Image Processing, Image Analysis and Real-Time Imaging (IPIARTI), Symposium on Acoustic, Speech and Signal Processing (SASSP) 2014

30th APRIL 2014

Booklet

IEEE (Malaysia Section)
Signal Processing Society

5th.Image Processing, Image Analysis and Real-Time Imaging (IPIARTI) Symposium 2014

2nd.Symposium on Acoustic, Speech and Signal Processing (SASSP) 2014

Abstracts

30th. April 2014
Pauh Putra Main Campus

School of Computer and Communication Engineering
School of Mechatronic Engineering
Universiti Malaysia Perlis

About IPIARTI

This is the 5th. installment of the symposium on Image Processing, Image Analysis and Real Time Imaging (IPIARTI) started in 2010. The IEEE Signal Processing Society (Malaysia Section) started this symposium with the following objectives

- to bring the university and industry community together to share and discuss the latest trends in image and signal processing, analysis and real-time implementation, and
- to promote IEEE Signal Processing Society Malaysia Chapter to the Malaysian academic and industry community as a forum for professional networking and advancement.

The symposium is open to all IEEE members and non-members, and registration is free to enable students to attend.

This year the symposium is being jointly organized with the School of Computer and Communication Engineering and School of Mechatronic Engineering.

Past IPIARTI

Year	Venue	General Chair
2013	Center for Signal Processing and Control Systems (*CSPaCS*), Universiti Tenaga Nasional	Syed Khaleel Ahmed Yasmin Hanum Md THayoob
2012	Universiti Teknologi Mara (UiTM), Shah Alam Campus	No'raini Abdul Jalil
2011	Multimedia University (MMU), Cyberjaya Campus	Mohammad Faizal Ahmad Fauzi
2010	Universiti Teknologi Malaysia, Kuala Lumpur Campus	Norliza Mohd Noor

About SASSP

The IEEE Signal Processing Society (Malaysia Section) decided this year to start another symposium on the lines of IPIARTI to extend the same benefits to researchers working in the areas of Acoustic, Speech and Signal Processing.

IPIARTI AND SASSP 2014 SCHEDULE

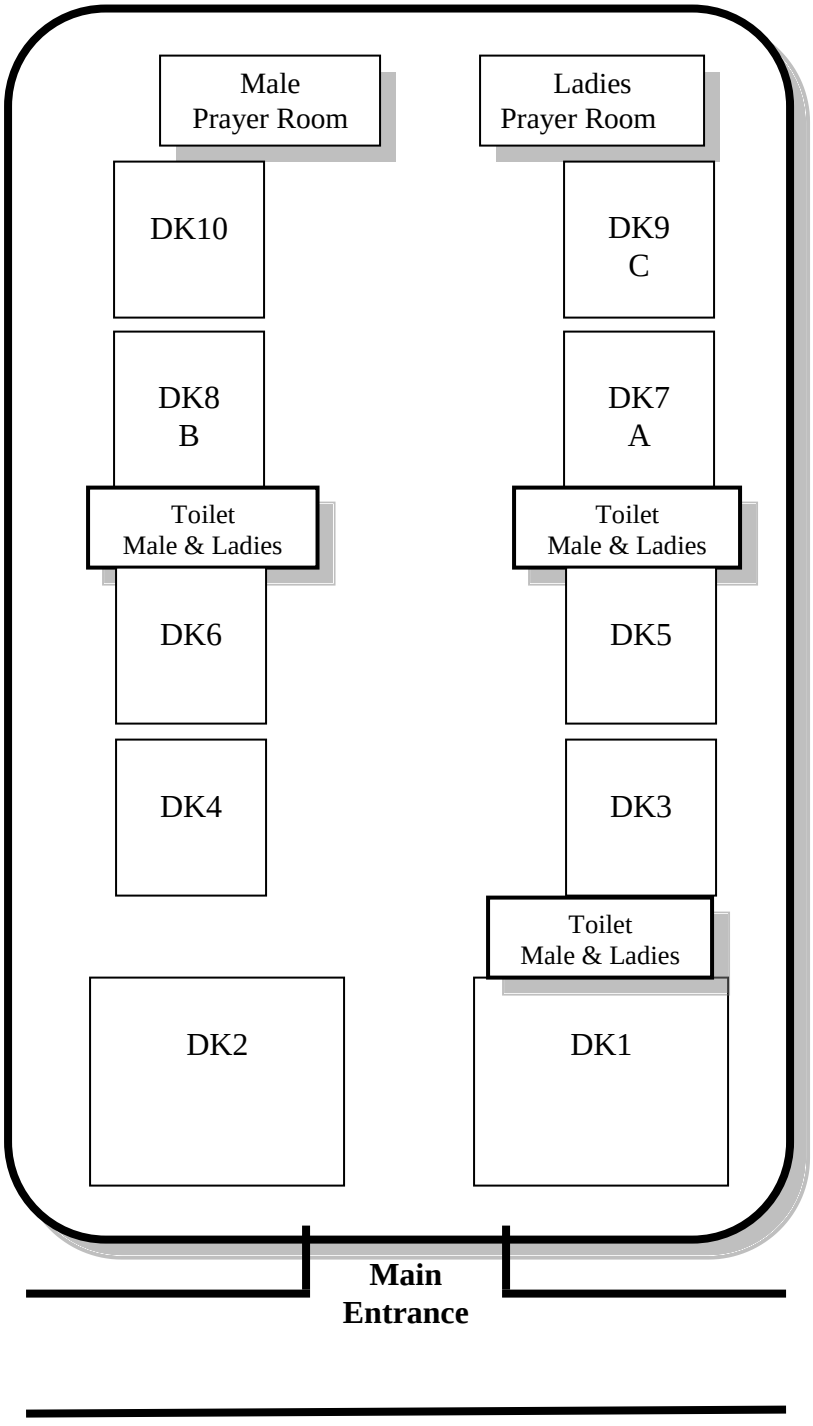
Opening Ceremony & Keynote Speakers
DK1, UniMAP Main Campus, Pauh Putra, Perlis

08.15	:	Registration & Breakfast (Kompleks Dewan Kuliah, Pauh Putra, UniMAP)
09.00	:	Opening Ceremony
09.15	:	IEEE Membership Development Talk
09.30	:	Keynote Speech #1 Application of Texture Features for Analysis of Myocardial Infarction Using Ultra-Sound Images: A Review. Assoc. Prof. Ng Yin Kwee, Eddie, NTU, Singapore
10.30	:	Morning Tea
10.45	:	Senior Member Elevation Talk
11.00	:	Keynote Speech #2 Acoustic Signal Analysis and Applications Prof. Dr. Sazali bin Yaacob, UniMAP.
12.00	:	Keynote Speech #3 Medical Imaging Research: Some Directions Prof. Dr. Mandava Rajeswari, USM.
13.00	:	Lunch and Prayer
14.00	:	Parallel Session #1A, #1B, #1C (IPIARTI)
15.15	:	Parallel Session #2A, #2B, #2C (SASSP)
16.30	:	Closing Ceremony
17.00	:	Evening Tea

LAYOUT OF CONFERENCE VENUE

IMAGE PROCESSING, IMAGE ANALYSIS AND REAL-TIME IMAGING (IPIARTI) SYMPOSIUM 2014
SYMPOSIUM ON ACOUSTIC, SPEECH AND SIGNAL PROCESSING (SASSP) 2014

LECTURE HALL COMPLEX



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(Chair of Board of Profecors, UniMAP)

MESSAGE FROM THE GENERAL CHAIRMAN

Average people with great minds create brilliant ideas.

The goal of the Image Processing Image Analysis Real-Time Imaging (IPIARTI) Symposium and the Symposium on Acoustic, Speech and Signal Processing (SASSP) is to expose researchers to brilliant and cutting-edge researches. The emphasis is on *student-researchers* most of whom are in the formative stages of their careers. *An exposure to world class research will help them to set appropriate challenging goals*. With this as the guiding principal, we annually invite researchers from different areas of signal and image processing along with different backgrounds. These researchers have their own style of work, but the results are indubitable.

Organizing the two different Symposiums at the same time has great advantages. Not only it provides a platform to share knowledge and idea in a particular area, but TWO related areas under one-roof. As IPIARTI & SASSP 2014 organizer, we believe that this symposium can be a platform for all the researchers to extend their networking in research, drive the collaboration between university and industry, inter-university and even internationally. The success of this approach can be seen by the ever increasing number of participants. This year, over 120 participants have registered. Including organizers, volunteers, and reviewers brings the total participation is about 150. They will hear three keynote speakers from industry and academia covering topics on image processing, bio-medical signal processing, and signal processing in practice. We are very excited by this and hope you are too.

With this we welcome all the delegates to 5th IPIARTI 2014 and 2nd SASSP 2014 jointly organized by IEEE Malaysia Section Signal Processing Chapter and the School of Computer and Communication Engineering, in collaboration with School of Mechatronic Engineering, Universiti Malaysia Perlis (UniMAP), Pauh Putra Main Campus, Perlis, Malaysia. We hope that these symposia will expose you to the state-of-the-art, network, and enhance your research.

We would like to take this opportunity to thank the members of the organizing committee for their effort and time, nothing could have been achieved without their support. Reviewing can be a time-consuming and laborious process. However, the quality of the symposium is a result of the reviewers' efforts. We are grateful to all the reviewers who took the time and put in their effort to examine the abstracts. We would like to express our gratitude to Universiti Malaysia Perlis for all sorts of necessary supports including: financial, approving the use of the campus and facilities to host the symposia. We would also like to take this opportunity to thank and acknowledge two sponsors of this event: COMREL Technologies Sdn. Bhd. and DreamWave Sdn. Bhd. for their financial support.

We wish you a pleasant time and hope you learn from, and enjoy the proceedings. Enjoy your participation in these Symposia 2014 and we hope you have memorable time visiting UniMAP and Perlis. We hope to see you in the next Symposia 2015!

Live long learning and continual process!

R. Badlishah Ahmad
Abu Hassan Abdullah
Sabira Khatun

KEYNOTE SPEAKER 1

Assoc. Prof. Dr. Ng. Yin Kwee, Eddie is an Associate Professor at the School of Mechanical & Aerospace Engineering, Nanyang Technological University, Singapore. He obtained his Bachelor of Engineering from the University of Newcastle upon Tyne in 1988 after two years experienced as a Marine Engineer. He pursued his PhD at Queens' College & Whittle Re-search Laboratory in Cambridge University with Commonwealth Scholarship. His main area of research is thermal imaging, human physiology, biomedical engineering; computational turbomachinery aerodynamics; microscale cooling problems; CFD/CHT. He is the academic-focus coordinator of aeronautical engineering (FY specialisation). Prof Eddie is also the subject coordinator for: Aircraft Propulsion, & Life Support Engineering for Msc. in Biomedical engineering courses. He has published more than 370 papers in refereed international SCI-IF journals (252), international conference proceedings (117), textbook chapters (81), & others over the years. He has co-edited 10 books on "Cardiac Pumping and Perfusion Engineering" by WSPC Press (2007); "Imaging and Modeling of Human Eye" by Artech House (2008); "Distributed Diagnosis and Home Healthcare, D2H2 v.1 & 3" by ASP (2009, 2012); "Performance Evaluation in Breast Imaging, Tumor Detection & Analysis" by ASP (2010); "Computational Analysis of Human eye with Applications" by WSPC (2011); "Multimodality Breast Imaging" by SPIE (2013); "Human eye imaging and modeling", "Image Analysis and Modeling in Ophthalmology" & "Ophthalmology Imaging and Applications" by CRC (2013, 2014); Co-authored a book: "Compressor Instability with Integral Methods" by Springer (2007). Prof Eddie has been an invited speaker for many international scientific conferences and workshops. He is also the Founding Editor-in-Chief for the Journal of Medical Im-aging and Health Informatics (JMIHI), Leading Editor-in-Chief for the Journal of Mechanics in Medicine and Biology (JMMB) and Strategy Assoc. Editor-in-Chief for World Journal of Clinical Oncology.

APPLICATION OF TEXTURE FEATURES FOR ANALYSIS OF MYOCARDIAL INFARCTION USING ULTRASOUND IMAGES: A REVIEW

Assoc. Prof. Dr. Ng Yin Kwee, NTU, Singapore.

Abstract:

The Myocardial Infarction (MI) or heart attack is the most common type of coronary heart disease (CHD) and is the leading cause of cardiac death worldwide. Detection of MI at an early stage can improve the survival rate. Though the two dimensional echocardiography helps to detect MI at the early stage, it is very laborious and time-consuming as the cardiologists need to go through different views of echocardiogram images continuously. Early identification of MI and extent of muscle damage (or left ventricular remodelling) are crucial to reduce the time taken for further tests, and possible further damage. Therefore, a computerised scheme based on advanced image processing techniques for the detection of MI can reduce the burden on echo technologists and cardiologists. In this talk, I will discuss the application of various texture analysis methods to accurately extract the features and detect normal and infarcted myocardium using echocardiography images. In this work, we have used 105 texture features extracted from the 1400 echocardiography images of 28 patients with MI and 1300 images of 26 normal subjects obtained from National Heart Centre, Singapore. The statistical analysis using student's t-test was performed to select clinically significant features ($p < 0.0001$). Our results show that, texture analysis methods can be used as an important MI detection (discriminative) technique in echocardiography imaging modality.

KEYNOTE SPEAKER 2

Prof. Dr. Sazali Yaacob received his BEng in Electrical Engineering from Universiti Malaya and later pursued his MSc in System Engineering at University of Surrey and PhD in Control Engineering from University of Sheffield, United Kingdom. He has successfully supervised 8 PhD candidates and more than 20 MSc graduates through research mode. Currently, he has 10 PhD and 8 MSc candidates. His research interests are in Control, Modelling and Signal Processing with applications in the fields of satellite, bio-medical, applied mechanics and robotics. In recognition of his expertise, several research grants have been awarded to him by Ministry of Science and Technology and Ministry of Higher Education. He is the Head of Intelligent Signal Processing Research Cluster of UniMAP since 2005. In 2009 his team has successfully completed a top down research grant from MOSTI for development of an Attitude Control Subsystem for a nano-satellite. He had also participated in Research Exhibition in National level such as ITEX, MTE, PENCIPTA and also International Level in Switzerland, Germany, South Korea and Belgium. He has published more than 70 papers in Journals and 200 papers in Conference Proceedings. From 1998-2004, he was the Dean for School of Engineering and Information Technology, Universiti Malaysia Sabah and upon his transfer to Universiti Malaysia Perlis, he was given the mandate as the Dean for School of Mechatronic Engineering from 2005-2007 and also the post of Deputy Vice-Chancellor for Academic from 2009-2010. He received his professional qualification as Charted Engineer from the Engineering Council, United Kingdom in 2005 and also a member to the Institute of Engineering and Technology, United Kingdom since 2003.

ACOUSTIC SIGNAL ANALYSIS AND APPLICATIONS

Prof. Dr. Sazali bin Yaacob, UniMAP, Malaysia.

Abstract:
Acoustics is the science of sound and the transmission of vibrations in gases and solids. Obtaining an acoustic signal for various applications requires signal processing. The advent of computer technology is owed by the power of microprocessor speed. Consequently, signal processing has been easier and various techniques can be adopted. From the various processing techniques we can interpret the data through a decision making process. One of the common methods and gaining popularity in this process is using artificial intel ligent which in turn has a number of techniques. Here, artificial neural networks are used to provide the various classifications of the data. Finally, we will look into the use of acoustic technology in several applications such as speech recognition, voice pathology, noise control, noise signature, speech intelligibility, speech classification and sound modeling.

KEYNOTE SPEAKER 3

Prof. Dr. Mandava Rajeswari is a Professor at School of Computer Science, Universiti Sains Malaysia (USM), Penang. She obtained her Bachelor of Engineering (B. E) from the University of Madras; Master of Technology (M. Tech) in Electrical Engineering from the Indian Institute of Technology, Kanpur, India and PhD in Electrical Engineering specializing in Image Processing and Machine Vision from the University of Wales, UK. Currently she is the Head of Computer Vision Research Group at the School of Computer Sciences, USM. Mandava has over 25 years of experience in image analysis and for the past 12 years her focus is on medical image analysis. Her key research areas include Machine Vision, Semantic Image Analysis and Medical Image Analysis. She has trained several undergraduate and postgraduate students in the span of her 31 year career at USM. In her early career, she has developed several machine vision solutions for industrial automation to serve the semiconductor industries in Penang. She and her group has made several key contributions including Brain White Matter Lesion quantification (WML), an image analysis solution, that is recognized as the top two best solutions, by the Medical Image Computing and Computer Assisted Interventions (MICCAI) Society. One of the innovative solutions from the group is the world's first Android based real time collaborative teleradiology solution. Prof. Mandava is pioneering yet another research area at USM: Neuroimaging with specific focus on Diffusion based imaging. The primary objective of this new research is to extract the brain white matter fiber tracts and neuronetworks.

MEDICAL IMAGING RESEARCH: SOME DIRECTIONS

Prof. Dr. Mandava Rajeswari, USM, Malaysia.

Abstract:
Researching on multispectral medical images is daunting task. Handling multispectral images together with a multitude of libraries written in various languages such as MATLAB, Java and C++ adds additional challenges to this task. This presentation covers our experience in handling this challenge by integrating Information Technology and medical image research to produce impressive research prototypes. This talk then illustrates how this experience has been stretched to generating various research projects in both Medical Informat ion Technology and Medical Imaging research. Further, this presentation talks about some of the emerging research challenges in medical imaging and then moves on to introduce the research area of Neuroimage analysis focusing on white matter fiber tracking.

TECHNICAL SESSIONS SCHEDULE

IMAGE PROCESSING, IMAGE ANALYSIS AND REAL-TIME IMAGING (IPIARTI) SYMPOSIUM 2014
SYMPOSIUM ON ACOUSTIC, SPEECH AND SIGNAL PROCESSING (SASSP) 2014

Wednesday, 30th April 2014

Session : Parallel Session 1A
Time : 2.00pm – 3.15pm
Venue : DK7
Chair : Kammarul Hawari Ghazali, *Universiti Malaysia Pahang (UMP)*

Title	Presenter
Cross-Source Co-Reranking for Visual Search	Siew Cheng Lai
De-blocking Filter in H.264AVC A Video Forensics Case	Jing Yi Tou
A New Framework for Evaluating Biodiversity Abundances: An Underwater Imaging Approach	Phooi Yee Lau
Design of Natural Image Denoising Filter based on 2nd Generation Wavelet Transformation and Principle Component Analysis	Asem Khmag
Robust Object Tracking System via Sparse Representation: A Review	Syafawati Md Yusof

Session : Parallel Session 1B
Time : 2.00pm – 3.15pm
Venue : DK8
Chair : Azremi bin Abdullah Al-Hadi, *Universiti Malaysia Perlis (UniMAP)*

Title	Presenter
Local Feature Representation, Fusion and Modelling in Multimodal Biometrics	Muhammad Imran Ahmad
Hazardous Area Mapping for Surveillance Monitoring	Altahir A. Altahir
Facial Emotion Recognition Based on Higher Order Spectral using Support Vector Machines	Hasimah Ali
Fast Human-Machine Interaction for 3D Objects Based on Estimated Features	Abadal-Salam T. Hussain
Utilizing the correlating properties of integer wavelet transforms for secured video steganography	Mritha Ramalingam

Session : Parallel Session 1C
Time : 2.00pm – 3.15pm
Venue : DK9
Chair : Muataz Hameed Salih Al-Doori, *Universiti Malaysia Perlis (UniMAP)*

Title	Presenter
A Combined Chaos and Neural Network Cipher Algorithm for Encryption of Compressed Video Signal Data	Tariq A. Fadil
Using Markov Random Field in Segregating Monocular Image Objects	Akbah A. Kalifa
A Review on Human Motion Tracking and Poses Estimation for Biomedical Application	Lim Chee Chin
Linear Blood Spatter Trajectory using Analytical Analysis for Crime Scene Investigation	Nusrat Jahan Shoumy
Aging Face Recognition using a Combination of Shape and Texture based Features	Amal Seralkhatem Osman

Session : Parallel Session 2A
Time : 3.15pm – 4.30pm
Venue : DK7
Chair : Vijanth Asivadam, *Universiti Teknologi Petronas (UTP)*

Title	Presenter
Performance Enhancement of Breast Cancer Imaging System using Efficient Feature Extraction Technique	Khondker Jahid Reza
Lossy Compression for Improved Image Quality and Analysis	Rajasvaran Logeswaran
An Evaluation: Thermal Human Detection Using Sliding Window Approach	Siti Sofiah Mohd Radzi1
Assistive Technology for Visually Impaired Using Eye-Tech	Choong Kit Lee
Gridding Techniques for DNA Microarray Images Analysis	Maziidah Mukhtar Ahmad

Session : Parallel Session 2B
Time : 3.15pm – 4.30pm
Venue : DK8
Chair : Muhammad Imran bin Ahmad, *Universiti Malaysia Perlis (UniMAP)*

Title	Presenter
Electrocardiogram Signal Processing Circuit Architectures Evaluation for Portable Biomedical Application	Ooi Chip Pin
Improving hybrid speaker verification in noisy environments using least mean-square adaptive filters	Mohd Zaizu Ilyasa
Sudden Cardiac Arrest (SCA) Prediction Based on Heart Rate Variability and Machine Learning Algorithms	L Murukesan
Unsupervised Single Channel Source Separation using Nonnegative Matrix Factorization with Application in Audio Processing	Abd Majid Darsono
A Rule-based Segmentation Method for Objects under Natural Illumination	Hamirul'Aini Hambali

Session : Parallel Session 2C
Time : 3.15pm – 4.30pm
Venue : DK9
Chair : Wee Fwen Hoon, *Universiti Malaysia Perlis (UniMAP)*

Title	Presenter
Sphere Detection Technique Assisted Optimum Detection for Data Transmission Systems	Mahmoud A. M. Albreem
Control of Assistive Device for Disable (Paraplegic) Patient using Respiratory Muscle Surface Electromyography Signal Classification	Ahmad Nasrul Norali
Development of Neuromarketing System using EEG Signals	M Murugappan
Identification of Vagina and Pelvis Regions Using Principal Component Analysis and Artificial Neural Network	Syahrul Akram Bin Zainal Abidin
A Review of Single Image Contrast Enhancement for Outdoor Machine Vision Applications	Mohd Helmy Abd Wahab

Paper Abstracts

Session 1A

Cross-Source Co-Reranking for Visual Search	
Author(s):	Siew Cheng Lai and Hung-Khoon Tan
Institute(s):	Universiti Tunku Abdul Rahman
Recently, search reranking has been shown to be an effective technique to boost the precision of an initial search result. However, the effectiveness of reranking relies on the assumption that there are sufficient positive samples among the initial top ranked images. However, this assumption is not fulfilled in scenarios where complicated query is posed or when the images in a social sharing site has poor quality annotations. To solve this problem, we adopt the crowd-reranking paradigm which engages external search engines to discover common visual patterns.	

De-blocking Filter in H.264AVC A Video Forensics Case	
Author(s):	Jing Yi Tou, Phooi Yee Lau, Hsueh-Ming Hang and Sungkwon Park
Institute(s):	Universiti Tunku Abdul Rahman, National Chiao Tung University, Hanyang University.
Video forensics is a new branch of multimedia processing of the last decade and it's largely on the extension of the image forensics techniques. Recently, more focus are being placed on forensics related issues especially for videos. Sharing of videos had never been so simple, with manageable instructions to assist, either downloading videos from a known or an unknown source. As such, in order to verify the authenticity of the said video, the video is required to be investigated for doctoring or alteration possibilities. Video forensics studies three aspects of a video, which includes: 1) acquisition; 2) compression; and 3) doctoring. To authenticate a video, all the above mentioned aspects need to be executed in order to gain a summarized analysis that could lead to a plausible conclusion. Video compression is one of the aspects that had yet to be well covered especially for the newly introduced video compression standard. The latest HEVC/H.265 standard introduced more challenges for the video forensics community. Nonetheless, the H.264/AVC standard, being used by most makers, had yet to be fully investigated, especially in terms of video forensics studies.	

A New Framework for Evaluating Biodiversity Abundances: An Underwater Imaging Approach	
Author(s):	Phooi Yee Lau,nChing Soon Tan, Siew-Moi Phang and Tang Jung Low
Institute(s):	Universiti Tunku Abdul Rahman, Universiti Malaya, Universiti Teknologi Petronas
There has been an increasing concern over the effects of industrialization, water pollution, habitat destruction, and over harvest of selected marine species that could threaten biodiversity development. The consequences are the reduced habitat complexities and the reduced marine biodiversity. Image survey using underwater cameras has been playing an increasing role in ocean and earth sciences studies, especially to facilitate the collection of ecological information and the studies of marine abundances. Conventional manual counting approaches used for studying abundances in videos/images obtained are always found to be expensive, subjective, and time-consuming. The application of automatic digital image processing techniques could be an effective and efficient solution to complement the manual procedures especially in addressing the repeatability of the counting	

process and the abundances accuracy. The aim of this research is therefore to propose a framework with strategies to automatically analyze, classify, and track species in video sequences/images obtained from targeted surveys, as a reliable complement to the conventional manual approaches.
Our work introduces underwater video acquisition and analysis methods: (1) at different depth, (2) for different species. The analysis provided by the framework include: (1) pre-processing stage, followed by (2) segmentation of regions of interest, the corresponding region (3) classification, that finally lead to the (4) quantification of targeted species. The framework is implemented in a new prototype software system, named UTAR-UM Underwater System (U3S) that could provide an objective, detailed and comprehensive analysis for the input videos/images. The preliminary work focuses on shallow water species, in particular, the algae, for abundance studies. Preliminary results were encouraging as it provides reasonable approximation of the actual quantification, i.e. achieving of about 78.38% average detection rate for NVH

Design of Natural Image Denoising Filter based on 2nd Generation Wavelet Transformation and Principle Component Analysis

Author(s): Asem Khmag, Abd Rahman Ramli, S. A. R Al-Haddad, S. J. Hashim and Zarina Mohd Noh

Institute(s): Universiti Putra Malaysia

This paper proposes novel image denoising algorithm using combination method. This method combines both wavelet based denoising (WBD) and principle component analysis (PCA) to increase the superiority of the observed image, subjectively and objectively. We exploit the important property of second generation WBD and PCA for a better preservation of image local structures, where in our algorithm a pixel and its nearest neighbors are modeled as a vector variable. One of the main advantages of the second generation wavelet transformation in noise reduction is its ability to keep the signal energy in small amount of coefficients in the wavelet domain. On the other hand, the main characteristic of PCA is that the energy of the signal concentrates on a very few subclasses in PCA domain, while the noise's energy equally spreads over the entire signal; this characteristic helps us to isolate the noise perfectly. Our algorithm compares favorably against several state-of-the-art filtering systems algorithms, such as Contourlet soft thresholding, Scale mixture by WT, Sparse 3D transformation, and Normal shrink. Our method outperformed state-of-the-art denoising methods in terms of quantitative by more than 2dB. In addition, the combined algorithm achieves very competitive performance compared with the traditional algorithms, especially when it comes to investigating the problem of how to preserve the fine structure of the tested image and in terms of the computational complexity where it took around 3~4 seconds to perform the denosing operations.

Robust Object Tracking System via Sparse Representation: A Review

Author(s): Syafawati Md Yusof, Kamarul Hawari Ghazali, Sunardi

Institute(s): Universiti Malaysia Pahang

Object tracking is a challenging issue in computer vision and it has been studied by numerous researchers, with several approaches are introduced to improve the tracking performance. The challenges arise in object tracking such as occlusion, background clutter, illumination conditions and appearance changes have motivated researchers to explore a robust tracking system which can handle these problem. One of the recent tracking technique is sparse representation method

where it has been exploited in many tracking-based applications as it is proven to be robust to the challenges stated earlier as compared to other tracking method. This paper reviews the recent sparse technique in several applications, focusing on the robustness and efficiency of the proposed method. More specifically, the advantages and disadvantages of the proposed algorithm in each application will be pointed out by comparing with other tracking methods. At the end of the discussion, a new tracking-based application deploying the robust sparse technique will be proposed.

Session 1B

Local Feature Representation, Fusion and Modelling in Multimodal Biometrics

Author(s): Muhammad Imran Ahmad, Mohd Zaizu Ilyas, Ruzelita Ngadiran, Mohd Nazrin Md Isa and Abd Majid Darsono

Institute(s): Universiti Malaysia Perlis, Universiti Teknikal Malaysia Melaka.

Single modal biometric has several limitations such as noisy input data, limited degree of freedom, intraclass variability and non-universality. Multimodal biometric is a new approach to biometric representation that aims to overcome the problems by consolidating the evidence presented by multiple biometric traits. Fusion of biometric traits can be performed at three different levels: feature; match score; and decision levels. The integration of information at an earlier stage of processing (feature level) is believed to provide better recognition results than at other levels as richer information is available. This paper proposes a new feature extraction method aimed at fusing information at feature level for multimodal biometrics. The method is based on compact independent local features extracted from sub block window of 2D images that are pre-processed by using multiresolution Gabor filter. The generation of compact energy representation by using low frequency components of the DCT transform can enhance the discrimination power of independent local features. Underlying statistical information in the fused feature vector is captured using Gaussian Mixture Model (GMM) which is able to estimate the probability density function of fused feature distribution in a non-Gaussian form provided a sufficient number of components is used. The classification process is performed by comparing normalized maximum likelihood score with global threshold values. Normalized likelihood is computed from background GMM model by estimating the statistical parameters from a pool of users. The proposed method is evaluated using a virtual combination of FERET face datasets and PolyU palmprint datasets. The best verification rate of the proposed method is 0.6% of Equal Error Rate (EER) and 97.5% of Genuine Accept Rate (GAR) at 0.01% False Accept Rate (FAR). Our results to date indicate that combining independent local features of face and palmprint images is a promising addition to the multimodal feature fusions at feature level.

Hazardous Area Mapping for Surveillance Monitoring

Author(s): Altahir A. Altahir, Vijanth S. Asirvadam, NH. Hamid and Patrick Sebastian

Institute(s): Universiti Technologi PETRONAS.

One of the major open problems in the field of visual surveillance is the optimizing the locations of the visual sensors. The efficiency of visual sensor localization becomes increasingly demanding as it can directly impact the efficiency of allocated resources as well as system performance. This abstract introduces a novel method for hazardous based area classification for

visual surveillance purposes. A similar work is applied successfully in localizing the fire sensors in oil and gas industry. Hazard mapping relies on extracting a set of features of the area of interest. Each extracted feature is assigned to a proper weight. Based on the weights, each pixel in the map is assigned to a distinguished color from a predefined color code. The degree of risk is attached to each color in the color code. This process is followed by proposing a combination of prior knowledge of the area with analyzing the generated edges to localizing the possible position set. The proposed technique is capable of locating the possible set of the visual sensor positions which is considered a primary requirement for the optimization of the camera placement for surveillance purposes.

Facial Emotion Recognition Based on Higher Order Spectral using Support Vector Machines

Author(s): Hasimah Ali, Hariharan Muthusamy, Sazali Yaacob, Abdul Hamid Adom

Institute(s): Universiti Malaysia Perlis.

Nowadays, the application of facial emotion recognition for human-computer interaction (HCI) is becoming an emerging trend. This HCI depends to a large extent on its ability to recognize the facial expression and ability to withstand of various kinds of noise. Confidence in its ability to provide adequate recognition remains challenging due to the variability and subtle changes of non-linear emotional features. Therefore, this paper proposed an application of using non-linear technique, High-Order Spectral (HOS) in recognizing the seven facial emotions (anger, disgust, fear, happiness, neutral, sadness and surprise) by using SVM classifier. The HOS features are extracted from 1D facial signal obtained from successive projections of 2D spatial domain facial images by means Radon transforms.

Fast Human-Machine Interaction for 3D Objects Based on Estimated Features

Author(s): Abadal-Salam T. Hussain & Mahmoud A. M. Albreem

Institute(s): Universiti Malaysia Perlis.

In this paper, a new method is presented that allows to understand of human hand status from far distance in 3D space by estimating its orientation and position in real time. In this proposed algorithm of morphology techniques were used in conjunction with various mathematical formulas to calculate the hand position and orientation. Comparing with another approach for a 3D scene representation using two randomly selected adjacent video frames. A single uncalibrated video camera used to take a record for uncalibrated environment. The Selection of two frames based on the maximum homogeneity of points on these frames are favorable; could be any other two adjacent frames or nearby. The use of Harris technique were useful to find the edges and corners on each selected image (frame), then the autocorrelation function based on Gaussian's function been used to find the corresponding matched points. The correlated matched pair points were found on both images by calculating the gradient of the correlated paired points on both images represents approximately the Z direction (calculating dzdx and dzdy). This is yielding that each point on each image (frame) can be represented in a 3D coordinates which yields to 3D shape estimation, which is achieved by the RANdom SAmple Consensus (RANSAC) function. Experimental results show that proposed morphology method is a robust technique in terms of the processing time for estimation of position and orientation of hand compare with the 3D scene representation.

Utilizing the correlating properties of integer wavelet transforms for secured video steganography
Author(s): Author(s):
Institute(s): Institute(s):
In this modern internet world it is more vital to have a secured data communication. Video steganography is a process of hiding secret data in videos. We propose to design a video steganography algorithm that provides highly secured data transfer using transform domain. We opt videos for data hiding as they provide fairly high bandwidth and are frequently transferred online. We employ the Haar Integer Wavelet Transforms (IWT) for data hiding and extraction in video files because the IWT are considered to be more apposite for video steganography because of its good de-correlating and perfect reconstruction properties. In this approach, we divide the cover-video into RGB frames and embed the text in binary form into the calculated IWT coefficients of the RGB components. Next, we employ the Inverse IWT to produce the stegovideo. The embedded text is extracted from stego-video using the reverse process of data hiding. To examine the security and robustness of the proposed algorithm, the experiments are conducted on Audio Video Interleave (AVI) files. The results prove that the proposed method has shown imperceptible modifications in avi videos that lead to high security to an eavesdropper's inability to detect hidden data.

Session 1C

A Combined Chaos and Neural Network Cipher Algorithm for Encryption of Compressed Video Signal Data
Author(s): Tariq A. Fadil, Shahrul N. Yaakob, Badlishah Ahmad
Institute(s): Universiti Malaysia Perlis.
The increasing demand for retrieving secure and high quality of multimedia service applications corresponding to available bandwidth channel has been proposed new challenges for system engineering designers to implement efficient and optimum solution ideas. The objective of this work is to combine chaos theory property with artificial neural network to construct a cipher algorithm called a Chaotic Neural Network (CNN). This cipher algorithm has been applied and integrated successfully inside MPEG-2 video codec standard, the resultant secure and compressed bitstream has been transmitted safely to destination. The tested sample video signal is of size 176 × 144 (QCIF standard format). The video sequence has been divided into sets of 30, 15, 10, and 5 frames which are fed to the framework. Weights and biases of neurons are setting based on binary sequence generated from chaotic logistic map for each iterate. Control parameter and initial value of chaotic logistic map are representing the secret keys of the algorithm. CNN has been used to encrypt/decrypt both of motion vector data and quantized vector data of MPEG-2 standard. CNN shows high sensitivity behavior for both key and plaintext modification. The encrypted video signal has high entropy result value of (7.833). Overall framework model has ability to control video quality level, bit rate, and Group of Pictures (GoP) number and arrangement. Subjective and objective measurements have been used to verify the framework performance. Simulation and implementation have been done by using MATLAB software package.

Using Markov Random Field in Segregating Monocular Image Objects
Author(s): Akbah A. Kalifa, Shahrul N, Badlishah Ahmad
Institute(s): Universiti Malaysia Perlis.
Many attempts have been conducted for the purpose of visualizing the three dimensional (3D) scenes. As a case in point is the 2.1D sketch, which is considered a powerful method for describing and visualizing the depth of the scene. Such a sketch divides an object into layers based on the local occlusion cues of the overlapping objects in an image. Markov Random Field (MRF), for instance, can be used to segregate even overlapping objects from a monocular image. This step helps encode any local decision and form new rules to the curves. The latter include T-Junctions, corners, contours and border ownership. Every feature can create a reasonable depth; however, all features are believed to provide better depth information if combined together. The first step in image segmentation includes the process of partitioning an image into contours and regions. Such a partitioning helps provide information on the actual patterned texture of the image. The second step involves the process of interpreting the edge and junctions to acquire low-level depth information in the image. It is to be known that no priori data of the scene is needed for the process of extracting the depth information between the objects in that scene. Result has shown that the proposed method fits and outperforms the other methods used in this regard.

A Review on Human Motion Tracking and Poses Estimation for Biomedical Application
Author(s): Lim Chee Chin, Shafriza Nisha Basah, Sazali Yaacob
Institute(s): Universiti Malaysia Perlis.
Recent researches have addressed reliable tracking and pose estimation in natural scenes. Progress has also been made towards automatic understanding of human actions and behaviour. This survey reviews recent trends in 2D-based and 3D-based human capture and analysis, as well as discussing open problems for future research to achieve automatic visual analysis of human movement in the field of computer vision, artificial intelligence and biomedical engineering and sciences. This is due to its wide and promising applications, namely, bio-instrumentation for human computer interfacing. This paper provides an extensive review on human motion tracking and poses estimation. The review focused on evaluating the human motion tracking and poses estimation techniques specifically for biomedical applications. This review is important as it provide guideline and recommendation for researchers and practitioners in developing Human Motion Analysis System for biomedical applications.

Linear Blood Spatter Trajectory using Analytical Analysis for Crime Scene Investigation
Author(s): Nusrat Jahan Shoumy, Shahrul Nizam Yaakob, Phaklen Ehkan
Institute(s): Universiti Malaysia Perlis.
This paper presents a noble theoretical method followed by an algorithm for analyzing the trajectory path of linear blood spatter droplet in motion based on impact image of a crime scene. Linear blood spatter drop has some specific pattern with moderate droplet size and elliptical or circular shaped stain on planner surface. Their free flight trajectories are non-linear such as parabolic due to motion with gravity and drag forces. Here, two types of drag forces working on the droplet have been introduced. They are Stokes' law (for $Re < 1$) and Newton's law (for $Re > 1$) depending on the circular blood droplet size, velocity and Re values. It also takes into

consideration the perturbed path for the droplet's movement, given room for a small error, , for the angle and speed to be corrected. Hence, more realistic reconstruction of trajectory path along with angle and speed of blood spatter drop compared to available ones. Besides, the proposed algorithm is able to reconstruct free flight trajectory and point of source based on the impact image for both very small (Re < 1, d < 1mm) and moderate size (Re > 1, approximately, 1mm d ≤ 4mm) blood droplets. The proposed method could be very helpful for blood spatter image analysis for crime scene investigation in near future.

Aging Face Recognition using a Combination of Shape and Texture based Features

Author(s): Amal Seralkhatem Osman Ali , Vijanth Sagayan, Aamir Malik, Azrina Aziz

Institute(s): Universiti Teknologi PETRONAS

In this work, we propose a combined shape and texture analysis approach toward age-invariant recognition. Physiological studies proved that the human visual system can recognize faces at different ages from the face outline only. Based on this scientific fact we adopt the Phase Congruency features for shape analysis to produce a face edge map. This is beneficial in tracking the craniofacial growth pattern associated with each subject. Craniofacial growth is common during childhood years, but beyond the age of 18 texture variations start to show as the effect of facial aging. To handle such texture variations, we adopt a variance of the well-known Local Binary Pattern (LBP) texture descriptor known as LBP Variance (LBPV). Our experiment results show that fusing the shape and texture features sets yields better performance than the individual performance of each feature set. Moreover, the individual verification accuracy for each feature set is improved when they are projected to a Principle Component Analysis (PCA) subspace. Finally, the system achieves an overall verification accuracy of above 97% when the fused features sets are encoded to a Local Discriminant Analysis (LDA) presentation

Session 2A

Performance Enhancement of Breast Cancer Imaging System using Efficient Feature Extraction Technique

Author(s): Khondker Jahid Reza, Sabira Khatun, Mohd F. Jamlos, Md. Moslemuddin Fakir

Institute(s): Universiti Malaysia Perlis.

Ultra-wideband (UWB) microwave technology is able to detect breast tumor in its early stage without any side effect on human health. Its detection principle is based on the dielectric properties difference between the affected tissue and the healthy tissue. Usually, affected tissues are more viscous and reflect more signals than the normal one. There exists two types of tumor which are benign and malignant. Benign is just a lump and non-cancerous while malignant is cancerous. The malignant tissue is our concern to investigate in this research. So far, the existing detection methods are expensive, bulky, operator dependent and for clinical purposes only. Unless, Alsehri et al. proposed a user friendly system consists of single transmit-receive antennas, capable of detecting tumor size up to 100 μm in simulation and 1 mm experimentally using commercial UWB antenna and large (50-300) feature values. They digitized the UWB received pulses to 1632 data points/features using discrete cosine transform (DCT). This large feature values slowed down the training process followed by system overwhelmed due to the huge data. Besides, the UWB antenna was not body friendly and optimized for breast cancer

detection. Hence, demand for body friendly optimized antenna along with reduced features for a low-cost and efficient breast cancer detection system, which is the aim of this research.

Lossy Compression for Improved Image Quality and Analysis

Author(s): R. Logeswaran A/L N.Rajasvaran

Institute(s): Nilai University

Lossy compression is well-known for being able to conserve storage but suffers from the inability to reconstruct the original data exactly. This 'weakness' however, could be a strength in image processing and analysis. Most raw data suffer from the effects of environmental or equipment noise during acquisition. Controlled lossy compression can be used to eliminate this noise, hence producing clean information. As an example, a photo taken in bright light may suffer from glare that may be eliminated in lossy compression, thus producing a high quality photo that better represents the actual scene.

In this work, the wavelet-based Set Partitioning in Hierarchical Trees (SPIHT) algorithm was used for controlled lossy compression of MRI images. The clinical images were subjected to various levels of lossy compression and provided to a group of trained radiologists for evaluation. The results of the double-blind test conducted showed that applying compression noise of up to 20% of the imaging noise improved the diagnostic quality of original image. The results have changed the perception of the specialists involved in terms of their preconception that no loss to the acquired images could be tolerated, as it is proven that the controlled loss introduced cleaned up the diagnostic images.

An Evaluation: Thermal Human Detection Using Sliding Window Approach

Author(s): Siti Sofiah Mohd Radzi, Kamarul Hawari Ghazali, Sabira Khatun

Institute(s): Universiti Malaysia Perlis

In this paper, to address these issues: (1) We have built a small-scale thermal image dataset by capturing images from KLIA followed by putting together a well-annotated thermal humans flow and study the statistics of the size, and occlusion patterns. (2) We proposed an approach based on sliding window paradigm and colour segmentation to overcome the challenges in thermal human recognition. (3) We evaluate and compare performance between our proposed methods with other detectors; Integral Channel Features (ICF) and Histogram Oriented Gradients (HOG). Our findings suggest that, despite of significant progress in visible pedestrian detection, there is still way for thermal image recognition to improve in order to achieve the same level performance as applied in the visual imaging.

Assistive Technology for Visually Impaired Using Eye-Tech

Author(s): Choong Kit Lee, Kar Hang Leung, Phooi Yee Lau, Tuan Pin Gan, Junn Ming Khoo, Kok Hong Lee

Institute(s): Universiti Tunku Abdul Rahman

Nowadays, many assistive tools have been developed to aid people with disabilities to live more independently. In this work, we propose an assistive human computer interface (HCI) to aid the visually impaired to pick up the correct key to unlock a lock via audio instructions. Due to the time constraint, each lock is assumed to have only one key and a unique colored label is associated with each pair of key and lock. The system consists of a small camera to be worn on the user's body, a laptop at the back to provide the computation power and earphones for voice

instructions. The process flow of the proposed system consists of 4 steps: (1) Pre-processing, (2) Hand detection, (3) Key detection, and (4) Matching key with lock. Among these 4 major steps, much greater weight is placed on the hand detection (Step 2). This is because the system needs to track the moving hand of the user. Apart from that, the key detection (Step 3) also plays an important role since the system needs to guide the user which key s/he should select to unlock the lock. The system starts from detecting the user hand after pre-processing. It then enters into the third step to detect the key label. Afterwards, it will be in the final step to look for lock label and determine whether the key matches with the lock with vocal guidance. Each of the processes is described below with more details. Pre-processing. The Canny-edge detection is performed in this stage. The edge representation of an image should drastically reduces the amount of data to be processed, yet it retains important information about the shapes of objects in the scene. This description of an image could then be easily integrated into a large number of object recognition algorithms used in computer vision and other image processing applications. Hand Detection. We first filtered out skin colour regions as potential hand objects. In this work, we used the HSV colour space to detect human skin. Afterward, the hand is detected through the Haar Cascade training. The training will be robust when the training sample set is large enough. Here, we train the system with twenty thousand negative samples (non-hand) and twenty thousand positive samples (hand images). Key Detection. In this process, we employed the Hough circle transform to detect colored circular labels on the lock and key. The labels make the key detection process easier, and the detected color will be recorded for the next step. The detected color will be communicated to the user via audio guidance. Matching key with lock. In this step, it is required that the user's hand and the key s/he is holding is out of the scene. Furthermore, the user is required to rotate his/her body such that the camera can capture the surround scene and perform lock label detection which is similar to the work done in the 'key detection' step. Once the lock label is found, the lock color will be compare to the key label color. The system then reports whether a match is found or not. Vocal Guidance. In this system, the Speech Application Programming Interface (SAPI) is used to build the vocal guidance. SAPI is a speech synthesis engine developed by Microsoft. It contains voice object that can be used to produce audio steam from text which is essential for our project to provide vocal guidance. Conclusion. The prototype system is able to guide a user to pick up the correct key for a particular lock. However, there are few drawbacks in current system, being the direction computation, i.e. inability to guide the user to unlock the lock. For this, we are planning to integrate our previous work with this system to complement the direction computation.

Gridding Techniques for DNA Microarray Images Analysis

Author(s): Maziidah Mukhtar Ahmad1, Asral Bahari Jambek2 and Mohd Yusoff bin Mashor3

Institute(s): University Malaysia Perlis

Microarray is the one of the most promising tool available for researchers in life sciences to study gene expression profile. The gene expression information embedded in the microarray is extracted by using image processing techniques. Gridding is one of the important processes to extract features in DNA microarray where it assigns each spot in the microarray with individual coordinates for further data interpretation. This paper evaluates popular techniques of DNA microarray image gridding exist in the literatures with emphasis on gridding accuracy, speed and the ability to remove noise. Based on the analysis, the Otsu method is able to give better performance in term of processing speed, accuracy and ability to remove noise compare to other methods discussed in this paper.

Session 2B

Electrocardiogram Signal Processing Circuit Architectures Evaluation for Portable Biomedical Application

Author(s): Ooi Chip Pin, Asral Bahari Jambek and Sazali Yaacob

Institute(s): Universiti Malaysia Perlis,

This paper discusses the circuit implementation of Electrocardiogram (ECG) heart beat detector for wearable biomedical devices. In this work, QRS complex is used for heart beat calculation that represents the main component in the ECG signal. In order to achieve high accuracy of the detector, the measured ECG signal must be noise free. Typically, there noises are originating from power line interferences and baseline wandering. Base on the analysis, the trade-off between complexity and accuracy for ECG signal architecture is important in order to design high efficiency system.

Improving hybrid speaker verification in noisy environments using least mean-square adaptive filters

Author(s): Mohd Zaizu Ilyasa, Salina Abdul Samadb, Aini Hussainb, Khairul Anuar Ishakb, Puteh Saada & Muhammad Imran Ahmada

Institute(s): Universiti Malaysia Perlis.

In this paper, we present a hybrid speaker verification system based on the Hidden Markov Models (HMMs) and Vector Quantization(VQ) and Least Mean-Square (LMS) adaptive filtering. The aim of using hybrid speaker verification is to improve the HMMs performance, while LMS adaptive filtering is to improve the hybrid speaker verification performance in noisy environments. A Malay spoken digit database is used for the testing and validation modules. It is shown that, in a clean environment a Total Success Rate (TSR) of 99.97% is achieved using hybrid HMMs and VQ. For speaker verification, the true speaker rejection rate is 0.06% while the impostor acceptance rate is 0.03% and the equal error rate (EER) is 11.72%. In noisy environments without LMS adaptive filtering TSRs of between 62.57%-76.80% are achieved for Signal to Noise Ratio (SNR) of 0-30 dBs. Meanwhile, after LMS filtering, TSRs of between 77.31%-76.87% are achieved for SNRs of 0-30 dB.

Sudden Cardiac Arrest (SCA) Prediction Based on Heart Rate Variability and Machine Learning Algorithms

Author(s): L Murukesan*, M Murugappan, M Iqbal

Institute(s): Universiti Malaysia Perlis

Sudden Cardiac Death (SCD) devastates millions of lives worldwide per year. SCD is result of Sudden Cardiac Arrest (SCA) which disables heart's ability to pump blood out of it. SCA happens due to many reasons such as smoking, hypertension, high cholesterol, arrhythmia and so on. Almost 80% SCA is due to arrhythmias and most prevalent among them is ventricular tachyarrhythmia. Due to severe nature of this problem, a SCA prediction algorithm which predicts SCA 5 minutes before its occurrence using 1 minute Heart Rate Variability (HRV) signal has been proposed in this work. In this work, two internet databases, namely, Physionet Sudden Cardiac Death Holter Database (SCDDB) and Normal Sinus Rhythm Database (NSRDB) have been used. SCDDB contains 24-hour 2-lead holter recording of SCD patients while NSRDB contains 2-lead recordings of healthy subjects. In total, 40 recordings from SCDDB and 36 recordings from NSRDB used in this work. Heart Rate Variability (HRV)

signals corresponding to segment of interest is extracted using built-in tool from database. Only one minute of HRV signal which is five minutes before SCA occurrence has been used in this work. As for NSRDB, one minute of HRV is extracted from middle section of ECG recording. Extracted HRV signal is subjected to ectopic beats detection and correction using mean and cubic spline interpolation method respectively. Then, 15 time domain and 6 nonlinear features extracted from preprocessed signal. Conjunctively, HRV is further preprocessed for detrending using Daubechies 4 (Db4) mother wavelet with 6 level of decomposition. Detrended HRV signal is subjected for frequency domain analysis and 13 features were extracted. In total, 34 features were extracted from the HRV signals. Then, Sequential Feature Selection (SFS) algorithm with Naïve Bayes (NB) and Tree Bagger (TB) classifier is used for feature selection. Three groups of features were obtained through this analysis. First group is features that get selected through SFS and NB. Second group is features from SFS and TB classifier. Finally, third group is combination of features from first and second group. All groups of features were subjected to SCA prediction using Support Vector Machine (SVM), Fuzzy Subtractive Clustering (FSC) and Neuro-Fuzzy Classifiers (NFC). These machine algorithms are chose since it proven to perform best for prediction applications in literature review. It was found that using group one features, SVM and NFC able to predict SCA five minutes before occurrence with 94.74 % accuracy. Prediction accuracy reported in this work is significantly better than other published researches using same database.

Unsupervised Single Channel Source Separation using Nonnegative Matrix Factorization with Application in Audio Processing

Author(s): Abd Majid Darsono, Nor Zaidi Haron, Redzuan Abd Manap, Muhammad Imran Ahmad

Institute(s): Universiti Teknikal Malaysia Melaka, Universiti Malaysia Perlis.

Blind source separation (BSS) refers to the statistical technique of separating a mixture of underlying source signals. BSS has become one of the promising and exciting topics with solid theoretical foundations and potential applications in the fields of signal processing, neural computation and advanced statistics. In most of BSS methods, its produces a good performance only if the numbers of observations equal to the numbers of sources. Single channel source separation (SCSS) is a branch of BSS family where the blind signal separation is achieved when only one single recording is available. For many practical applications such as audio scenarios, generally only one channel recording is available in the hardware and in such cases conventional source separation techniques are not appropriate. This research investigated a model of single channel source separation using two-dimensional nonnegative matrix factorization (NMF2D) with the Beta divergence as an objective function. In this approach, source separation is performing without using any prior knowledge about the corresponding source signal. A novel solution is developed that efficiently performs source separation to be used in automatic music transcription. The proposed solution operated in time-frequency using constant-Q transform and the objective function was minimized using multiplicative update rules. In NMF2D, the time-frequency (TF) profile of each source is modeled as two-dimensional convolution of the temporal code and the spectral basis. In addition, sparsity constraint was imposed to reduce the ambiguity and provide uniqueness to the solution. Experimental tests have been conducted in audio application to blindly separate the source in audio mixture. Results obtained have shown the effectiveness of the algorithm in separating the audio sources from a single channel mixture.

A Rule-based Segmentation Method for Objects under Natural Illumination	
Author(s):	Hamirul'Aini Hambali, Sharifah Lailee Syed Abdullahb, Nursuriati Jamil, Hazaruddin Harun
Institute(s):	University Technology MARA,

Image segmentation is gaining importance due to its wide use in image processing applications including in agricultural and medical areas. Image segmentation is a process which divides a digital image into multiple regions with the aim to extracts object of interest from the background. However, the segmentation process is very challenging for experiment conducted in outdoor environment. This is due to the existence of non-uniform illumination on the object surface. Technically, different illuminations lead to different intensity on the object surface thus leading to inaccurate segmented images. Further, the low quality segmented images may lead to inaccurate image classification process. Image segmentation can be accomplished using several methods such as Otsu and K-means. However, both traditional methods have limitations in producing accurate segmented areas for images captured under natural environment. Therefore, this paper proposed an improved segmentation method that is able to segment natural images correctly and accurately. The new method namely TsNKM, integrates two algorithms which are modified thresholding-based and adaptive K-means to produce the best segmented images. The three segmentation methods; Otsu, K-means and TsNKM are implemented on fruit images and their performance are compared based on visual and quantitative evaluations. The analysis results showed that TsNKM has the ability to produce good quality segmented images. Furthermore, this new method is proven to be more accurate than the other traditional methods.

Session 2C

Sphere Detection Technique Assisted Optimum Detection for Data Transmission Systems	
Author(s):	Mahmoud A. M. Albreem , Abdal-Salam T. Hussain, and F. Malek
Institute(s):	Universiti Malaysia Perlis

The complexity of exhaustive search detection technique grows exponentially with size of transmitted data. This paper proposes lattice sphere detection technique with optimum performance and lower complexity. A linear system with a relatively small condition number (τ) is well-conditioned, so errors are not amplified significantly. In this paper, orthonormal basis of channel matrix has been used; hence the condition number is 1 which is the minimum.

In this paper, the orthonormal basis of channel matrix has been used. A comparison in term of system performance and complexity has been done. Two channels had been used (channel A and channel B). For channel A, the proposed LSD technique has 2 dB SNR advantage over the technique in literature at BER = 10-2 and it is quasi-identical to exhaustive search. For channel B, the proposed LSD has 0.2 dB SNR advantage over the previous technique in literature at BER = 10-2 and it is also quasi-identical to exhaustive search. The computational complexity analysis is done by comparing the number of objective function evaluations executed in detecting a single block.

Control of Assistive Device for Disable (Paraplegic) Patient using Respiratory Muscle Surface Electromyography Signal Classification

Author(s): Ahmad Nasrul Norali, M. Murugappan, R. Badlishah Ahmad

Institute(s): Universiti Malaysia Perlis

Numerous assistive devices had been developed for the aid of disabled people. For the control of these devices, researchers had applied various approaches from manual to automatic control. This includes the use of human bioelectrical signal such as electroencephalogram (EEG) and electromyogram (EMG) as the input command for device control. In this project, EMG of respiratory muscle will be used for control of the assistive device particularly for the disabled i.e. paraplegic patients. Paraplegia is the disability of the lower extremities which in turn causes the inability to perform one of the important human movements i.e. walking. In most cases, a patient became paraplegic due to spinal cord injury below the thoracic spinal level. At present, paraplegic patients utilizes their arm to ease their daily activities. The number of patients affected by paraplegic is increasing and most of the present rehabilitation devices are restricted in providing supports to their needs. Although there are various types of assistive device that could provide support to paraplegics, still it is required to have a device with better features and function. This work aims to utilize the breathing pattern of paraplegic patients derived from Electromyogram (EMG) and Respiration Rate (RR) sensor to control the rehabilitation device. The reason of choosing the breathing pattern is to explore an alternative option for providing control command input to a device apart from using the arm and hand parts. A set of electrodes placed on the patient's chest and muscle contraction of patients over different patterns of breathing is acquired using Electromyogram (EMG) and RR sensor. EMG and RR data is acquired from a set of paraplegic patients through a proposed data acquisition protocol. The acquired data were preprocessed using digital Infinite Impulse Response (IIR) filter and a set of statistical features were extracted using Multiwavelet transform (MWT). These extracted features were statistically validated using one way analysis of variance (ANOVA) to determine its significance on distinguishing the breathing pattern. The significant features are further given to a machine learning approaches to classify the breathing pattern. From this study, the researchers expected to devise the pattern of EMG and RR signal which could be useful for controlling the rehabilitation device during walking through simulation. By using this proposed study, the paraplegic patients could use their arms and hands for other day to day activities and able to use their breathing pattern for controlling the rehabilitation device motion.

Development of Neuromarketing System using EEG Signals

Author(s): Dr M Murugappan

Institute(s): Universiti Malaysia Perlis

Neuromarketing is an new field of emerging research in economics and behavioural marketing. Throuh this modality the product designer and manufaturers can read the real demand of consumer to earn more profits than conventional marketing methods. According to the recent review, there are several million USD is invested on conventional marketing methods such as radio/video broadcasting and advertising through newspapers. But, many of the products launched by the manufacturers are not satisfying the real consumer demands and there by those products failures to bring the investment and profit to the manufacturers. Recent years, designing of products through consumer demand or expectation increases the product success rate and this type of study has been performed through neuromarketting. In this work,a set of EEG signals collected from a consumers while watching the most famous automotive brands in Malaysia is

used to develop a neuromarketing system. The four auromotive brands in Malaysia (Toyota, Audi, Proton and Suzuki) are considerd and shown their video clips to a set of consumers. EEG signals are collected through wirelesslly from 14 channel Emotiv data acquisition system at a sampling frequency of 128 Hz. EEG signals are preprocessed using 4th order Butterworth filter ad smothed using Surface Laplacian filter. A set of simple statistical feature were extracted using Fast Fourier transform. These features were stastistically validated using one way ANOVA. Finally, these features were given to K Nearest Neighbour and Probablistic Neural network. The experimental results indicate that, most of the consumers participated in this study indicates that, Toyota is the most preferred brand in Malaysia compared to othrr automotives shown to them. This indicates that, though the cost of this car is expensive than other cars, the people thought about its quality,durability, and its performances.

Identification of Vagina and Pelvis Regions Using Principal Component Analysis and Artificial Neural Network

Author(s): Syahrul Akram Bin Zainal Abidin, Nor'aini Abd. Jalil, Rohilah Sahak, Azilah Saparon

Institute(s): University Technology MARA,

This paper describes the identification of vagina and pelvis regions from iris using principal component analysis (PCA) and Artificial Neural Network (ANN) based on iridology chart. The localization of the iris was carried out using two methods namely circular boundary detection (CBD) and Circular Hough Transform (CHT). The iris region is segmented based on the iridology chart and was unwrapped into polar form using Daugman's Rubber Sheet Model. The regions of vagina and pelvis are cropped for feature extraction. Features obtained from the cropped regions in pixel values are transformed into principle PCA and are the inputs to the ANN. Comparison of each test feature vector with the target vector is measured in percentage classification accuracy using ANN. In the experiments, 15 patterns of pelvis and 20 patterns of vagina are used for classification. Dimension of vagina and pelvis region is 40 x 7 at the region of interest (ROI) stage. The best result obtained from the experiments is by training 7 samples each vagina and pelvis that is the overall correct classification when using CBD and CHT for localized iris is about 67% and 81% accuracy respectively. From the experiments, it is observed that vagina and pelvis regions are able to be identified even though the results obtained are not 100% accurate. Precise classification of vagina and pelvis regions is required to further determine the health condition of these regions. Using iris recognition on the selected regions will create a non-invasive procedure for early detection of certain diseases in future.

A Review of Single Image Contrast Enhancement for Outdoor Machine Vision Application

Author(s): Mohd Helmy Abd Wahab

Institute(s): Universiti Tun Hussein Onn Malaysia

Outdoor machine vision is getting a concern nowadays. Ranging from surveillance and monitoring system to automotive system such as driver assistance system require vision application or artificial eye to keep monitoring the situations. However, most of these applications are working very well during clear weather and degrade during bad weather due to the atmospheric particles mitigate the quality of vision system. This paper discuss the state of the art of image enhancement techniques used to adjust the contrast of an outdoor image degrade by fog, haze, and rain. A brief overview of bad weather will be discussed and several recent techniques on removing fog, haze and rain are discussed.

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