrCT coefficient and its neighborhood of each selected block according to human visual system criteria. Due to better function approximation, learning and generalization capability of GRNN, extraction of watermark using trained neural network is quite successful. The transform order of fractional discrete cosine transform provides the security to the proposed scheme. Experimental results prove that the proposed image watermarking scheme is imperceptible as quantified by high peak signal to noise ratio (PSNR) and robust as measured by the bit correct ratio between the original watermark and extracted watermark.

Session 3   *Image and Video Compression*

1569816387   **Early Termination in Diamond Search Method Using Statistical Analysis**

Nehal N. Shah, Upena D. Dalal

Abstract - Multimedia is key technology for today's handhelddevices. Interactive messages, video chat, video conferencing are quickly replacing traditional way of communication, which has become possible because of effective video processing methods that enable high compression. Variety of devices are used from high end computers to low end phones to serve the purpose. Specifically gadgets with low computational power, wants toachieve reasonable good quality video with little cost

of computation that can be accomplish by proficient video coding. Motion Estimation and Motion Compensation are tools for video compression, in which motion information of the current block ispredicted from adjacent blocks using Sum of Absolute Difference as cost function. Whole process is extremely computation rigorous and demands reduction in amount of computation with clause of sustaining visual quality, to make it suitable for end devices with low computation supremacy. In this paper, statistical analysis of motion information is made which is used to diminish amount of computation in existing diamond search (DS) method.

1569780283   **Quality Evaluation of Synthetic Video in Simultaneous Double Stimulus Environment**

Romass Pauliks, Ilmars Slaidins

Abstract - Advances in video technologies combined within creased usage of synthetic video artifacts even in natural video scenes may cause problems in subjective perception of quality. In this paper, investigation is done on how subjective quality assessment scores depend on technical specifications of video interface (YPbPr, YCbCr and YIQ) and video content containing diverse synthetic video artifacts. Single Stimulus (SS) and Simultaneous Double Stimulus (SDS) subjective quality assessment methods were used and results compared. It was also revealed that SDS method allows better differentiation of subjective quality. This result agrees well with statistics obtained from crowd-based questionnaires used inseparate study where most observers preferred SDS as a simpler and more comfortable method compared to SS method.

1569790283   **One Pass Quality Control and Low Complexity RDO in A Quadtree Based Scalable Image Coder**

Yi Liu; Olivier Deforges; François Pasteau; Khouloud Samrouth

Abstract - Separation of traversal path from the non-traversal path area is a fundamental problem in computer vision and an active area of research in the intelligence transportation systems community. In spite of many years of research, general purpose traversal path-detection mechanism is still a very challenging task because of the dynamic nature of the variables involved and the ever-changing geographic terrains. Among the various methodologies addressing the issues of traversal path detection, schemes that employ path detection are good but lack robustness whereas other procedures such as template matching are static in nature and one may even consider a system involving only optical flow which may be robust in comparisons to others but cannot be applied to various region of interest and is thus unable to solve the above mentioned problem as a single entity. In this paper, we present a methodology wherein we apply optical flow in synchronization with dynamic template matching togenerate the traversal path area. The problem is partitioned into several categories; each category is processed according to a particular method and the output may serve as the input for theother classes. Information is also provided on real-time performance of the algorithm and the results are illustrated todescribe the efficiency and robustness of this approach. The algorithm having tested over various environmental conditions is found to be effective and robust.

1569819013   **Efficient Progressive JPEG Decoder Using JPEG Baseline Hardware**

Mihir Mody, Vipul Paladiya, Kapil Ahuja

Abstract - The Widespread usage of social media for pictures having led resulting popularity of JPEG progressive format dueto refinement of image over time on slow

internet connection.Typically; these pictures are decoded by means of software andtakes large decoding time as resolution in terms of M pixels increase. In case of embedded devices, typically have Baseline JPEG hardware support due to traditional camera capture and local playback. The paper proposes a novel decoding of Progressive JPEG images using existing hardware solution, which natively supports Baseline JPEG. The solution used enhancing native baseline JPEG hardware by means of local CPU to enable Huffman decoding for Progressive format. The second part of part proposed memory optimization for Progressive JPEG to reduce DDR storage requirement for low cost embedded system.This uses concept of sign and zero map with non-bit exact decoding without visual quality impact. The solution runs faster by large factor (factor of HW and CPU speed) with 88% lesser memory storage for any resolution.

1569819363 **Scalable High Performance Loop Filter Architecture for Video Codecs**
Niraj Nandan, Mihir Mody

Abstract - There is continuous thrust on improved and innovative video solution to facilitate video conferencing, video surveillance, transcoding, streaming video and many more customer centric new solutions. Increasing frame rate and frame size demands high performance hardware accelerators (HWA) to enable efficient 16x16 pixels macro block level (MB) pipelining inside video processing engine (IVAHD). In-loop de-blocking filter of H.264 codec reduces blocking artifacts in MB and it is very demanding in terms of cycles and resources (memory access and memory storage). Removal of blocking artifacts due to block-based video codecs takes around 20-25% of overall decoder complexity in current generation of standards (H.264) and trend will continue going forward in H.265. Higher adaptability of filter process, smaller block sizes (4x4), motion vector (MV) dependent boundary strength (BS) computation for each edge of 4x4 block, predefined order for doing filtering (vertical edge followed by horizontal edge) and data pixel loading of current and neighbor MB requires large number of accesses to shared memory of IVAHD (SL2), higher processing cycles and larger internal pixel buffer (IPB). This paper discusses novel approach of loop filter (LPF) operation to overcome above barriers and facilitate IVAHD to go up to 240fps frame rate in full HD processing of H.264 codec with leadership area and power. The final design in 28nm CMOS process is expected to take around 0.10 mm2 after actual place and route (consisting of 220 KGate with 5 KB of internal memory). Proposed design is capable of handling 4K@60fps and scalable to support H.265 in loop de-blocking filter.

1569819109 **An FPGA-Based Fixed-Point Architecture for Binary Logarithmic Computation**
J. G. Pandey, A. Karmakar, C. Shekhar, S. Gurunarayanan

Abstract - Real-time numerically intensive image processing applications demand dedicated hardware for various complex arithmetic functions. These arithmetic functions can be efficiently implemented by employing a binary logarithmic circuit. In this paper, a field-programmable gate array (FPGA) based architecture for the binary logarithm approximation unit is proposed. The proposed architecture utilizes combinational logic circuit elements and fixed-point data path. The implemented architecture is capable of finding approximated logarithm of an integer number, integer with fractional number and only fractional number. The architecture uses the same set of circuit elements for all computations. In the implemented architecture eight-region approximations is used. The proposed architecture is implemented in a Xilinx Virtex-5 xc5vfx70t FPGA device. The available FPGA macros are utilized for the elementary circuit elements. The device utilization summery shows that the proposed architecture consumes minimal FPGA resources. The error analysis,

performed with multiple sets of random numbers, illustrates that the proposed architecture has very nominal error associated with both the fractional as well as fixed-point numbers.

1569791421   **Phase-edge Based Approach for Pedestrian Segmentation Using NIR Camera and Tracking for Driver Assistance**
K S Chidanand Kumar

Abstract - A new approach using phase edge based technique for night time pedestrian segmentation and tracking using Near IR camera is proposed in this paper. A Gabor filter is used to extract even weak potential vertical edges that belong to candidate pedestrian blocks even under non-uniform illuminations and poor contrast. Vertical and horizontal projection on Gabor filtered response is carried out to determine the bounding-box of pedestrian-like candidate blobs. Pedestrian like candidate blocks undergo through a series of rule based classifiers. Once such set of pedestrian blocks are identified, candidate pedestrian blocks are tracked in next consecutive frames of a video using density confidence based tracker which uses Gabor filter edge response for feature-space analysis. False positives are greatly removed using spatio-temporal analysis and tracking mechanism. Performance characterization of the algorithm has been carried out in highway roads under non-uniform illuminations and varying contrast. Experimental result shows that algorithm can produce a detection rate of nearly 69% and can be used in real-time.

Session 4   *Document Image Processing*

1569814045   **CRAMM - Character Recognition Aided by Mathematical Morphology**
Sanatan Sukhija, Subhash Panwar, Neeta Nain

Abstract - A Character recognition system takes input in the form of scanned images of handwritten, printed or typewritten text and outputs some form of machine editable text. Intelligent Omni font CR systems have high degree of accuracy and are capable of producing formatted output that closely resembles the original input image. In this paper, a set of prominent structural featuresare extracted to precisely distinguish one character from the other. The classification process makes use of a decision tree classifier where at each node the decision rules are defined by some morphological operations till the final realization is done. The decision trees have been optimized for performance based on classification algorithms. The results obtained are prominent and the accuracy of our CR system is on an average 95% for handwritten text and for printed text, it achieves an accuracy of 99%. The recognition is a fine transformation invariant with the assumption that individual characters are not overlapping.

1569792127   **Kalman Predictor Based Edge Detector for Noisy Images**
Pradipta Roy, Prabir Kumar Biswas, Binoy Das

Abstract - Edge Detection is a primary but one of the most essential segmentation tasks of image processing. Though numerous techniques are available for edge detection, it is hard to find a generalized version adaptive to all situations. Edge detection challenge gets stiffer in case of noisy images, because most of the derivative based edge detectors are very sensitive to noise. In this paper, we have tried to attack the edge detection problem from a different perspective. Instead of finding gradient, we run a Kalman Predictor over the image from two opposite directions of horizontal and vertical dimensions. Error between estimated and actual

pixel values provides cue for edge localization, which is further processed by dual threshold to get the true edges. Proposed edge detector performs quite satisfactorily in case of noisy images and can be used for textextraction from noisy document image or medical images corrupted by artifacts.

1569801453   **Automatic Blur Detection in Mobile Captured Document Images**

Ganesh Nunnagoppula, K Sai Deepak, Harikrishna G., N. Rai, P. Radha Krishna, Noranart Vesdapunt

Abstract - Optical Character Recognition is widely used for automated processing of document images. While character recognition technology is mature, its application to mobile captured document image is still at its nascent stage. Capturing images from a mobile camera poses several challenges like motion blur, defocus and geometrical distortions which areusually not encountered in scanned or calibrated camera captured images. Therefore determining the quality of images automatically prior to recognition is an important problem.Quality check is especially useful in financial transaction instruments like bill payment where accuracy of text recognition for sensitive fields such as "amount due" should be high. Poor quality images can be rejected prior to OCR to avoid incorrect text recognition and save processing time. This paper discusses some techniques in literature for blur detection in mobile cameracaptured document images. We propose a simple yet elegant method that addresses some challenges faced in these document images. Extensive testing is performed on large dataset containing more than 4000 mobile captured images and optimum parameter values for performing quality check against motion blur and defocus are identified. Our experimental results demonstrate the effectiveness of the proposed method. In addition, we realized a smart mobile application for blur detection and report its performance on several mobile devices.

1569792531   **Circuit Recognition Using Netlist**

Srikanth Sridar, Krishnan Subramanian

Abstract - The existing software for circuit design and simulation require the user to be skilled either with good programming ability or with 'pick and paste' model. To remove this barrier of programming knowledge, we propose a simulation model where a circuit drawn on a paper will be simulated. The circuit drawn on the paper will be fed to the computer using a scanner/camera. The image is de-noised and the nodes in the circuit are detected. All the characters, numbers and symbols alone are stored in a separate image, which is used for optical character recognition. After node detection and character recognition, a net list is compiled which is used for simulation. Applications of this simulation model include smart teaching systems, tablet app and with more research, a great deal ofcomponents including transistors and ICs can be simulated.

1569791949   **General Bases Indexing Using Approximate Structure Techniques**

Neila Kacem, Abir Gallas, Ezzeddine Zagrouba

Abstract - The emergence of numerical technologies requires the use of powerful tools and retrieval engines for fast and efficient access to images datasets. In spite of the rapid growth of computing performance, it is always difficult to manage huge amount of data because of the exponential growth of the processing time according to the data complexity. Therefore, in this paper, Approximate Nearest-Neighbor (ANN) algorithms are used as a solution of dramatically improving the retrieval speed. Indeed, we focus on locality-sensitive hashing (LSH) technique. Since its performance depends essentially on the hash function used to partition the space, we

propose to introduce a new function inspired from the E8 lattice and to combine it with theMulti-Probe-LSH and the Query Adaptive LSH (QA-LSH).This method is applied in our case in the context of CBIR. In order to prove the robustness of the proposed approach, a set of experimental results are compared with similar state of the art algorithms.

1569791253   **Modified Self - Adaptive Plateau Histogram Equalization with Mean Threshold for Brightness Preserving and Contrast Enhancement**

Aedla Raju, Dwarakish G. S, D. Venkat Reddy

Abstract - Histogram Equalization (HE) is a simple, effective and widely used contrast enhancement techniqueas it can automatically define the intensity transformation function based on statistical characteristics of the image, but it tends to change the mean brightness of the image to the middle level of the gray level range. HE also produces saturation effects by extremely pushing the intensities towards the right or the left side of the histogram. To surmount these drawbacks, Clipping or Plateau Histogram Equalization techniques for brightness preserving and contrast enhancement have been proposed, but, these are not suitable for automatic systems because of manual selection of threshold level. Self-Adaptive Plateau Histogram Equalization (SAPHE) selects the threshold level automatically, but the process is relativelycomplicated and sometimes fails in execution. To overcome these drawbacks, a Modified Self – Adaptive Plateau Histogram Equalization with Mean threshold (Modified SAPHE-M) is proposed in this paper and compared the experimental results with Histogram Equalization (HE), Self-Adaptive Plateau Histogram Equalization (SAPHE) and Modified Self-AdaptivePlateau Histogram Equalization (Modified SAPHE) by using image quality measures such as Absolute MeanBrightness Error (AMBE) and Peak-Signal to Noise Ratio(PSNR).

1569798507   **Discrimination Metric for Bi- Histogram Equalization of Contrast Enhancement**

Santhi Krishnamoorthy, Wahida Banu

Abstract - A simple discrimination metric (DMBHE) is developed to avoid the drawbacks of conventional histogram equalization for gray scale images. The proposed technique uses both global and local information to remap the intensity levels that helps to improve the image contrast. The original histogram is divided into sub-histograms with respect to the mean value. Discrimination metrics are used, so that highcontrast per pixel between original image and enhanced image is obtained. The simulation results show that the proposed method performed well for microstructure images. Parameters like structural similarity index and contrast per pixel are used to analyze the image quality.

1569792059   **An Efficient Interest Point Detection Technique**

Pooja H R; Mohammed Shahid

Abstract - Feature selection is a key step for image registration process. The success of feature selection has a fundamental effect on image matching. Corner points are considered as interest points as they are formed from two or more edges and edges usually define the boundary between two different objects or parts of the same objects. Corners determine the contours characteristics of the target image and the number of corners is far smaller than the number of image pixels, thus corner can be a good feature for image registration. Detection of corners for image registration is difficult task for an airborne real-time platform. Airborne platform suffers with many constraints like processing power, qualified hardware, real time constraints etc. In this paper, we propose an efficient interest point detection technique to meet

airborne real-time constraints. It requires sorting in local neighbourhood in spatial domain. Performance is evaluated quantitatively using SNR criteria in neighbourhood and random location. The results are further validated against image translation and rotation.

<u>Session 5</u>   *Image and Video Processing Architecture*

1569790317   **Blind Image Quality Metric for Blurry and Noisy Image**
Zianou Ahmed Seghir, Fella Hachouf, Frédéric Morain-Nicolier

Abstract -In this paper, an objective assessment of image quality is considered. Principal human eyes function is to takeout the region or edge information from the vision field. Based on this function, a new no-reference image quality measure is proposed. First, we identify the image edges using canny operator. Secondly, we compute the absolute difference mask. Then, the two operators are used to compute the entire metric. Experimental results show the efficiency of the suggested measure.

1569815869   **Systolic Array Based Architecture for DS Fast Motion Estimation Algorithm**
Karam Singh, Shaik Rafi Ahamed

Abstract - The H.264/AVC video coding standard can achieve up to 50% more compression than its prior video coding standards. From the last two decade, developing systolic array architectures is one of the popular research for VLSI designers because of their inherent regularity and modularity. This paper introduces a 2-D systolic array architecture of diamond search (DS) block-matching algorithm. Until now, no one exiting architectures give the high throughput with 100% hardware utilization. By using, systolic array we have proposed a novel 2-D architecture for DS block-matching algorithm which over come this problem at the expense of more hardware and power. This is also feasible for variable block size motion estimation and so, we can easily use this in new standards like H.264.

1569781311   **Effective Use of Dense Optical Flow for Path Recognition**
Suman Deb1, Mrinal Kanti Debbarma, S T Reddy, Ujjwal Baidya, Amit Kumar Sarkar, Pratik Renu

Abstract - Separation of traversal path from the non-traversal path area is a fundamental problem in computer vision and anactive area of research in the intelligence transportation systems community. In spite of many years of research, general purpose traversal path-detection mechanism is still a very challenging task because of the dynamic nature of the variables involved and the ever-changing geographic terrains. Among the various methodologies addressing the issues of traversal path detection, schemes that employ path detection are good but lack robustness whereas other procedures such as template matching are static in nature and one may even consider a system involving only optical flow which may be robust in comparisons to others but cannot be applied to various region of interest and is thus unable to solve the above mentioned problem as a single entity.In this paper, we present a methodology where in we apply optical flow in synchronization with dynamic template matching to generate the traversal path area. The problem is partitioned into several categories; each category is processed according to a particular method and the output may serve as the input for the other classes. Information is also provided on real-time performance of the algorithm and the results are illustrated to describe the efficiency and robustness of this approach. The algorithm having tested over various environmental conditions is found to be

effective and robust.

1569791505   **Image Registration in Noisy Environment Using Particle Swarm Optimization**
Haradhan Chel, Debashis Nandi

Abstract - Image registration is a process of over laying multiple images of the same scene taken from different view points or by different sensors or at different times. The registration geometrically aligns multiple images with respect to a reference image. It has wide application in remote sensing, super resolution, medicine, cartography (map updating), and in computer vision (target localization, automatic quality control) etc. Traditional methods for image registration are sensitive to image degradations such as variations in noise, blur or illumination. In this paper an accurate rigid image registration technique based on Particle Swarm Optimization (PSO) is proposed which is robust to additive noise. It is observed that proposed algorithm shows same performance at different level of noise power. Experimental results confirm the claims of the algorithm.

1569819497   **Low Power Architecture for Motion Compensation in a 4K Ultra-HD AVC and HEVC Video Codec System**
Hetul Sanghvi

Abstract - Motion Compensation in Video Codec is a step where blocks of pixels from Reference Picture are fetched and interpolated to form the prediction image for the current picture being processed. There are several challenges in implementing this functionality in hardware - (1) to identify the minimum set of reference pixels needed to give the required prediction image in an efficient manner from external memory, (2) to fetch these pixels from the external memory at a rate to match the 4K UltraHD frame processing and (3) to perform the processing in a power optimal manner. This paper describes architecture for motion compensation hardware which integrates command preparation, a 2D reference pixel data caching scheme, a DMA engine and a power efficient pixel interpolation engine. The 2D caching technique helps in reducing the LPDDR2 SDRAM power for a 4k Ultra-HD decoder by up to 70 mW and bandwidth by 800 MB/s (50% reduction), increasing the typical 1080p30 HDMI playback time by 2 hours. The motion compensation hardware module dissipates 3 mW for 1080p30 decode.

1569819021   **Efficient Bit-Plane Implementation for VC1 Video Decoder for Multi-core Architecture**
Mihir Mody, Dinesh Anand, Kothandapani

Abstract - The Widespread usage of social media for pictures haring led resulting popularity of JPEG progressive format due to refinement of image over time on slow internet connection. Typically, these pictures are decoded by means of software and takes large decoding time as resolution in terms of M pixels increase. In case of embedded devices, typically have Baseline JPEG hardware support due to traditional camera capture and local playback. The paper proposes a novel decoding of Progressive JPEG images using existing hardware solution, which natively supports Baseline JPEG. The solution used enhancing native baseline JPEG hardware by means of local CPU to enable Huffman decoding for Progressive format. The second

part of part proposed memory optimization for Progressive JPEG to reduce DDR storage requirement for low cost embedded system. This uses concept of sign and zero map with non-bit exact decoding without visual quality impact. The solution runs faster by large factor (factor of HW and CPU speed) with 88% lesser memory storage for any resolution.

<u>Session 6</u>   *Color Image Processing*

1569819691   **Mobile Plant Species Classification: A Low Computational Approach**
Shitala Prasad, Sateesh K. Peddoju, Debashis Ghosh

Abstract - In this paper, a reduced shape and color feature extraction method is proposed for a mobile device based plant classification system. For scientists, botanists, farmers, and others plant identification is a useful and important task. The original image captured is reduced to similar aspect ratio, which does not affect the shape information but reduces the computation cost nearly up to half of the total cost. The algorithm first calculates the geometric feature and then polar Fourier transform and trained using k-NN classifier. Then two nearest classes were selected on the basics of smallest distance which is further rectified by the color features using a decision tree. The algorithm proves to be better in performance compared to other already existing algorithms.

1569819395   **Implementation of Steganography Using CES Technique**
Jyoti Gaba, Mukesh Kumar

Abstract - Over the last few decades, security of data exchanged over the network has become a major concern. Two major techniques have existed to achieve the same, namely cryptography and steganography. Cryptography alters the structure of the text itself whereas steganography hides the text behind some other digitally representative media, thus transmitting it unsuspectingly. But with the increase in networks usage and advancements in technology, it has become increasingly complex to protect the information. So the need arises for an almost unbreakable system. In this paper, a technique named CES is proposed for exchanging secret data / information between two ends. This technique pre-processes the data before masking it behind a cover image. Preprocessing involves compressing the data to reduce its size and then altering it using a key. Compression reduces the size of text and allows more data to be hidden behind the same cover image. Encoding text with the help of a key makes discovering the original text difficult even if some intruder succeeds in obtaining the modified data. Finally, the processed data is masked behind an image using frequency domain based steganography. The proposed technique is implemented using MATLAB and its strength is compared by calculating the MSE and PSNR of the cover image to the stego image. The various results obtained for different cover images demonstrate that the stego image obtained by applying this technique is not visually distorted because the PSNR is high and MSE is low. Thus, experimental results demonstrate that the technique performs well as compared to other image steganography techniques.

1569819003   **Comparison of Various Models and Optimum Range of ItsParameters Used in SVM Classification of Digital Satellite Image**
Ankur Dixit, Shefali Agarwal

Abstract - SVM is a one of the most favorite and efficient supervised classification technique. As it is supervised so learning of the model directly affects the result. Learning of SVM is done with the help of sample data points and model; it can be either linear or non-linear. Number of models has been used so far for multiclass classification but which one is better with optimal value of parameters? If we have several models for SVM and each model has some parameters so one could confuse about to select the model and optimal values of its parameters. SVM is broadly used for binary classification or multiclass classification with linear model. In this article, we will describe linear as well as non-linear models and their accuracy with focus on the optimal value of parameters used in each model and tolerating cost of SVM.In this paper, class agreement between model and particular class is explained so that one can understand better that which hodel is responding well for which particular class. So this paper will provide comparative study between various models, for hyper-plane, used with SVM for LULC classification of digital satellite image. The kappa coefficient is calculated to compare the classified result and standard error is evaluated under the 95% confidence interval to estimate the error in result.

1569812605   **A Steganography Framework for Easy Secret Sharing Through Images**
Praveen Palanisamy, Manoj Kumar Rajagopal

Abstract - This paper presents a robust framework for secured communication of data through images using steganography.The framework will help in developing applications that make sharing secrets and confidential information as easy as sharing pictures, while making the users feel more secure about the information exchanged. We have developed the framework to create steg images in JPEG format, which is more widely used than other formats. A pilot implementation is developed using this framework on an embedded platform and the results are discussed.

1569790807   **Development of Photomicrographic Image Analysis Solution for Sporozoa Detection in Tasar Moth**

Abhra Pal, Tamal Dey, Amitava Akuli, Nabarun Bhattacharyya

Abstract - In spite of the availability of natural resources and traditional skills, Tasar sericulture in India is stagnating due to frequent outbreak of a number of diseases. The most commonand deadliest among all is Pebrine disease caused by a microsporidian parasite Nosema sp. Infections of the diseaserange from chronic to highly virulent and can result in completeloss of crop. The disease has become increasingly more and more complex as more number of microsporidian strains infecting silkworms is being identified. Therapeutic methods to control the disease at commercial scale have so far been proven to be ineffective. As of now, preventive methods are generally followedto restrict the disease below the danger threshold. As the diseases trans-ovarially transmitted hence the common method is to eliminate primary infection at the egg stage by testing the bodyfluid of the egg laying moths under microscope. If the tissues are found free of infection, then only the corresponding eggs are distributed amongst the villagers pursuing sericulture. Currently the entire process is manual, time and labor intensive. Many atime human error also creeps in leading to outbreak of thedisease. This paper proposes automation of the disease detection process by capturing photo-micrographic images and classifying spores using digital image analysis technique thereby improving productivity and accuracy of this process. The proposed solution has been tested in the tasar grain ages and the software resultshave been validated with the human

experts. The accuracy of correct identification of Pebrine spores has been found as 87%.

1569819067   Secure Key Based Image Realization Steganography
Shabnam Samima, Ratnakirti Roy, Suvamoy Changder

Abstract - Steganography is the science of hiding crucial information in some innocuous objects such that the mere existence of the hidden information is unidentifiable in human sight. Various unique methodologies have been implemented over time to hideinformation using steganography. In most of the methodologies the exact secret information is hidden inside the cover image in a way that it is completely unrecognizable. Thus, if the embedding mechanism is compromised, there is no way that the hidden message can remain unexposed. Security of the secret information can be enhanced if the actual secret message is not embedded in thecover image at all. In this paper, a novel approach to image steganography through image realization has been proposed in which, rather than sending the actual secret information some mapping information of the secret information is embedded in the stego image. The actual realization of the secret information is secured using a multi layered secure pass key.

1569793385   Development of Improved SSIM Quality Index for Compressed Medical Images
Basant Kumar, Shishu Bind Kumar, Chandrahas Kumar

Abstract - This paper presents the development of improved structural similarity index (SSIM) quality assessment parameter for compressed medical images. The SSIM has been proved better objective quality assessment metric which exploits the structural similarity in the viewing field. In this paper, the SSIM quality index has been modified by achieving optimal value of arbitrary constant K used in SSIM index expression. The analysis has been done for three different types of medical image; MRI scan, CT scan and ultrasound image. SSIM index along with PSNR, MSE and mean-opinion- score (MOS) are computed for SPIHT compressed medical images at varying compression rates by setting values of K in the range 0.02 to 2.0. The value of K giving maximum correlation coefficient (CC) between SSIM index and MOS is selected as optimal value. It is found, that optimal values of K equal to 0.5, 0.05 and 0.1.

Session 7   *Image Restoration*

1569814339   Boundary Evolution Algorithm for Occluded Region Reconstruction (BEAORR)
Bindu A, C N Ravi Kumar

Abstract - In the World today, secure and accurate identity retrieval for Real Time Authentication has become mandatory because of the drastic evolutions experienced inthe security breeching techniques. Realizing the efficient Real Time identity retrieval is confronted by many hindrances present across the face in the form of varying degrees of occlusion; aging; variations in illumination; the existence of external structural components like spectacles,beard, moustache, scarf and hair style etc; disguise or distortions caused by accidents. The occluded/ deformed facial

samples have to be reconstructed with utmost proficiency, which is accomplished with the aid of the In painting Algorithms. But, when the boundary of the face to be reconstructed is heavily occluded the currently available Inpainting algorithms fall short of achieving commendable reconstruction results. The boundary function imposes a limiting condition for the in painting algorithms. The occluded face boundary contributes predominantly towards achieving efficiency in Reconstruction and consequently in retrieval of unique identity. Evolving the exact boundary of the face is achallenge which needs to be eminently addressed. TheProposed Algorithm paves way towards the evolution of occluded Face Boundary and proves to be a creditable preprocessing step to address the problem of occlusions present across the Face boundary!

1569795013   Decision Based Salt-and-Pepper Noise Reduction Using Adaptive Weighted Bézier Approximation
Vivek Singh Bhadouria, Dibyendu Ghoshal

Abstract - The study proposes a novel image denoising algorithm based on Adaptive Weighted Quartic Order Bézier Approximation (AWQBA), for the images corrupted with low density saturated impulse noise, often termed as salt-and-pepper noise. The proposed algorithm first detects the presence of noisy pixel in sliding window of dimension 5X5, followed by smoothing operation on the detected noisy pixels using Bézier surface smoothing approach. To ensure the maximum likelihood between the reconstructed central pixel and its corresponding neighbors,a locally computed weight is multiplied with the reconstructed central pixel thereby restoring the image details, even after thefiltering operation. Based on quantitative evaluation criteria of Peak Signal-to-Noise Ratio (PSNR), we have experimentally found that the proposed algorithm out performs existing state-of the-art median based filtering methods. High PSNR suggests the practicability of the proposed algorithm for subsequent image processing stages viz. edge detection, contour detection etc. and for low cost, high-quality imaging devices such as digital cameras, visual surveillance and consumer video-recorders etc.as well.

1569813203   Image Registration in Shifted Focus
Shree Lakshmi C H, Jai Prakash Bhagat, Sibsambhu Kar

Abstract - Image registration is a key requirement in many multi-frame imaging solutions like focus stacking, stereo imaging, 2D to 3D video reconstruction etc. Several techniques are proposed in literature based on key point or feature detection. Most of these techniques involve correlation, featureor key point detection, projection on multiple coordinates etc.But such methods work fine for images with uniform focus as the features or key points are consistent across the frames. But if the focus regions are different in different frames, these features do not show consistency across the frames and hence the alignment of frames becomes difficult. In this paper, we propose a method of aligning images with different focus points using multilevel down-sampling and correlation maximization.The proposed method is highly accurate and reasonably fast.The method may be useful in focus stacking, HDR and many other applications.

1569849233   A Novel and Fast Algorithm for Random Valued Impulse Image Noise Cancellation Using Cubic B-splines
Mohit Saxena, Mukesh Kumar Gupta

Abstract - A novel and faster method for cancellation of random valued impulse noise is proposed in this paper. Our proposed algorithm works in two stages. In stage

one, the noisy pixels are located and removed and in second stage, these noisy pixels are used for edge restoration. The results thus obtained are quite better and comparable to previously proposed algorithms and methods even at the noise levels of 60%.

1569798211   **No-Reference Ultrafast Blur Evaluation in Ocular Biometrics**

Plamen Doynov, Sriram Pavan Tankasala

Abstract - Defocus and motion blur are common distortions inocular biometric image collections. This is especially prevalent forimage acquisition in less constrained environment. An accurate estimation of the degradation parameters can be used for image quality assessment and for degradation restoration. Computationally fast methods are applicable for real-time imagequality evaluation and feedback during the acquisition process.ISO/IEC 29794-6 (SC 37 N4302) specifies the computational method for sharpness as a focus-quality metric. The method formotion blur calculation is not defined. In this paper we report the performance of fast, non-referenced sharpness and motion blur estimation algorithms with application in Ocular biometrics. This paper reviews current techniques for blur estimation and reports the comparable accuracy of the proposed methods for multi pledegrees of degradation.

1569800295   **Hybrid Method for Image Super-Resolution Using Steering Kernel Regression and Example-based Approaches**

Sai Hareesh A, Chintalapati Lalith Srikanth,Venkatachalam Chandrasekaran

Abstract - A hybrid method for image super-resolution consisting of steering kernel regression (SKR) and example based super-resolution (EBSR) techniques has been proposed. In this model the output of SKR is given as the input to the EBSR module. It is observed, that though the image super-resolution performed by SKR gives a reasonable result, in terms of perceptual quality, the regression techniques have inherent disadvantage of generating artifacts. EBSR on the other hand augments the image with high frequency information to the image, thereby sharpening the edges. In this paper, we demonstrate that the proposed hybrid scheme performs better than the individual methods described above.

1569791947   **Hybrid Method for Wavelet Image Denoising**

Souad Benabdelkader, Ouarda Soltani

Abstract - This paper presents a hybrid method for wavelet image denoising. The classical wavelet denoising scheme estimates the noise level in the wavelet domain using only the upper detail subband. In the proposed method, the standard deviation of the noise is estimated on the entire image pixels in the spatial domain within an adaptive edge preservation scheme.There after, that estimation is used to calculate the threshold for wavelet coefficients shrinkage. A contrast enhancement procedure is employed as a pre-processing step.

1569843511   **Design of Filters in Matlab Simulink for Reducing Current Harmonic Distortion**

Dhiraj Singh, Rohit Soni, Devendra Mittal

Abstract - This paper deals with the design and implementation of a three phase Electromagnetic Interference. A Harmonic passive filter has been proposed for a three phase power system . A Matlab Simulink analysis of the three phases EMI harmonic filter system is incorporated. The design and implementation of the filters are illustrated, with specific attention to the strict requirements of the given power supply application.. The passive EMI, Harmonic filter is an attractive topology of

power system. Factors such as the absence of harmonic, increased power density, reduced size and weight and good power quality are fundamental aspects of good design considerations. An improved control structure is proposed. This structure employs simple R,L,C elements in order to attenuate or eliminate the undesired harmonic distortion in the output voltage and current waveforms in the power network. The proposed system having RLC filter is analyzed and verified by simulation. The indepth analysis of the input and output waveforms clearly indicate the constraints that need to be satisfied for successful operation of the proposed filter.

Session 8   *Wavelet Image Processing*

1569775751   **Joint Time Frequency Analysis Based Liveness Fingerprint Detection**
Anita Bhanarkar, Pankaj Doshi, Aditya Abhyankar, Aarti Bang

Abstract - Fingerprint identification is most widely used and popular form of biometrics. By use of simple and inexpensive techniques it is possible to spoof fingerprint scanners which has inbuilt liveness detection. This paper deals with an image processing technique in order to detect the liveness of an authenticated person for fingerprint biometric system. The presented system is based on profiling and a wavelet based approach. In this work, the difference between a live and a spoof fingerprint image has been exploited. Profiling of fingerprint images gives the results for the same. The wavelet based approach deals with the decomposition of the fingerprint image using Daubechies wavelet till four levels and profiling of the approximated image. By setting proper threshold for both theabove methods results are obtained. The proposed approaches are tested for 50 live and 50 silicon spoof fingerprint images and Receiver Operating Characteristics (ROC) is plotted and an equal error rate of 0.078 for profiling and 0.147 for wavelet based approach is obtained. Finally both the approaches are cascaded for liveness detection. The success rate obtained is100%.

1569822949   **A Novel Algorithm for Random-valued-impulse Noise Detection and Removal Using Chebyshev Polynomial Interpolation**
Kireeti Bodduna

Abstract - This paper proposes an efficient way to remove random valued impulse noise and also the edge-preserving regularization of the henceforth obtained image. We follow a two phase mechanism where the noisy pixels in the interior regions are dealt with first and those in the edge regions later. Promising results were found even for Noise levels as high as 60% with the proposed algorithm.

1569792037   **Binary Weights to Neighbouring Pixels Based Resolution Enhancement Mapping of Hyperspectral Image**
N. Prabhu, Manoj K. Arora, R. Balasubramanian ,Kapil Gupta

Abstract - Per pixel classification algorithms are incapable of mapping the land cover classes at its sub pixel level. The solution to this problem is to make the spatial resolution finer than the original data and arrange the sub pixels according tothe fractional cover of each of the classes in the pixel and their class distribution in neighboring pixels. In this paper, an algorithm, named as 'pixel filling algorithm' for super resolution mapping has been proposed. The algorithm considers the information from the neighboring pixels of pixel to be super-resolved and treats all the classes equal to producefine spatial resolution maps. The performance of the

algorithm has been tested on a synthetic dataset as well as on a hyperspectral data. The datasets were reduced by Daubechies 4 wavelets and then a 3x3 filter was applied to make the datasets coarser. The overall accuracy of super resolution algorithm for synthetic data and hyper spectral data are calculated as 96.3 percent and 83.6 percent, respectively for the whole data and 86.3 percent and 70.8 percent, respectively for super resolved mixed pixels.

1569816343 **Analysis of micro-Doppler Radar Signatures of Rotating Targets Using Gabor-Wigner Transform**

P. Suresh, K. Venkataramaniah, T. Thayaparan

Abstract - Micro-Doppler signatures provide unique information about properties of the target. These micro-Doppler features can be used for real time target recognition in military applications and surveillance operations. In this paper, we present Gabor-Wigner transform for extracting micro-Doppler features from the radar returns. The effectiveness of the Gabor-Wigner transform in extracting micro-Doppler features has been compared with short-time Fourier transform, Wigner Distribution and S-method. The efficiency of the Gabor-Wigner transform in micro-Doppler feature extraction is demonstratedby applying it to different experimental data sets.

1569796465 **SVD Based Low Contrast Satellite Image Enhancement in Stationary Wavelet Transform Domain**

Nagarjuna Venkat P, Umakant Mandawkar, Amit Kumar D

Abstract - A novel method proposed for low contrast satellite image enhancement using stationary wavelet transform (SWT) and singular value decomposition (SVD) illustrates in this manuscript. The singular value matrix represents the intensity information of the given image and any change on the singular values change the intensity of the input image. The whole processing is done in SWT domain and later reconstructed the enhanced image using inverse SWT. Proposed technique is compared with conventional techniques such as Dual tree complex wavelet transform, WZP, DWT etc. The experimental results show the efficiency of the proposed method over conventional methods.

1569812287 **Multi-touch Out-Focus: A Realization of SLR-like Narrow DOF in Mobile Camera**

Jai Prakash Bhagat, Shree Lakshmi C H, Kumar Ashish, Suresh Kr. Gara, Sibsambhu Kar

Abstract - Most of the mobile cameras support digital zoom but not the optical zoom. As a result, capturing images at narrow depth-of-field (DOF) is not possible. SLR cameras can capture such images with the help of optical zoom using multiple lens assembly. In this paper, we propose a technique to create SLR-like narrow DOF images using multiple frames focused at different regions or depths. The proposed method identifies the regions or objects focused in different frames and do necessary blurring or sharpening to virtually reduce the DOF of the image. A wavelet transform based information measure has been used to separate focused and de-focused regions in a single frame and also to identify a frame which is best focused in a specific region. The proposed solution will allow the users to create narrow DOF at single or multiple user specified points in a single image.

1569791529 **Noise Removal Using Double-Density Dual-Tree Complex DWT**

Rahul K. Sarawale, S. R. Chougule

Abstract - The real world signals do not exist without noise. Image denoising

system should remove this noise to recover the original signal. Noise removal can be conducted in the time-space (original signal) domain or in a transform domain. To perform intransform domain, researchers utilize the Fourier Transform (FT) or the Wavelet Transform (WT). The Wavelet Transform, specifically Discrete Wavelet Transform (DWT) performs well in noise removal applications. But they suffer from poor directional selectivity, shift sensitivity problem and absence of phase information. The proposed double-density dual-tree complex DWT is based on two scaling function and four distinct wavelets. This technique removes the demerits of the DWT and performs superior in image denoising applications than traditional linear processing (such as wiener filtering), stationary wavelet transform (SWT), dual-tree DWT, double-density DWT etc. In this paper, the prominent results in terms of PSNR, MSE and Histogram of the proposed system is compared with dual-tree complex wavelet transform and global thresholding method. From experimental point of view, the grayscale images are considered which are corrupted by Gaussian noise.

1569865405 **A Fast Novel Algorithm for Salt and Pepper Impulse Noise Removal using B-Splines for Finger Print Forensic Images**
Syamala Jayasree P, Pradeep Kumar

Abstract - In Image Forensics, the accuracy of a proper Biometric Identification and Authentication Systems depends on the image quality to arrive at a reliable and accuracy result. To get a noise-free fingerprint image, they are subjected to pre processing and filtering tasks. In this paper, we propose a faster and an efficient way to remove salt and pepper impulse noise and also the edge preserving regularization of the henceforth obtained finger print noise free image using B-Splines. The results were found to be much better than the previously proposed nonlinear filters or regularization methods both in terms of noise removal as well as edge regularization for image forensics.

TRACK 2 - Computer Vision

Session 1 -Computational and Statistical Methods

1569819545 **Multistereo System Design**
Apoorva Bhatia, Pallabi Ghosh, K.S. Venkatesh

Abstract – Depth estimation using stereoscopy can be done by comparing the relative positions of the same (point) object displayed in the two different images captured by two cameras. Quantization errors that follow a square law with respect to distance are one of the errors that arise during depth estimation. The solution to limit this error is to use a multi camera arrangement. We deal with the physical aspect of arrangement of a multi camera system to reduce quantization error of the camera system, and to make the quantization error more uniform with respect to distance (over a certain range), using multiple baseline stereo. We also propose a method to calculate the minimum number of cameras required for a given camera resolution to measure a range of depth with a bounded error performance. The most important contribution is our investigation of the camera placement problem: given a set of pairwise camera distances, does a solution even exist? It turns out that a solution does not exist in general. Further, we deal with considerations pertaining to the arrangement of the cameras to find the direction as well as the depth of the object with respect to the camera system.

1569795817 **A Probabilistic Method of Skin Detection**
Souradeep Mitra

Abstract –This work presents a novel technique for detection of skin color. This method is based on probabilistic modeling of skin pixel testing, which has produced highly encouraging results. This paper also introduces the method of using trained neural networks for fitting probability distributions. A comparison with other popular methods has been provided in this paper.

1569791547 **Enhancing Accuracy of Multi Criteria Recommendation Systems Using Genetic Algorithm**
RubinaParveen, Anant K. Jaiswal, Vibhor Kant

Abstract – Recommender system (RS) the most successful application of Web personalization helps in alleviating the information overload available on large information spaces. It attempts to identify the most relevant items for users based on their preferences. Generally, users are allowed to provide overall ratings on experienced items but many online systems allow users to provide their ratings on different criterions. Several attempts have been made in the past to design a RS focusing on the ratings of a single criterion. However, investigation of the utility of multi criteria recommender systems in online environment is still in its infancy. We propose multi criteria RS based on leveraging information derived from multi-criteria ratings for enhancing the recommendation quality. In our work, we suggest to use genetic algorithm for determining the relative importance of the individual criteria ratings and compute overall ratings for items using a weighted approach. Experimental results are presented to demonstrate the effectiveness of the proposed recommendation strategy using a well-known Yahoo! Movies dataset.

1569802953 **A Study of Stochastic Algorithms for 3D Articulated Human Body Tracking**
Sanjay Saini, Dayang Rohaya Bt Awang Rambli, Suziah Bt Sulaiman, M Nordin B Zakaria

Abstract - The 3D vision based research has gained great attention in recent time because of its increasing applications in numerous domains including smart security surveillance, sports, and computer games and so on. This paper presents a study of various stochastic algorithms to identify their utilization in an efficient manner for effective 3D human articulated body tracking. First part of this paper enlightens the stochastic filtering algorithms including particle filter and its variants annealing particle filter. The second part focused on evolutionary optimization algorithms based effective tracking. Currently these two types of algorithms are most extensively used for tracking due to their ability to solve highly nonlinear problems and their consideration uncertainties in the pose estimation. In order to evaluate the performances of these algorithms both qualitatively and quantitatively, we investigate the implementation of the various stochastic algorithm including, particle filter, annealing particle filter, particle swarm optimization and quantum-behaved particle swarm optimization.

1569786075 **Reliability Assessment and Prediction of Open Source Software Systems**
Jitendra Singh, L S Maurya

Abstract - Affordability, redistributable, modifiability, availability of source code, zero price and freedom of choice are the characteristics which have made Open source (OS) a preferred platform for many software industries and individuals, who believeto use the power of high quality software. The technological motivation for OSS development directly relates to the software crisis, which clearly specifies that traditional development do not perform very effectively, specifically in the areas of speed, quality and cost of development. In this paper, fact regarding open source software as well as different reliability, concepts are elaborated. Practical implementation of OSS reliability modeling and decision making about product release has been done. For this purpose software, performance measures Failure intensity, Mean Time to Failure (MTTF) and Reliability of three different open source software's failure data sets are computed and analyzed. Comparative selection of best suited Software Reliability Growth Model (SRGM) among four SRGMs for concerned data sets have been done on the basis of two comparison parameters Bias and SSE.

1569791515   **Use of Computer Vision to Detect Tangles in Tangled Objects**

Paritosh Parmar

Abstract - Untangling of structures like ropes and wires by autonomous robots can be useful in areas such as personal robotics, industries and electrical wiring & repairing by robots. This problem can be tackled by using computer vision system inrobot. This paper proposes a computer vision based method for analyzing visual data acquired from camera for perceiving the overlap of wires, ropes, hoses i.e. detecting tangles. Information obtained after processing image according to the proposed method comprises of position of tangles in tangled object and which wire passes over which wire. This information can then be used to guide robot to untangle wire/s. Given an image, preprocessing is done to remove noise. Then edges of wire are detected. After that, the image is divided into smaller blocks and each block is checked for wire overlap/s and finding other relevant information. TANGLED-100 dataset was introduced, which consists of images of tangled linear deformable objects. Method discussed in here was tested on the TANGLED-100dataset. Accuracy achieved during experiments was found to be74.9%. Robotic simulations were carried out to demonstrate the use of the proposed method in applications of robot. Proposed method is a general method that can be used by robots working in different situations.

1569816639   **A Robust Video Stabilization Using Optimized Dynamic Time Warping**

Deepika Shukla, Rajib Kumar Jha

Abstract - Video stabilization has become a demanding field with the emerging compact and handy imaging devices in the market. Videos recorded with these devices mostly suffer from some unwanted jittery motions induced due to shaky hands or environmental vibrations. This paper presents an efficient Dynamic Time Warping (DTW) approach for the translational jitter stabilization in the recorded videos. The approach utilizes the dynamic programming for the optimized performance. The use of dynamic programming based DTW gives a significant improvement in the processing speed and memory consumption over the classical DTW approach. The algorithm has been tested on different categories of video like moving platform, homogeneous regions and low quality blurred videos, which are generally considered as bottleneck problems for accurate motion estimation. The proposed approach provides better stabilization in relation to the existing intensity based methods and the computational efficiency is inherited from recursive property of dynamic programming. Comparative analysis of results is given in terms of difference frame analysis and overall performance evaluation is given using inter-

frame transformation fidelity (ITF) factor and processing time.

1569787463   **Development of Machine Vision Solution for Grading of Tasar Silk Yarn**

Abhra Pal, Tamal Dey, Amitava Akuli, Nabarun Bhattacharyya

Abstract - Quality of Tasar fabric demands uniform colored silk yarn during weaving. But, the variation of yarn colour depends on various natural factors like eco-race and feeding of silkworms, weather conditions etc and other production factors. So, silk yarns need to be sorted after production. At present, yarnsare sorted manually by a group of experts which is subjective innature. Again, due to lustrous nature of silk yarn, it reflects lightand therefore it is difficult to ascertain the exact colour manually. Slight variation in colour is difficult to detect manually but the market demands lots with perfectly uniformly coloured yarns within the lot though the inter-lot variation in colour is encouraged. So, there is need to develop a solution which can grade the silk yarn objectively, reliably and mimic the human perception. This paper proposes a new machine vision solution for automatic grading of silk yarn based on its colour. The system consists of an enclosed cabinet which encompasses of a low cost digital camera, uniform illumination arrangement, weighing module, mechanical arrangement for sample holding and a grading software which applies image analysis technique using CIELab colour model with rotational invariant statistical feature based hierarchical grading algorithm for colour characterization. Performance of the system has been validated with the human experts and accuracy has been calculated as 91%.

Session 2   *3D Shape and Structure Analysis*

1569813543   **Gesture Recognition Using Kinect for Sign Language**

Harsh Vardhan Verma, Eshan Aggarwal, Satish Chandra

Abstract - Sign Language is a widely used method of communication among the community of deaf-mute people. It contains some series of body gestures, which enables a person to interact without the need of spoken words. Although the use of sign language is very popular among the deaf-mute people but the other communities do not even try to learn it, this creates a gulf of communication and hence becomes a cause of the isolation of physically impaired people. The problem creates a requirement of a system, which can facilitate a way of communication between these two communities. This paper presents a novel method for identification of an isolated sign language gesture using Microsoft Kinect. This paper presents the way of extracting some highly robust features from the depth image provided by Kinect and to use them in creating a robust and accurate gesture recognition system, for the purpose of sign language translation. Apart from translation, the proposed system also opens the doors of endless applications in the field of Human Computer Interaction. The proposed algorithm helps in translating a sign language gesture performed by a user, which in-turn can be used as an input for different types of applications.

1569790881   **Hybrid 3D Registration Approach Using RGB and Depth Images**

Imran A Syed, Bishwajit Sharma

Abstract - We propose a novel technique for registration of 3D point sets using both the RGB data as well as the depth data. The main advantage of any RGB-D sensor is the pixel wise correspondence between RGB values and depth values, which can be leveraged to register two RGB-D datasets. RGB images are used for correspondence identification and these correspondences are transferred to depth images to be used

for the registration algorithm. RANSAC is used for rejection of noisy data points, which increases the registration accuracy. We also analyze and present an error threshold selection strategy for fitting 3D points. Our approach achieves faster execution, thus enabling real-time implementation of change detection and 3D mapping of the environment, etc. Multiple feature extraction methods have been tested to evaluate tradeoffs between accuracy and time.

1569826085 **Formulation of Hierarchical Framework for 3D-GIS Data Acquisition Techniques in Context of Level-of-Detail (LoD)**

Parag Wate, Sameer Saran, S. K. Srivastav, Y.V.N. Krishna Murthy

Abstract - Two-Dimensional Geographic Information Science (2D GIS) development has reached its highest level in terms of acquisition, processing, analysis and presentation techniques. Further development in 2D GIS is restricted due to its 2D abstraction of real world objects which are having third dimension (3D) in practical world. The abstraction of 3D real world objects is of extreme importance for user applications to address issues related to infrastructure development, entertainment, tourism, sustainable management of cultural sites and to tackle effects of various social and environmental factors. Hence, formulation of mechanism to model 3D real world objects and its phenomena especially related to urban segment from data acquisition and analysis perspective is essential. The 3D GIS data acquisition techniques such as Satellite Photogrammetry, LIDAR data processing, Building structure extraction algorithms, Close-Range Photogrammetry and total station survey contribute significantly towards generation of 3D digital models. Most of 3D GIS analysis largely depends upon 3D data structure and on data acquisition mechanism in particular. The structured way of data acquisition facilitates encoding of same into common information model which further aids in complex GIS analysis. Therefore, this paper proposes a structured mechanism for data acquisition in context of hierarchical framework of Level-of-Detail (LoD).

1569791697 **Virtual Walkthrough of Data Centre**

Dhirendra Kumar Verma, Alpana Rajan, Amit Paraye, Anil Rawat

Abstract - Virtual reality has been common part of many domains and has drawn much attention in last few years. Virtual reality allows us to simulate the real world, or to build new worlds of our own imagining. Creating virtual reality applications has always been a critical factor for practitioners belonging to different areas such as universities, industries, and R&D sectors. This paper gives an idea for developing a virtual reality application 3D Visualization and walkthrough of Data Centre. The paper first examines underlying components and key concepts of the technology used to develop the application. The paper then elaborates the development workflow and simulation pipeline of the application. EON Studio is used to develop this application which is a complete GUI based authoring tool for developing interactive 3D applications. The application presently facilitates walkthrough of Data Centre in 3D space to monitor a specific component more closely with the help of stereo projection system, stereo eye wear, and stereo emitter. The application also provides feedback about current space utilization of the Data Centre that will help Data Centre Administrator to make key consolidation and expansion decisions. Finally, the paper discusses some future enhancements to convert the existing application into pure virtual environment, in which individuals can immerse themselves fully in the virtual environment and can interact with 3D objects.

1569781185 **Lunar Impact Crater Modeling Using Trinocular Stereoscopic Depth**

Inpainting
Raghavendra H. Bhalerao, Shirish S.Gedam

Abstract - In this paper, a novel approach of stereoscopic depth in painting is presented to model lunar craters. In case of lunar mission, the disparity map generation using stereoscopic images is limited by shadows inside impact craters. Impact craters are most important features on lunar surface but cannot be modeled using stereo cue alone. Taking the importance of crater modeling and limitations of stereo cue into consideration, We are proposing stereoscopic depth in painting method as an additional method to model the lunar impact crater.

1569795161   **3D Modeling of Indoor Environments Using KINECT Sensor**
Arafa Majdi, Mohamed Chafik Bakkay, Ezzeddine Zagrouba

Abstract - 3D scene modeling for indoor environments has stirred significant interest in the last few years. The obtained photo-realistic rendering of internal structures are being used in a huge variety of civilian and military applications such as training, simulation, patrimonies conservation, localization and mapping. Whereas, building such complicated maps poses significant challenges for both computer vision and robotic communities (low lighting and texture less structures, transparent and specular surfaces, registration and fusion problems, coverage of all details, real time constraint, etc.). Recently, the Microsoft Kinect sensors, originally developed as a gaming interface, have received a great deal of attention as being able to produce high quality depth maps in real time. However, we realized that these active sensors failed completely on transparent and specular surfaces due to many technical causes. As these objects should be involved into the 3D model, we have investigated methods to inspect them without any modification of the hardware. In particular, the Structure from Motion (SFM) passive technique can be efficiently integrated to the reconstruction process to improve the detection of these surfaces. In fact, we proposed to fill the holes in the depth map provided by the Infrared (IR) kinect sensor with new values passively retrieved by the SFM technique. This helps to acquire additional huge amount of depth information in a relative short time from two consecutive RGB frames. To conserve the real time aspect of our approach we propose to select ky-RGB-images instead of using all the available frames. The experiments show a strong improvement in the indoor reconstruction as well as transparent object inspection.

1569816725   **Ontology Development Using Hozo and Semantic Analysis for Information Retrieval in Semantic Web**
Gagandeep Singh, Vishal Jain, Mayank Singh

Abstract - We are living in the world of computers. This modern era deals with a wide network of information present on web. A huge number of documents present on web have increased the need for support in exchange of information and knowledge. It is necessary that user should be provided with relevant information about given domain. Traditional Information Extraction techniques like Knowledge Management Solutions were not so advanced that they can lead to extraction of precise information form text documents. It leads to the concept of Semantic Web that depends on creation and integration of Semantic data. The Semantic data in turn depends on building of Ontology. Ontology is considered as backbone of Software system. It improves understanding between concepts used in Semantic Web. So, there is need to build an ontology that uses well defined methodology and process of developing ontology is called Ontology Development.

Session 3 *Motion and Video Analysis*

1569816785 **Recognizing Fast Moving Objects At Normal Human Perception Rate**

Birmohan Singh, Dalwinder Singh, Gurwinder Singh

Abstract - Human visual system has limits as compared to machine based visual systems. Time required for understanding a scene from surroundings is one of them. Due to which fast moving objects become invisible to human eye. In this paper, a technique has been proposed which helps the human beings to see fast moving objects. The idea is to put all the information from some of the previous frames to a single frame. The number of frames from which information is going to be extracted depends upon defined parameter. The video sequences that are recorded using high speed cameras are collected and proposed algorithm is applied to these video sequences. Experimental results show the improvement in recognizing the fast moving objects.

1569787389 **Fast Epipolar Resampling of Trinocular Linear Scanners Images Using Chandrayaan-1 TMC Dataset**

Raghavendra H. Bhalerao, Shirish S. Gedam, Andrés Almansa

Abstract - In remote sensing linear scanners are widely used for acquiring stereo images as they provide data with very high resolution. A trinocular stereo view increases the accuracy of 3D modeling as it gives an additional view to compensate occlusions. However, data in triplet mode by linear scanners is challenged by data processing steps, which lead to a new research area for remote sensing society. In various earth and planetary missions such as ALOS PRISM, Chang'e-1, Pleiades and Chandrayaan-1a trinocular stereo sensor was used to capture data in triplet mode. The sensor used is a linear push broom scanner with 3 linear array sensors looking in three directions of Aft, Nadir and Fore, which captures trinocular stereo images in along track mode. This exploration has enabled availability of large science planetary data publically but some parameters are not available as RPC parameters. Without these parameters for generation of digital elevation model (DEM), the images are required to be re sampled to the epipolar geometry and then matched using area based methods. So that corresponding conjugate points can be determined, using which, parallax and finally the elevation can be estimated. In case of linear scanners, the epipolar geometry is quite challenging and it is not as straightforward as for a perspective (pin hole) frame camera. The third view gives an additional complexity to the system. These three aforestated points increase the difficulty of DEM generation for planetary missions. In this paper based on the triplet of images from linear scanner the geometrical relations are established between the three images and a method is proposed for fast epipolar resampling of triplet of images.

1569793839 **A Variational Approach for Optical Flow Estimation in Infra-Red or Thermal Images**

Sanoj Kumar and Sanjeev Kumar, Balasubramanian Raman

Abstract - The most important application of the thermo vision system is the detection and tracking of moving objects in infrared images. In this paper, we have designed an approach for estimating the optical flow in thermal image sequences. This optical flow estimation approach is based on local as well as a global method which takes the advantages of both the brightness constancy assumption and spatiotemporal smoothness constraints. A new nonlinear cost function is designed

with these constraints. This nonlinear cost function is minimized by the modified steepest descent method. The estimated optical flow fields demonstrate a high level of random motions caused by thermal noise. The experimental results show the robustness of the proposed method.

1569810885 Depth and Scale Modeling of Object for 3D Motion Analysis in Video

Gurjit Singh Walia, Rajiv Kapoor, Satbir Singh

Abstract - The aim of this paper is to introduce the robust models for scaling and speed relations, with reference to the 3Ddistance from the camera, in order to enhance the target tracking and localization efficiency. The estimated distances of the object, using our model, from the camera is useful for handing both, self-occlusion and inter-object occlusion efficiently. Apart from the above, scaling factor estimation is useful for efficiently tracking the object under multi person tracking scenario. In order to establish our models, we have taken different sets of video sequence from standard video set captured under different environments. Curve fitting methods were applied in order to deduce the robust scaling and speed model for 3D motion analysis in single view video sequences.

1569787969 Mu-MoR: Multiple Moving Object Recognition Using Gabor-PCA Approach

M.T Gopala Krishna, M. Ravishankar, Ramesh Babu

Abstract - Moving object recognition in the field of intelligent video surveillance system is a most crucial task. Security has become a major world-wide concern since many criminal events occurred across world. Monitoring such activities currently rely on technology and man power. However, automatic monitoring has been advanced in order to avoid potential human errors that can be caused by different reasons. To overcome these limitations, intelligent video surveillance system is developed form monitoring moving object recognitions. Moving object recognition remains challenging due to cluttered backgrounds, varying illumination. All in all, these make it necessary to develop exceedingly robust approaches. This paper introduces multiple moving object recognition (Mu-MOR) system based on Gabor-PCA approach and Angle based distance similarity measures techniques used to recognize the object as a human, vehicle etc. Experimental results show that our proposed approach achieves good recognition rate. Thus, the system Mu-MOR provides a simple & efficient of recognition of multiple moving objects.

1569830915 Object Tracking Using Joint Enhanced Color-Texture Histogram

Manoj Diwakar, Pawan Kumar Patel, Kunal Gupta, Chetan Chauhan

Abstract - Object tracking is an important task within the field of computer vision. There are two key steps in video analysis: detection of interesting moving objects and tracking of such objects from frame to frame. Mean shift object tracking algorithm is a feature based algorithm. In this paper color information of object are extracted as well as texture information is also extracted by using local binary pattern technique to represent the object. In joint color-texture histogram region of interest is extracted and then edges and corners are extracted from the region of interest. Color histogram is insensitive to non-deformation and partial occlusion but it does not perform well when in case of color aberration. To overcome this drawback Local Binary Pattern method is used. This feature makes this algorithm more efficient in comparison of color histogram algorithm.

Session 4 *Segmentation and Grouping*

1569788125 **An Adaptive Seed Point Selection Technique for Segmentation of Polarimetric Synthetic Aperture Radar Images**

Sanjay, D. Chaudhuri, Manish P. Singh, Abhai Mishra

Abstract - The performance of the most popular unsupervised clustering algorithm, k-means depends on the initial seed points. This paper proposes a mode based adaptive seed selection algorithm, which is used to improve the performance of Wish art segmentation for the segmentation of polarimetric synthetic aperture radar images.

1569819125 **Obstacle Detection System for Visually Impaired People**

Avneendra K Kanva, Chandan Jyoti Sharma, Tarun Kumar Rawat

Abstract - This paper describes an obstacle detection system for visually impaired people using image processing in MATLAB. This system, together with an ultra-sonic sensor interfaced with Arduino, detects stairs and doors (with or without signage) and calculates distance of these objects from the user. This information is conveyed to the user through a speaker. The results show satisfactory accuracy in detecting stairs and extracting signage on doors.

1569813785 **Graph-Based Superpixel Labeling for Enhancement of Online Video Segmentation**

Alaa E. Abdel-Hakim, Mostafa Izz, Motaz El-Saban

Abstract - In this paper, we propose a novel approach for video segmentation. The proposed work is based on exploiting a super pixel-based image segmentation approach to improve the performance of state-of-the-art foreground/background segmentation techniques. A fusion between a bi layer segmentation and a geodesic segmentation approaches with a graph-based super pixel segmentation method is performed. Four different combination alternatives are investigated in terms of performance and efficiency. Manually labeled ground truth video sequences as well as our own-recorded video sequences were used for evaluation purposes. The evaluation results confirm the potential of the proposed method in enhancing the accuracy of the video segmentation over the state-of-the-art.

1569800293 **Performance Evaluation of Localized Person Based Scene Detection and Retrieval in Video**

Neetirajsinh J. Chhasatia, Chintan U. Trivedi, Komal A. Shah

Abstract - In this paper work regarding person localization using novel approach has been carried out. Person localization is the first step in all the surveillance application in multimedia and human-computer interface applications. The objective of this paper is to address a system for a person localization system, which describes important tasks of video content analysis, namely, video segmentation, localizing the person and their identification. Video segmentation involves partitioning a video sequence into several smaller meaningful units, based on temporal discontinuities in the video sequence. A novel framework is proposed for combined video segmentation and retrieval of scene with object/person localization. In which the dominant regions as a large area of the frame have been tracked throughout a shot and then stable features are extracted. Dominant region based effective parameters

(DREP) model, which includes low level features of the proposed model. Here the low level features are referenced as the color of dominant region, edges, area, centroid and position of a particular object or person to is localized in the video. Based on the extracted information dimensional processing is used to extract images of faces or the required objects. The simulated results based on the presented algorithm shows good performance. Also it is highly robust to camera, objects motions and can with stand illumination changes even in different poses in the sequences of the images.

1569794471   **Saudi Riyal Coin Detection and Recognition**
Rawan S. Hassoubah, Amel F. Al Jebry, Lamiaa A. Elrefaei

Abstract - Coin detection and recognition applications play an important role in computer vision and in industry. Many applications have been developed to detect coins and estimate its corresponding values either by camera picture or mobile devices. This paper proposes a system that uses number of computer vision techniques to detect and recognize coins applied to Saudi riyal currency and returns its estimated values. The main goal goes around differentiating between different divisions of the same currency.

1569791249   **Indian Topographic Map Symbols Understanding System**
Nikam Gitanjali Ganpatrao, Jayanta Kumar Ghosh

Abstract - Recognizing symbol is the first step in using a topographic map. Despite the prerequisite for extraction of information from topographic map, automated understanding of symbols is a challenging task. The objective of this paper is to explain the development of a system for automatic understanding of symbols from the Indian topographic map. The system has been developed making use of shape analysis method in which complex valued chain coding has been used for representation of the exterior boundary of the shape of the symbol. Fourier discrete transform and Auto-correlation function have been used to define shape descriptors. Classification and recognition have been implemented through template matching method and Similarity measures. The system is trained with 150 samples of each of 20 types of symbols from National digital topographic database (NTDB) for OSM of Indian topographic maps. The developed system is tested for 200 samples of each type of symbol from NTDB. It is found that 84.68% of symbols are understood correctly by the developed system. However, there are some inherent limitations in understanding the symbols from an actual map.

1569818535   **Multiclass Image Classification Using Multiscale Biorthogonal Wavelet Transform**
Om Prakash; Manish Khare; Rajneesh Srivastava; Ashish Khare

Abstract - Image classification is an important problem because of its applications in many fields like shape analysis, object tracking, image retrieval etc. Many techniques have been proposed in literature for classification of objects into two classes. Multi class image classification with high accuracy is a challenging task. In this paper we propose a new algorithm for multi class image classification that uses biorthogonal wavelet transform as image feature. Original images are decomposed into subbands LL, LH, HL and HH using Biorthogonal wavelet transform at multiple scales. The coefficients of LH, HL, HH subbands are used as features for classification. The approximate shift invariance and linear phase properties of

Biorthogonal wavelet transform are useful for classification of images. Also, the lifting-scheme of Biorthogonal wavelet yields reduced computational cost. Quantitative evaluation of classification accuracy demonstrates the strength of the proposed method.

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Session 5   *Motion and Tracking*

1569819427   Automatic Cameraman for Dynamic Video Acquisition of Football Match

Bikramjot Singh Hanzra, Romain Rossi

Abstract - A system is described for dynamic video acquisition of football match. The system uses 2 cameras, a static and a dynamic camera. The raw frames from the static camera are processed to track player position in the field. The tracking data is then used to control a Pan Tilt Zoom (PTZ) Camera that focuses on the area of maximum player density. Other than this the players are also classified into their respective teams, 2D representation of player with respect to field, offside line detection is also done using the static camera frames. Use of multiple static cameras is also discussed in the paper.

1569791569   Robust Self Localization by Edge Feature Tracking

Sezal Jain, Disha Prakash, Venkatesh K Subramanian

Abstract - Feature tracking algorithms have traditionally relied on point features and the use of edges as features is under investigated. Our paper, addresses the "Line segment" as the highlighted edge feature. In order to track the visible motion between two images, we have used the intersection points between pairs of line segments, which are more stable than the center or end points or any single line-segment reference. In this paper, we address at length the problems associated with segment extraction and use a method which breaks curved edge into a reliable straight line segment by putting a limit on its curvature. A straightforward approach toward tracking is discussed by defining geometric information as well as neighboring elements for a line segment feature. Finally, we conclude with a technique to reject outlier matches of line segments by using virtual intersection points to improve tracking.

1569814921   Real Time System for Robot Navigation

Aman Pratap Shakya, Govind Kumar Jha.

Abstract - This paper is concerned about providing the real-time navigation to robots. In this text we will try to find the optimal solutions of two difficult problems in robot motion planning. First problem is to find the optimal path to the target (for robot to navigate) and second is to avoid the obstacles that come across its path. We are using the 2-D map of the location (location may be building or any other structure) to find the optimal path while the camera will assist the Robot for capturing the images so that it can produce the 3-D map of the surroundings to avoid the obstacles. At the end, the learning phase is introduced to make the Robot more intelligent for navigation.

1569817019   An Efficient Algorithm for Human Tracking in Visual Surveillance System

Ashish Kumar Sahoo, Sandeep Patnaik, Pradyut Kumar Biswal, Alok Kumar Sahani, Padma Bhushan Mohanta

Abstract - This paper focuses on algorithms, which are used to count the number of people moving in or out of an area supervised by a single fixed overhead camera. The algorithms presented here have the capability of determining people count for a single person as well as for multiple people crossing the range of camera. The overall mechanism has been divided into five modules and each one of them has been explained in detail. An efficient algorithm has been proposed for tracking single as well as multiple persons in the scene with the help of tracking using the center of gravity approach. Counting is basically, done by tracking the person/people in the range of camera. The proposed system, however, faces certain limitations like the background must be constant, illumination should be invariant, static object problem etc.

1569819517 **Online Detection and Tracking of Moving Objects Based on Iterative Background Subtraction**

Khansa Ayari, Walid Barhoumi, Ezzeddine Zagrouba

Abstract - The present work aims to propose a method for online detection of multi-person in a video sequence acquired with a single freely moving camera. To do this, we have adopted a background subtraction approach that can provide the best compromise between performance and reliability. Indeed, the background modeling requires an online construction of a panoramic image synthesizing the visual content of the scene. Then, we proceeded to estimate binary masks of moving people in the current arrived frame using an iterative background subtraction. Once the moving foreground objects are detected, they are accurately separated into moving persons. Preliminary experiments on real-world videos showed that the proposed method allows to correctly detecting multi-person on-the-fly under different occlusion situations.

1569819077 **Review on Different Change Vector Analysis Algorithms Based Change Detection Techniques**

Sartajvir Singh, Rajneesh Talwar

Abstract - Detection of Earth surface changes is essential to monitor regional climatic changes, avalanche hazard analysis and energy balance studies that occurs due to air temperature anomalies. Geographic Information System (GIS) enables such research activities or procedures to carry out through change detection analysis. From this perspective, different change detection techniques have been developed for Land-Use Land-Covered (LULC) region. Among the various change detection techniques, Change Vector Analysis (CVA) has levelheaded capability of extracting maximum information in terms of overall magnitude of change and the direction of change between multi-temporal multi-spectral bands satellite datasets. Recently developed CVA techniques such as CVA in Posterior Probability Space (CVAPS), Cross Correlogram Spectral Matching (CCSM) based CVA, CVA using enhanced Principal Component Analysis (PCA) and Inverse Triangular (IT) Function, and Median CVA (MCVA), are effective LULC change detection tools. This paper presents a systematic survey on recently developed CVA algorithms along with their characteristics, features and shortcomings. This paper also summarized the necessary pre-processing steps such as geometric corrections, atmospheric corrections, radiometric corrections and topographic corrections for flat surface as well as rugged mountain terra into correct the estimated spectral reflectance value. It is expected that this reviewed paper on different CVA techniques gives an effective guidance to

algorithm designers for modifying and developing CVA based change detection techniques that effectively use the diverse and complex remotely sensed data for detection of flat as well as undulating surface changes.

TRACK 3–Image Security & Forensics

Session 1   *Image Forensics*

1569790175   **Multispectral Palmprint Identification by Hybrid Haar Wavelet Employing Multiple Score Level Fusion Modus Operandi**
H. B. Kekre, Pranay Naresh Arya, Aashita M. Irani

Abstract - The Hybrid Haar Wavelet proposed in this paperis simple to generate and exhibit an excellent value of EER assystem implementation. The Hybrid Haar Wavelet is generated by reiterated kronecker product of basis haar wavelet with itself. This paper describes a new method to authenticate individuals based on their palm print identification. ROC plot of FMR v/sFNMR is generated based on the values obtained by score levelfusion of red, blue, and green palm scans. The Hybrid Haar Wavelet proposed in this paper provides for a fool-proof system with GAR of 91.2% at a threshold of 7. One-to-many identification of 6000 multi-spectral palm print images from 500different palms is used to validate the performance of the system,with 14 fusion schemes proposed to increase GAR while reducingFMR of the system. Minimum EER obtained is 2%, with amaximum GAR of 100%. The system being fool-proof can be efficiently implemented for high security applications like military access.

1569805207   **Ocular Detection for Biometric Recognition**
Rohit Dattatray Ekatpure, Sandipan Pralhad Narote

Abstract - Ocular biometric has created vital progress overpast decade among the all biometric trains. The white region of eye is sclera, which is exposed. The sclera is roofed by the thin clear wet layer referred as conjunctiva. Conjunctiva and episclera contains the blood vessels. Our aim is to segment the sclera patterns from the eye footage.This paper focuses on the detection of ocular region fromthe eye image, enhancement of blood vessels and feature extraction. The features extracted from ocular regions are used for biometric recognition.

1569794941   **Hand Shape Based Biometric Authentication System Using Radon Transform and Collaborative Representation Based Classification**
Ahana Gangopadhyay, Oindrila Chatterjee, Amitava Chatterjee

Abstract - Biometric authentication systems are used toidentify individuals based on their unique physiological and behavioral characteristics for access control and security enhancement. In this paper, we propose a novel method of authentication using hand images by collaborative representation based classification (CRC). The contour or hand shape of a query image is extracted by morphological operations and its radon transform is computed along an optimal direction to produce unique one-dimensional feature vector. The feature vector of thequery image is then coded over similarly processed training samples from all subjects (or classes) and identified as a member of the class, which produces the least reconstruction residual by

regularized least square (RLS) instantiation of collaborative representation. Extensive experiments were conducted on a database of 300 images employing two different mathematical operators for dimensionality reduction of acquired feature vector.

1569791013 **Face Recognition Using Gradient Based Local Feature Matching**

Jyoti Nigam, Tejas Gandhi

Abstract - In this paper, a measure that computes dissimilarity score is proposed that can be used to find out the distance between two face samples. Gradient Binary Pattern are applied over face samples to transform them into some robust representation. Later corner features are extracted and they are tracked using KL-tracking and the number of unsuccessfully tracked corners are counted between each testing and training images. Four publicly available face databases are used for system testing, viz. YALE, BERN, ORL, CALTECH.

1569790151 **ECR (Encryption with Cover Text and Reordering) Based Text Steganography**

Sahil Kataria, Kavita Singh, Tarun Kumar, Maninder Singh Nehra

Abstract - This paper presents ECR (Encryption with CoverText and Reordering) based text steganography approach which works on simple encryption technique using ExOR Operation of two characters and reorder them, which would be more secured and hard to fetch original message from enciphered text. Our encrypted text is reordered using Eight bit random key for hiding our data in a more secure way. Our Eight bit random key will contain four number of zero and four number of one where one bit describes our encrypted text and zero bit describes cover text. We are also merging our random key with our enciphered text atthe last. We are also presenting comparison of our proposed approach with some of the previous popular text stegano graphic approaches with load time and also the data which will be required to be enciphered using n bit cover text. At the last weare showing that how our approaches are performing best in the existing approaches. As our approach generates 2n bytes where nare no. of bytes in our plain text and n bytes for cover text and reordering using random key.

1569795115 **A Novel Visual Cryptography Scheme Based on Substitution Cipher**

Gyan Singh Yadav, Aparajita Ojha

Abstract - Security of information communication through open channels has been the prime concern during the last few decades. Apart from many conventional cryptographic schemes, visual cryptographic techniques have also been in use for data and information security. Visual Cryptography is basically a cryptographic method in which decryption is performed by human visual system. In this paper, we present a novel visual cryptography scheme based on a substitution cipher and random grid. The scheme uses two-fold encryption. In the first fold of encryption, Caeser cipher is used to encrypt the image row wise and then column wise using a key of the size equal to the greatest common devisor of the number of rows and columns in the secret image. Then a random matrix is generated and the transformed secret image is XORed with this random matrix to enhance the security. The scheme is shown to be secure and decryption is also lossless.

1569789813 **A Hybrid Approach for Image Security by Combining Encryption and Steganography**

Jaspal Kaur Saini, Harsh K Verma

Abstract - data is more used on internet so it is desired to secure the data before transmitting. Various algorithms have been researched and proposed in this regards. This paper presents the hybrid approach for image security that combines both encryption and steganography. First the image is encrypted using proposed new version of AES algorithm, which is then hided into cover image using the steganography concept. Experimental results and analysis is shown. This hybrid approach provides greater security against attacks.

1569848485   Performance Comparison of Wavelet Filters Against Signal Processing Attacks

Amit Kumar Singh, Mayank Dave, Anand Mohan

Abstract - The rapidly growing field of digital contents (image, audio, and video) has incited the need of copyright protection and content authentication, which can be used to verify against any unlawful attempt to either reproduce or juggle them in order to change their identity. Digital watermarking is a method providing a best result to the trouble of copyright protection and content authentication of digital contents. However, the digital contents can be easily obtained or facsimiled, misrepresented, distributed and stored. In this paper, we present the image watermarking method depends on the two most popular transform methods such as discrete wavelet transforms (DWT) and singular value decomposition (SVD). Based on observations, this algorithm combines the advantages and removes the disadvantages of these two transforms techniques. Also, we compare the results obtained from different wavelet filters against the number of signal processing attacks. This scheme is provides robust watermark without degradation of image quality.

Session 2   *Image Security*

1569815527   Newly Framed Cryptosystem for Color Images
Taranjit Kaur, Reecha Sharma

Abstract - Security of confidential information is always at threat. In present days safeguarding information, in form ofimages is a major-league and demanding process as compared totext encryption due to high correlation among pixels and huge information capacity. Due to this, novel cryptosystem TJ-ACA in CBC mode algorithm is proposed for encrypting images, in which shortcoming of TJ-ACA and TJ-SCA of not repelling differential attack is removed. In this paper, these three algorithms arebriefly discussed and security decisive tests of all three cryptographic algorithms are calculated and compared. All algorithms work well for color images and lossless decrypted image is recovered. All the algorithms are private key algorithms and are also applicable for steganographed images.

1569814077   A Fast DCT Based Method for Copy Move Forgery Detection
Sunil Kumar, Jagannath Desai, Shaktidev Mukherjee

Abstract - Copy move forgery detection is emerging as one of the hot research topic among researchers in the area of image forensics. Many techniques have been suggested to detect such type of tampering with the original image, but the problem is far from being solved. Some issues still remained either unsolved or there is a lot of scope for performance improvement. Block matching algorithm or block tiling algorithm is the most commonly used method to detect the duplication in the image.

One of the major challenges is the time complexity of such algorithms. As the image size increases, the number of overlapping blocks increases rapidly and feature collection and matching takes relatively long time. In the proposed method this issue has been addressed without compromising the quality of the method. Discrete Cosine Transform (DCT) is used to represent the features of overlapping blocks. Also effort has been made to automate the threshold for separating the stray matches from the authentic matches.

1569814459   Private Chaotic Biometric Template Protection Algorithm
Sanaa Ghouzali,Wadood Abdul

Abstract - Biometric authentication systems have proven apriority over traditional systems like passwords. But while biometrics ensure uniqueness; they do not provide secrecy and security of the users data. Many attacks can be launched against biometric systems resulting in the reduction of these systems credibility. Specially, the attack on the biometric templates stored in the system database consists an attack on the integrity of these templates. In this paper, we present the design and development of a new approach for biometric template protection based on the chaotic behavior of logistic map. The proposed biometric template protection algorithm satisfies the requirements of revocability, diversity and privacy. Moreover, experimental results conducted on several face databases show the ability ofthe proposed scheme to preserve the performance of the protected system.

1569816079   An Overview of Face Recognition in an Unconstrained Environment
Rishav Singh, Hari Om

Abstract - Face recognition in an unconstrained environment is still a challenging problem. Variations in aging, partially visible faces, expression, illumination, pose, disguise, and twin faces are considered as basic challenges in face recognition. This paper presents a comparative study of existing 2D and 3D face recognition.

1569815145   Analysis of Secured Video Steganography Using Computer Forensics Technique for Enhance Data Security
Sunil. K. Moon, Rajeshree. D. Raut

Abstract - Steganography is used to hide the messages inside other harmless messages in a way that does not allow any enemy to even sense that there is a second secret message present while the purpose of computer forensics is that it provides security from covert communication dealing with digital data and covert communication channel. In this paper, we used video as covermedia for hiding the secret message and used computer forensics as tool for authentication. Our aim is to hide an image and textbehind a video file. Suitable algorithm such as 1LSB, 2LSB, 4LSB is used and 4LSB method found to be good for hiding more secret information data. This paper deals with the idea of video steganography, cryptography and the use of computer forensic techniques in both investigative and security manner.

1569774815   Thermal Human Face Recognition Based on Gappy- PCA
Ayan Seal, Mita Nasipuri, Debotosh Bhattacharjee, Dipak Kumar Basu

Abstract - Over the last forty years several different techniques have been proposed for human face recognition. This has been used in different application especially in the field, where security is the main concern. Most of the face recognition algorithms work on visual face images. But the visual face images have several drawbacks because the quality of the visual images degrades gradually with the increase of

darkness. So, face recognition system doesn't work properly when illumination changes. But thermal infrared camera can capture the same images even in dark situation which means thermal images are illumination independent. We have proposed a Gappy PCA based thermal human face recognition technique for frontal faceonly. The results obtained on testing sets, about 98.61% correct recognition using this technique.

1569791247 **Unusual Event Detection Using Sparse Spatio-Temporal Features and Bag of Words Model**
Balakrishna Mandadi; Amit Sethi

Abstract - We present a system for unusual event detection in single fixed camera surveillance video. Instead of taking a binary or multi-class supervised learning approach, we take a one-class classification approach assuming that training dataset only contains usual events. The videos are modeled using a bag of words model for documents, where the words are prototypical sparse spatio-temporal feature descriptors extracted along moving objects in the scene of observation. We learn a probabilistic model of the training data as a corpus of documents, which contains a certain probabilistic mixture of latent topics, using Latent Dirichlet Allocation framework. In this framework, topics are further modeled as certain probabilistic mixture of words. Unusual events are video clips that probabilistically deviate more than a threshold from the distribution of the usual events. Our results indicate potential to learn usual events from a few examples, reliable flagging of unusual events, and sufficient speed for practical applications.

TRACK 4 - Pattern Recognition

Session 1   *Technical Session*

1569812895 **Resourcesat-2 Image Restoration for Differential Pulse Code Modulation Compression Artifacts**
Anurag Pushpakar, Nitant Dube, Debajyoti Dhar, R. Ramakrishnan

Abstract - Remote sensing satellites use onboard compression techniques to overcome the limited bandwidth and increasing data volume requirements of images. On-board compression using Differential Pulse Code Modulation (DPCM) is implemented for Resourcesat-2, LISS-3 and LISS-4 sensors. Implemented DPCM is a lossy compression and hence renders artifacts, when images are decompressed on ground. In this paper, a technique for restorationof DPCM artifacts is proposed and its performance is evaluated during Mean Square Error (MSE) and Peak Signal to Noise Ratio (PSNR). Proposed technique is used as part of operational data products generation software and sample results are shown.

1569800133 **A Unified Framework for Geometry and Exemplar Based Image Inpainting**
V Sairam, R Raghunatha Sarma, S Balasubramanian, A Sai Hareesh

Abstract - Image inpainting is a process of retrieving missing portions of an image without introducing undesirable artifacts. Methods based on partial differential

equations, variational formulations and diffusion are local in nature. They work well in propagating the geometry of images into target region. However, they fail to predict the values for large missing portions of the image. Exemplar methods try to solve the shortcomings of the earlier methods by generating texture as well. They use a confidence map to determine the order fill-in. Nonetheless, they often fail to capture the coherence with respect to the surrounding region. In recent times, the trend is to unify these techniques to get best of the both worlds. In this direction, we have proposed a unified framework of geometry and exemplar based image in painting. A non-local variation image inpainting formulation is introduced using graph based regularization. The direction of inpainting is influenced by a confidence map. Gabor filter responses are utilized to automatically decide if diffusion or exemplar method to be used in the course of inpainting. Results show that our method performs better than the state-of-the art methods.

1569815977 **Copyright Protection of Color Images Using A Novel Wavelet Based Watermarking Algorithm**
Kaiser J. Giri, Mushtaq Ahmad Peer, P. Nagabhushan

Abstract - The field of digital watermarking being one of the important areas of research has received a lot of attention from researchers over last two decades, and a number of techniques have been developed. In this paper, novel watermarking scheme for copyright protection of color images using wavelets ispresented. The results obtained have clearly shown that the scheme is resilient to various attacks such as image compression, noise besides rotation, scaling and transformation.

1569815701 **A Dualistic Sub-Image Histogram Equalization Based Enhancement and Segmentation Techniques for Medical Images**
K. RajMohan, G.Thirugnanam

Abstract - Image segmentation plays a vital role in many medical imaging applications by automatically locating the regions of interest. Image segmentation is the most crucial functions in image analysis and processing. Also segmentation results affect all the subsequent processes of image analysis.Manual segmentation of medical image by the radiologist is notonly a tedious and time consuming process but also not very accurate. Hence it is necessary to develop medical image segmentation algorithms that are accurate and efficient. In this work, we propose a dualistic sub-image histogram equalization based enhancement and segmentation techniques. The proposed method has been tested and evaluated on several medical images. In this work, the medical image is lineated and extracted out sothat it can be viewed individually. The results demonstrate that the proposed algorithm is highly efficient over hierarchical grouping technique. This is validated using the performance measures such as completeness and clearness.

1569794625 **Evaluation of Penalty Function Methods for Constrained Optimization Using Particle Swarm Optimization**
L. Ashoka Vardhan, Arunachalam Vasan

Abstract - Solving complex problems with higher dimensions involving many constraints is often a very challenging task. While solving multidimensional problems with particle swarm optimization involving several constraint factors, the penalty function approach is widely used. This paper provides a comprehensive survey of some of the frequently used constraint handling techniques currently used with particle swarm optimization. In this paper, some of the penalty functional approaches for solving evolutionary algorithms are discussed and a comparative

study is being performed with respect to various benchmark problems to assess their performance.

1569789703 **Robust Content Based Image Retrieval Based on Multi-Resolution Wavelet Features and Edge Histogram**

C. Patvardhan, A. K. Verma, C. Vasantha Lakshmi

Abstract - The paper presents an efficient and simple approach for content based image retrieval. It utilizes the strength of multi-resolution wavelet transform and edge histogram to extract colorand texture features. The wavelet based color feature extraction scheme performs better than existing Mpeg-7 color descriptors. Texture features are extracted from the edge histogram obtained from wavelet coefficients of the image at multiple resolution levels. The multi-resolution approach helps in collecting texture details from finer to coarser levels providing better performance than existing Mpeg-7 descriptors. The combination of the two features is trained and tested for Wang's image database. The results of retrieval are expressed in terms of precision and recalland compared with existing schemes. The results show the superiority of the scheme. The proposed scheme is fairly robust against several types of image alterations.

1569792167 **Video Shot Boundary Detection Based on JND Color Histogram**

Nitin J. Janwe, Kishor K. Bhoyar

Abstract - The method of having detected the boundaries of a shot automatically in a stream of video is referred as shotboundary detection (SBD). This paper presents a novel method of shot boundary detection, based on the JND (Just Noticeable Difference) color histogram. Using JND color model, for every two consecutive frames in a video, histograms are computed and for this pair of histogram; a degree of similarity is computed.This is treated as an indicator for discontinuity between frames. In the presented, method, adaptive threshold based on sliding window is used to detect cuts and dissolve/fade gradualtransitions. The performance of the presented method is evaluated on open database videos using criteria Precision, Recall and combined measures. Results show that the performance of the presented method is outstanding in its category.

<u>Session 2</u>   *Object Recognition*

1569801617 **Expanding Small UAV Capabilities with ANN: A Case Study for Urban Areas Observation**

Rodrigo L. Mota, Luiz F. Felizardo, Elcio H. Shiguemori, Alexandre B. Ramos, Felix Mora-Camino

Abstract - Autonomous Unmanned Aerial Vehicles (UAVs) are available alternatives for urban areas inspections due to its cost and safety when compared to other traditional methods. The purpose of this paper is to report the development of a system capable of analyzing digital images of the terrain and identifies potential invasion, unauthorized alterations on the ground and deforestation in some areas of special use. Images are captured by a camera coupled to an autonomous helicopter, which flight around the area. For the processing of the images an artificial neural network technique called Kohonen SOM (Self Organized Map) will be used. The processing is actually a set of steps that seek to collate the final common characteristics of a given image.

1569791549   Automatic Flag Recognition Using Texture Based Color Analysis and Gradient Features

Saumya Jetley, Atish Vaze, Swapnil Belhe

Abstract - To add to the growing corpus of handy computer vision applications on smart-phones and Tablet PCs, this paperpresents our work on real-time Flag Recognition. The novelty of our attempt at recognizing country flags lies in a three-fold contribution - a 56805 flag images database, 38532 for training and 18273 for testing; a generic recognition approach suited not only to flags but also other insignia and object recognition tasks in which the major discriminative information lies in the relative spatial distribution of colors; and practical usability of the approach in a smart-phone application, being trained and tested on a diverse set of camera captured flag images and having real-time performance. With its large number ofclasses, little or no shape based difference, high inter-classcolor similarity, and much intra-class color variation, the 224country-flags database proves to be very challenging. Additionally, the real-time database incorporates considerable variation in texture, scale, illumination and viewpoint. Our work introduces an improved MSD approach in corporating new and revised criteria for HSV based color binning, appliesit in a 'by-parts' manner and reinforces it with gradient analysis to achieve an accuracy of 99.2% on the training setand an accuracy of 76.4% on the test set. For practical purposes, top-5 and top-10 results, accuracies have also been compiled over the test data, reaching 92.46% and 95.56% mark respectively.

1569795129   Improved Active Contour Model for Satellite Images

Pratibha P. Shingare, Madhuri M. Nagare, Chaitrali P. Joshi

Abstract - Snakes or active contours are used extensively incomputer vision and image processing applications, particularly to locate object boundaries. The traditional snake was sensitive to initialization of contour; also one snake wasable to detect one object only. In presented research work we have developed improved active contour model for detection of multiple objects well as edge detection in satellite images. We have proposed modified gradient vector flow as external force to make edge detection insensitive to initialization and to exact contour on edges. Method of capturing of relevant control points, so as to neglecting extra control points is introduced to get proper edges. For satellite images new techniques as pre processing to enhance edges by removing noise, double thresholding based method for deleting of excess control points, and average based thresholding for obtaining continuous edges by eliminating need of complex interpolationis developed. The algorithm is tested on variety of images and cases. Both internal and external initialization of contours gives satisfactory edges. Snake work efficiently for both noise free as well as noisy images. Algorithm also outperforms interms of time complexity as compare to other edge detection algorithm such as canny edge detector.

1569806061   A Rotation and Location Invariant Face Identification and Localization with or Without Occlusion Using Modified RBFN

Dhananjoy Bhakta, Goutam Sarker

Abstract - This paper presents a new modified Radial Basis Function Network (RBFN) for identifying and localizing faces with or without occlusion for single images as well as for multipleimage frame. The present method of facial identification is completely rotation and location invariant in the image frame.The technique of using the modified RBFN to perform learning of the different facial images and subsequent identification andlocation invariant localization of the clear, rotated and occluded faces is efficient, effective and fast. Also the identification rate

off aces in single and multi-frame is quiet moderate.

1569819415   **Medical Image Denoising From Similar Patches Derived by Rough Set**
Ashish Phophalia, Suman K. Mitra, Ajit K. Rajwade

Abstract - Current state-of-the-art research on denoising involves patch similarity. The similar patches are obtained eitherfrom image itself or from dictionary of patches. This paper proposes a new way to find similar patches from a given image using Rough Set Theory (RST). Search for similar patches is usually restricted locally. However, a global search could fetch patches which are more similar. The current RST based approach is enabling such search global and hence satisfying theNon-local principal which is the basis for patch based denoising. Like a few other denoising techniques, the framework of nonlocalmeans and principal component analysis both are then utilized to denoise medical images. The main essence of the current work reflects true sense of non-locality of similar patches. Exhaustive experiments clearly indicate comparability of the current proposal to the state-of-the-art methods in the light of several evaluation measures.

1569786869   **Recovery of Drawing Order in Handwritten Digit Images**
Anuj Sharma

Abstract - This paper presents recovery of drawing order that converts offline handwritten text to their online handwrittenformat. The offline text images are preprocessed using stages assize normalization, noise removal and thinning of text. We have proposed, a traversal algorithm to recover drawing order of digit images that convert offline image to online handwriting format and find trajectory direction using chain code features. The chain code features are extracted from the recovered trajectories and support vector machine has used as recognition technique to recognize text images. Our approach has been implemented with MNIST database and we have achieved an overall error rate as 2.61%.

1569816791   **Robust and Accurate Iris Recognition Using Improved Classical Hough Transform for IRIS Detection Methodologies**
Megha Chhabra, Nitin Bhatia

Abstract - The leading and distinguishing traits of digital image processing include feature extraction and recognition. The application area considered in this paper for same is 'iris recognition'. Circle Hough transform provides a robust technique for iris detection, but lacks speed owing to its high timecomplexity. This paper proposes a modified Circle Hough transform which significantly advances the speed of the process without compromising the correctness of the technique. Anextensive analysis is conducted for a large number of iris imagesand comparison results are shown. In order to achieve the objective, HT and its variations are competent tools. The work aims at reducing the time, computational complexity and memory requirements of CHT. To decrease computation time, HT space is partitioned into varying sized grids. These contribute in finding the considerable region of the image needed to be processed in future by CHT. Therefore, determining the valid region can be the important first step for fast detection. Results of robust tracking of the iris over a large number of images are presented. Time of execution of CHT is compared with proposed CHT using varying sized grids. The quality improves by 89.020% using 3 x 3 sized grids, 95.85% in 5 x 5 sized grids and 97.792% in 7 x 7 sized grids. Performance is effectively shown by graphs as well. Ideally, all the grid sizes should give accurate center and radius values along with the efficient performance. Fortunately, 3x 3 and 5 x 5 sized grids provide good results where as 7 x 7 sizedgrid lacks accuracy in same images. The reflected conclusion of experiments on image

sequences using different sized grids is that the accuracy gets compromised with grid size 7 x 7 and above.

1569819149   **ChuckMe: A Fast Chucking Detection Algorithm Using Silhouette Analysis of Cricket Videos**
Vejey Subash Gandyer

Abstract - In modern day cricket, bowlers are critically analyzed for their bowling action. Chucking, act of throwing the ball instead of bowling, gives the bowlers a great advantage over the batsmen. This paper tries to solve the problem in finding whether the bowler's delivery is legal or not. A real-time chucking detection is tried out using extracted silhouettes of the bowling action of the bowler. The proposed approach uses simple mathematical geometric concepts like slope & angle parameters on the thinned silhouette of the bowler's arm with two-camera view, one being side-on view and the other rear view. The proposed system alarms the umpire once the ball bowled is not a legitimate one. The proposed algorithm is tested on a collection of different bowling actions and results of the proposed approach with an acceptable precision & accuracy of the detection process is presented.

Session 3   *Object Detection and Categorization*

1569805659   **Identification of Military Vehicles in Hyper Spectral Imagery Through Spatio-Spectral Filtering.**
Meghavi Prashnani, Ravi Shankar Chekuri

Abstract - The application of Hyper Spectral Imagery (HSI) for identification, classification and status of a specific material based on its spectral characteristics has been demonstrated bythe researchers in past. In recent years, the use of Hyper spectral imagery in areas relating to tactical detection and classification of military vehicles is growing interest. However, literature on the suitable algorithms or methods for these type of applications are scarce if nonexistent. In this paper, authors are proposing a method for detecting sub pixel sized military vehicles in acquired hyper spectral imagery. In the proposed, approach Region Of Interests (ROIs) identified with Reed-Xiaoli (RX) anomaly filter, are processed using spectral-spatial information for identifying military vehicles. Performance of proposed method is analyzed Hyper Spectral Image(HSI) data set constructed by embedding two types of military vehicle signatures in HSI datacube at random locations. Principal Component Analysis, Anomaly detection (RX) and Spectral Angle Mapper (SAM) classification algorithm are applied to the data set being analyzed. This work shows that using proposed method detectionand discrimination of military vehicles is feasible with high probability of detection and low probability of false alarm.

1569820399   **Checking Automobile Fuel Adulteration Using Image Processing Techniques**
Sarvraj Singh Ranhotra

Abstract - This paper tries to characterize different samples of automobile fuel, petrol contaminated with different proportionsof kerosene, and thereby proposing a sensor for checking adulteration of fuel using image processing techniques. Images of different samples are captured using a camera and image processing is employed to extract the trends of measures oftexture analysis. The findings show that adulterating fuel with different proportions of impurities display varying

characteristics of five measures of texture. This research is enormously significant to the development of sensors to detect fuel adulteration.

1569817021   **Transfer Learning Using Adaptive SVM for Image Classification**
Arihant Jain, Siddharth Srivastava, Sumit Soman

Abstract - Transfer learning is a learning paradigm which enables us to transfer knowledge gained in one domain to other familiar domains. These approaches are useful in scenarios where one domain has large amount of labeled data and another domain has either none or very few labeled examples. In this work, we have used feature extraction techniques (such as PCA, SURF and Gabor filter) to implement transfer learning between human face images in the source domain and images of cat faces in the target domain. Specifically, this work focuses on using the adaptive SVM for classification in the target domain. The noveltyof this work is characterized by the use of multiple features for transfer learning, which are robust and sensitive to image orientation, texture and shape. Our results indicate effective transfer learning between the source and target domains, based on the fact that the classifier performs better in the target domain as it learns on more examples in the source domain.

1569794681   **Local Directional Pattern (LDP) Based Fingerprint Matching Using SLFNN**
Ravinder Kumar, Pravin Chandra, Madasu Hanmandlu

Abstract - Recently a number of biometric indicators are inuse for human identification, but the fingerprint based individual identification is still the dominating biometric indicator. In this paper, we present a fingerprint matching system by exploiting local directional pattern (LDP) based features, which are originally proposed for face recognition and facial expression detection. Fingerprint image texture is encoded by computing the response value of edges in different directions from the extracted region of interest (ROI) images. Single hidden layer feed forward neural network (SLFNN) is trained using three training algorithms namely gradient decent with momentum (GDM), resilient propagation (RP), and scaled conjugate gradient (SCG) to detect the match between test and trainee images. The experimental results show that the RP algorithm converges faster and perform well in terms of matching accuracy as compared to the other two algorithms.

1569799923   **Hand Gestures Recognition Based on Lightweight Evolving Fuzzy Clustering Method**
Anna K. Lekova, Maya I. Dimitrova

Abstract - Robots of the future will socialize with humans. Human-robot interaction (HRI) by a vision-based gesture interface helps to personalize the communication with humans in various contexts - from support of their daily life to social skills training of children with developmental problems. We are especially interested in vision-based hand gesture HRI and propose a hand gesture recognition system based on a novel online extraction and classification scheme, which is light weight and can be used in a mobile robot. An online Lightweight Evolving Fuzzy Clustering Method is used to categorize the positional and HSV model of pixels for the edges of the gesture image. The result clusters consist of (x, y) coordinates and the averaged grayscale level at these locations. Then these clusters are processed to identify typical for the hand features brighter and darker pixel information. The database consists of averaged grayscale levels in HSV format for neighbor pixels that characterize different features. For feature recognition we use Tanimo to similarity measure for matching the current grayscale patterns to those in the database. Then

the feature location is encoded in a binary format. For gesture recognition we use a formalism of Symbol Relation Grammars to describe a gesture, as well as simple and fast bitwise operations to find the position and orientation of the features in the gesture.

1569816031 **Identification of Kashmiri Script in a Bilingual Document Image**
Rumaan Bashir, Smk Quadri

Abstract - Script identification is a very important field in thearea of pattern recognition & document image analysis.Commendable work has been proposed and implemented torecognize various common scripts in unilingual, bilingual and multilingual contexts. So far, diminutive work has been presented for Kashmiri script identification. In this paper, we are describing and experimentally testing our approach for identification of Kashmiri script with respect to English scriptwhich comprises a text document image. Two important and simple features are used for identification of scripts: Horizontal Profile Coefficients (Peaks) & Horizontal Profile Valleys.

1569813265 **Text Extraction From Natural Images Based on Stroke Width Map**
Chunmei Liu

Abstract - This paper proposes a text extraction method for text in natural images, which apply color and edge information to obtain text candidate areas, and use stroke width information to filter out non-text areas. The stroke width map (SWM) is proposed to compute the stroke width by finding the maximal distance among the shortest distances with the same nearest boundary pixel. It can reflect the true stroke width and adapt to complex situations by improving the accuracy of stroke width. It does not require any training process. Experiment results demonstrate that this approach can achieve a good performance of text extraction with various degradations, highlighting the system efficiency and the text extraction capability.

1569804869 **Image Processing for Smart Farming: Detection of Disease and Fruit Grading**
Monika Jhuria; Rushikesh Borse; Ashwani Kumar

Abstract - Due to the increasing demand in the agricultural industry, the need to effectively grow a plant and increase its yield is very important. In order to do so, it is important to monitor the plant during its growth period, as well as, at the time of harvest. In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. For this purpose artificial neural network concept is used. Three diseases of grapes and two of apple have been selected. The system uses two image databases, one for training of already stored disease images and the other for implementation of query images. Back propagation concept is used for weight adjustment of training database. The images are classified and mapped to their respective disease categories on basis of three feature vectors, namely, color, texture and morphology. From these feature vectors morphology gives 90% correct result and it is more than other two feature vectors. This paper demonstrates effective algorithms for spread of disease and mango counting. Practical implementation of neural networks has been done using MATLAB.

Session 4   *Statistical Methods and Learning & Face Recognition*

1569793245   **Sequential Minimal Optimization for Support Vector Machine with Feature Selection in Breast Cancer Diagnosis**

Ajay Urmaliya, Jyoti Singhai

Abstract - Accurate and proper diagnosis in shorter time avoids the breast cancer death. The goal is to find breast canceras early as possible because earlier staging of breast cancer iscurable. Support Vector Machine is a useful classifier among other method but the main disadvantage of Support Vector Machine (SVM) is that it's time-consuming to train large dataset because of the traditional Quadratic Programming (QP) optimization problem. In this paper, Sequential Minimal Optimization (SMO) for SVM with feature selection in breast cancer diagnosis has been proposed. This method is more efficient on diagnosis that increases the classification accuracy with faster training time to train the datasets. We have done experiments on different training-test sets of the Wisconsin breast cancer dataset (WBCD) which is the most popular datasetamong the researchers for breast cancer diagnosis. After that, performance evaluation is measured which shows the diagnosticperformance of the SVM. At last, proposed approach obtained 100% accuracy with faster training time and there is no misclassification sample because false positive (FP) and false negative (FN) is zero for the model 4 in 80-20% training-test dataset.

1569807527   **A MFCC Based Hindi Speech Recognition Technique Using HTK Toolkit**

Shweta Tripathy, Neha Baranwal, G.C. Nandi

Abstract - To utilize the robot's capabilities, it is necessary for us to communicate with them efficiently. Thus, Human Robot Interaction is attracting the attention of most of the researchers these days. In this paper, a speech recognition system has been developed using different feature extraction techniques like MFCC (Mel Frequency Cepstral Coefficient), LPC (Linear Predictive Coding) and HMM (Hidden Markov Model) is used as the classifier. Less work has been done for Hindi language in this field with a vocabulary size not very large. So, work in this paper has been done for Hindi database, with a vocabulary size a bit extended. HMM has been implemented using HTK Toolkit. Afterwards the performances of both of the techniques used have been compared. The work has been done using audacity for sound recordings and Cygwin to execute the HTK commands in Linux type environment in windows platform. As well as, the system developed has been tested in the speaker dependent and speaker independent both types of environments, whoseperformance results, as well as, the comparison graph of the system shows that MFCC performs well as compared to LPC in each and every condition.

1569791821   **Contour Feature-Point Tagging as a Mechanism for Automated Splitting of Highly-Occluded and Dissimilar-Sized Cells in Blood Smear Images**

Urmila Airsang, Viraj Ghorpade, Srividya Tirunellai Rajamani

Abstract - The presence of clumps in blood smear images may degrade the performance of automated cell counting techniques. This paper proposes a new system to split the occlusions in blood smear images. Prior art algorithms address problems like splitting of touching cells using concavity points and occlusion of only similar sized cells using distance transform. The system proposed in this paper addresses real life problems like heavily overlapped cells, dissimilar sized cell occlusions and uneven cell contours. The uniqueness of the paper lies in introducing geometrical measures in blood smear image analysis, tagging of feature points on the contour of the occluded segment, splitting of occlusions containing dissimilar sized cells and splitting of heavily overlapped cells. Using the feature points, approximate center of individual cells are calculated. To account for uneven cell contours, an iterative method is adopted to find the accurate center from the obtained approximate center. Using these accurate centers as reference, the occlusion is split into its constituent cells. The experimental results show that the system is highly robust and immune to cell deformations and heavily overlapped cells. A set of 12 images from different blood smear slides were taken for the study. The results show successful splitting for even 85 percent of overlaps.

1569813167 **A Novel Online Ensemble Approach for Concept Drift in Data Streams**
Parneeta Sidhu , MPS Bhatia, Aditya Bindal

Abstract - Data Streams are data instances which arrive at avery rapid rate with varying concepts. Many online ensembles of classifiers were developed which handled the drifting concepts and were proved to be better than a single classifier system. In our work, we will discuss our new approach, Early DynamicWeighted Majority and will empirically prove it to be better thanthe existing online ensemble approaches. Empirical results would prove that all these online approaches can be quite competitive, and show good accuracy and speed in handling and identifying drifts in data.

1569791269 **HCI Using Hand Gesture Recognition for Digital Sand Model**
Harshitha R, Imran A Syed, Sangeeta Srivasthava

Abstract - The Digital Sand Model is a tactical exercise without troops, which gives a bird's view of the terrain and allows the users to work on the battle planning and management. Interaction plays a substantial role in such training setups. In this paper, we designed and developed an intuitive and "hands-free"human computer interaction for the DSM. The captured image is pre-processed for enhancing the hand object in the image.Specific features need to be extracted for fast and accurate recognition of the hand gesture. Two sets of feature vectors are explored in this paper, namely, Hu moments and hand contour. Here features are classified using two different classifiers, namely, SVM and HMM and their performances are compared and analyzed.

1569813421 **Constant Dimensionality Reduction for Large Databases Using Localized PCA with an Application to Face Recognition**
Tanuj N. Palghamol, Shilpa P. Metkar

Abstract - This paper aims to reduce the complexities such as computation and storage of the facial data much further ascompared to the methods described by PCA and LDA whilst keeping the discriminatory information, which is achieved by using a modified PCA technique along with an idea involving'separation of classes' similar to LDA. Furthermore, the problem that, reduced dimensionality' ironically increases with a growing database, is solved. Additionally, the possibility of

updating the facial database dynamically for facilitating the most recent capture of a person is concluded to be much more feasible.

1569788223   **Gene Expression Programming Based Age Estimation Using Facial Features**

Ashutosh, Baddrud Z. Laskar, Sunil Kumar, Swanirbhar Majumder

Abstract - The core target of this paper is to estimate human age automatically through facial image analysis. In this research study, we put forward a system constructed on the basis of Gene Expression Programming (GEP) to estimate human ages using face features. Gene expression programming (GEP) is a handy tool to find out functions. Due to prompt developments in machine vision and computer graphics, age estimation through faces have turn out to be most dominant issues now a days due to their wide spread applications in real world, such as safety control, investigation monitoring, biometrics, scientific art, automated client relationship management and cosmetology. As it is difficult to estimate the actual age, our system is going to estimate the ages within certain ranges. Total age range is classified into four classifications, which differentiate the individuals oldness in relation with age. Our proposed approach has been initialized with GEP and then developed and tested using MATLAB. A public data set, FG-NET was used to develop the system. The quality of the proposed system for image-based age estimation is shown by broad experiments on the available database of FG-NET. To assess the performance of our system, we have done a relative study based on various parameters of GEP and found significant results.

TRACK 5 - Information Processing

Session 1   *Wireless Networks & Ubiquitous Computing*

1569816401   **A Software Reliability Growth Model with Two Types of Learning and a Negligence Factor**

Javaid Iqbal, N. Ahmad, S.M.K. Quadri

Abstract - Reliability attribute of dynamic software systems is a key to the normal operational behavior of such systems. Although the acquisition of perfect (cent percent) level of reliability for software may be practically very difficult but achieving near-perfect reliability growth levels is very much possible using reliability engineering study. Many SRGMs have been proposed including some based on Non-Homogeneous Poisson Process (NHPP). There realistic characteristics about human learning and experiential gains of new skills for better detection and correction of faults on software are being incorporated in such models. This paper incorporates two types of learning effects and a negligence factor into the SRGM with learning effect proposed by Chiu, Huang and Lee, taking advantage of the improvement proposed by Chiu, interms of introduction of a negligent factor, in Chiu, Huang and LeeSRGM. In this paper, we simultaneously incorporate learning effect that exists in two forms: one is autonomous learning and the other is acquired learning as well as a negligence factor. The resultant model equations are subjected to the statistical analysis and the results are satisfactory.

1569790033   **ToA Localization Using Two BTSs and Three BTSs with Dual Circlein GSM Network**

Atul Kumar Uttam, Sasmita Behera

Abstract - For any emergency/rescue operation it is very important to locate the victim accurately in a short time to provide appropriate help. Such emergency services are gaining very high attention in recent years. Wireless communication network technologies like, Global System for Mobile Communication (GSM) network has gained huge popularity and widely used around whole world. So it would be beneficiary to use such existing networking technology for localization purpose. In GSM system a user has a mobile device called mobile station (MS). For any positioning technique, it is very important to locate the MS accurately in a short time and without causing much modification in existing wireless infrastructure. This paper presents two modified time of arrival (ToA) based positioning techniques with two BTSs and with three BTSs with dual circle. A comparison has been shown for proposed modified techniques with standard time of arrival-based technique, in various environments (urban, suburban, hilly and open area).

1569818315   **A Novel Approach for Location Tracking in Mobile Agents System Using Forward and Backward Pointers**

Rahul Hans, Ramandeep Kaur

Abstract - Mobile agents are the intelligent programs that act autonomously on behalf of a user and can migrate from one host to another host in a network in order to satisfy the requests made by their clients. The critical problem in managing a mobile agent system is to track the location of the agents. Communication with a mobile agent incorporates the ability to locate it. This paper proposes a novel approach for tracking the location of the agent in its itinerary by integrating footprints to centralized server approach, using forward and backward pointers. The results show better performance incase where a centralized server gets destroyed due to some fault and looses all its data of various locations, also to maintain the hierarchy of visited hosts we add the concept of forward and backward pointers.

1569818327   **Elimination of Gaussian Noise Using Entropy Function for a RSSI Based Localization**

Ashutosh Patri, Sai Prasanna Rath

Abstract - In this paper a novel algorithm is proposed for nearly precise localization of a mobile sensor node from less number of low cost anchor nodes, using the received signal strength Index (RSSI) of a very high frequency wireless signal. Often the loss of signal, called as the shadow fading generates spurious data in RSSI, due to Gaussian noise, which is removed using entropy function. The viability of the proposed system is practically experimented. The error analysis is done using analysis of variance (ANOVA) method for the proper validation of results obtained.

1569816903   **Function Point Distribution Using Maximum Entropy Principle**

Sanjeev Patel

Abstract - Software cost is estimated through the effort and number of functioning components measured in terms of person month (p-m) and function points (FPs) respectively. In this paper, we have considered the software cost based on the FPs because FPsis independent of the technologies. Initially function point analysis(FPA) was designed without any reference to the theoretical foundation which is based on the measurement done by the expert team. Function point data is described for more than hundred software development projects in the literature. It was also discussed about limitations of the resulting model in estimating

development effort. This paper attempts to study and quantify the software cost in case of multiple projects or set of software's. In case of single project or software, we attempt to study and quantify the function point counts (FPCs) for different components of the software or function types (FTs). Maximum Entropy Principle (MEP) is a very popular technique to estimate the maximum information or entropy subject to the given constraints. This paper presents an application of Maximum Entropy Principle (MEP) to distribute the Unadjusted Function Point Counts (UFPCs) subject to a given software cost. Thereafter, this application is applied overset of software's to allocate the individual software cost when total cost to the software was given. In this paper, we have also analyzed the proportionate of Unadjusted Function Point Counts (UFPCs), Number of FPs (# FPs), and weight of the different functional components or FTs for given software cost.

1569789555 **Heterogeneous Fuzzy Based Clustering Protocol**
Chander Mohan, Suman, Ashok Kumar

Abstract - Sustaining wireless sensor nodes' energy in wireless sensor networks is a very crucial issue. Wireless Sensor Networks (WSNs) is an anthology of hundred or more sensor nodes for sensing their respective vicinity. These sensor nodes have restricted battery life and their recharging is difficult. Thus, to protract the lifespan of wireless sensor networks many optimization techniques had been introduced. Clustering is popular scheme used for enhancing the lifetime of network. Low Energy Adaptive Clustering Hierarchy (LEACH) was the first hierarchical based clustering algorithm in which cluster heads are determined using probabilistic approach in a distributed manner. After that many protocols had been introduced which utilize selecting the cluster head and rotating them to balance the energy consumption, but none of these protocol consider predicted residual energy, the energy which is left behind after performing the action as a cluster head for a complete round. Here, we introduced heterogeneity in the network with the addition of fuzzy-based clustering scheme using energy prediction for appropriate cluster head selection to optimize the energy of wireless sensor node. In this work, we introduced three different types on sensor nodes on the basis on their initial energy level. In Heterogeneous Fuzzy Based Clustering Protocol (HFCP) firstly, eligible cluster head candidates are selected using FuzzyInference Engine (FIS) using inputs as Residual Energy (RE) and Predicted Residual Energy (PRE) and output as the Chance to bea Cluster Head (CCH), then from the eligible candidates set cluster heads are elected using probabilistic approach including remaining energy of every node and initial energy of node. Finally, the simulation outcomes show that HFCP is more efficient in terms of First Node Dead (FND), Half Node Dead(HND) compared with LEACH and LEACH-ERE.

1569854711 **Performance Evaluation and Comparison of AODV and DSR Routing Protocols in MANETs Under Wormhole Attack**
Ravinder Ahuja, Pawan Ahuja, Alisha Ahuja

Abstract - Routing in wireless network is fundamental task which helps node to send and receive packets. Due to lack of centralized authority security in mobile ad hoc networks is very difficult. Traditionally, routing protocols were designed for good performance only and security issues were not considered. So either new routing protocols should be designed which have security parameter also or security parameters must be included in the existing routing protocol. There are number of attacks on routing protocol, one of them is wormhole attack. We will evaluate the performance of AODV and DSR routing protocol under wormhole attack and compare the performance of these protocol without wormhole attack. Performance parameters are Average end to end delay, Throughput, and Packet delivery

ratio(PDR). We will use Qualnet Simulator 5.0.