



IEEE (MALAYSIA SECTION)
Signal Processing Society

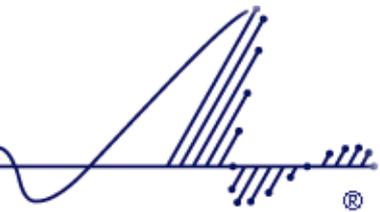


Image Processing, Image Analysis and Real-Time Imaging (IPIARTI) Symposium 2013



Symposium on Acoustic, Speech and Signal Processing (SASSP) 2013

Thursday May 09, 2013

BA Lecture Theater

Abstracts



About IPIARTI

This is the 4th 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 Center for Signal Processing and Control Systems (*CSPaCS*), Universiti Tenaga Nasional.

Past IPIARTI

Year	Venue	General Chair
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.

Message from the General Chair

Great things happen when ordinary people do extra-ordinary things.

The goal of the Image Processing Image Analysis Real-Time Imaging (IPIARTI) Symposium and the Symposium on Audio Speech and Signal Processing (SASSP) is to expose researchers to extraordinary research. 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 set challenging goals. With this as the guiding principal, we have annually invited researchers from different areas of signal processing and with different backgrounds. These researchers have their own style of work, but the results are indisputable.

The success of this approach can be seen by the ever increasing number of participants. This year over 100 participants have registered. Including organizers, volunteers, and reviewers brings the total participation to about 130. 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 IPIARTI/SASSP 2013 organized by the IEEE Signal Processing Society (Malaysia Section) and the Center for Signal Processing and Control Systems (*CSPaCS*), Universiti Tenaga Nasional at Universiti Tenaga Nasional Putrajaya Campus. 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 the effort to examine the abstracts. We would also like to express our gratitude to Universiti Tenaga Nasional, and the College of Engineering, for approving the use of their campus and facilities to host the symposia.

We wish you a pleasant time and hope you learn from, and enjoy the proceedings.

Live long and process!

Syed Khaleel Ahmed
Yasmin Hanum Md THayob

Program

Time	Title	Presenter
08.30 - 09.00	Registration	
09.00 - 09.15	Welcoming Speech	Syed Khaleel Ahmed, General Chair
09.15 - 09.30	About IEEE	Syed Abdul Rahman Syed Abu Bakar, Chair, IEEE SPS (Malaysia Section)
09.30 - 10.30	Keynote Speech #1: The Status of Digital Watermarking	Dr. Ton Kalker, VP, Security and DRM, DTS Inc., USA.
10.30 - 11.00	Morning Tea	
11.00 - 12.00	Keynote Speech #2: Technologies in Cardiac Imaging	Prof. Dr. Ir. Eko Suprianto, Director, IJN-UTM Cardiovascular Engineering centre, UTM
12.00 - 13.00	Keynote Speech #3: From theory to practice – Experiences with the DSP-Microcontroller for Mechatronic Systems	Dr. Farrukh Hafiz Nagi, Associate Professor, Universiti Tenaga Nasional
13.00 - 14.30	Lunch and Prayer	
14.30 - 15.30	Parallel Session #1	
15.30 - 16.30	Parallel Session #2	
16.30 - 17.00	Closing and Evening Tea	

Keynote Speakers

The Status of Digital Watermarking

9.30am – 10.30am

Dr. Ton Kalker, VP, Security and DRM, DTS Inc., USA.

Digital Rights Management (DRM) refers to a set of technologies and systems with the aim of controlling access to and use of (valuable) digital content. The perceived overarching reason for the deployment of DRM is to 'restore' the pecuniary feedback from content consumers to content creators & owners.

Traditional DRM technologies require cryptographic wrappers as a core component. In the mid-nineties however, awareness arose that cryptographic wrappers cannot be relied upon in the whole of the content creation to content consumption chain: human perception requires plain-text content representation. Thus arose the interest in media technologies that allow content management tools that do not rely on wrappers. Digital watermarking and robust identification are the two main representatives in this class of techniques.

In this talk we will sketch the state-of-the-art of digital watermarking, preceded by an historical overview. In particular we will show how digital watermarking has evolved from hiding logos in images to a method for robustly transmitting information hidden in a chosen host object. We will address the basic performance parameters, with particular emphasis on watermark security. In passing we will also shortly mention reversible watermarking, data hiding and the relation with robust recognition. Finally, we will highlight the strengths and the weaknesses of digital watermarking in the context of DRM.

Technologies in Cardiac Imaging

11.00am – 12.00noon

Prof. Dr. Ir. Eko Suprianto, Director, IJN-UTM Cardiovascular Engineering centre, UTM

Cardiovascular disease is the first common cause of death in human worldwide. Unhealthy life style is believed as the main cause of this disease. In order to detect, diagnose, treat and monitor this disease, cardiac imaging is required. Technologies in cardiac imaging have been explored since more than one hundred years. This includes the using of X-Ray in the beginning and combination of some modalities in the recent years. The objective of the exploring technologies is to visualize anatomical and physiological structure of heart in the very high image quality, very low or no radiation, and real time or very high speed imaging.

In this lecture, the different modalities of cardiac imaging will be discussed. This includes the use of electromagnetic and acoustics waves. Some clinical examples of cardiac abnormalities images in different modalities will be also explained. State of the art of the imaging technologies including molecular imaging, multimodalities imaging and three dimensional imaging will be also highlighted. The technologies include image reconstruction technology, image processing technology as well as image visualization and analysis technology. It is expected, by end of the discussion, the potential research field and methodology in the area of cardiac imaging can be well understood.

From theory to practice – Experiences with the DSP-Microcontroller for Mechatronic systems

12.00noon – 1.00pm

Dr. Farrukh Hafiz Nagi, Associate Professor, Universiti Tenaga Nasional

This talk addresses some common issues faced by beginners who like to use DSP for real-time applications. The strengths and weaknesses of the DSP and the programmers would be discussed here alongside with DSP application and development tools. DSP application in the fields of signal processing, control engineering and mechatronics will be narrated for the benefit of the audience. Supporting simulations in MATLAB/SIMULINK environment would be demonstrated for the DSP application.

Parallel Session 1A
2.30pm – 3.30pm BA-4-050
Chair: Sabira Khatun, *Universiti Malaysia Perlis (UniMAP)*

Title	Presenter
Analysis of Wavelet Based Audio Steganography Algorithms in-Term of Full Hiding Message Recovery	Haider Ismael Shahadi
Nobel Feature Extraction Method for Neural Network Based UWB Breast Cancer Detection System	Khondker Jahid Reza
Sound Attraction In Swiftlet House	Siti Nurzalikha Zaini Bt Husni Zaini
Power system harmonics estimation using sliding window LMS	Hussam Mubarak Mohmmmed
Classification of Transformer Core and Winding Conditions from SFRA Measurement Using Statistical Parameter	Mithila a/p SevaBala Sundaram

Parallel Session 1B
2.30pm – 3.30pm BA-4-051
Chair: Vijanth Asirvadam, *Universiti Teknologi Petronas (UTP)*

Title	Presenter
Underwater Video Analysis at the Depth of 400 meters and Beyond off Portuguese Coast	Lau Phooi Yee
Real Time Age-invariant Face Recognition	Amal Seralkhatem Osman Ali
A novel approach to remove high density salt and pepper noise from image and video	Mohammad Reza Khammar
Object Finder for the Visually Impaired	Leung Kar Hang
An Introduction To Image Fusion	Zaid Omar

Parallel Session 1A:
Haider Ismael Shahadi, Razali Jidin and Wong Hung Way, Analysis of Wavelet Based Audio Steganography Algorithms in-Term of Full Hiding Message Recovery

Steganography is the art of hiding a secret message on a host signal without attracting attention. Full recovery means that a legal receiver can retrieve the hiding secret message from the host signal without any distortion. For audio steganography algorithms that based on convolution Discrete Wavelet Transform (DWT), an input audio host data have to convert several times from integer to floating and vice versa during the hiding process. These conversions (data type conversions) require data rounding because representation of transformed host data in larger number of bits per sample than original one of the input host audio signal. The final audio output should be saved or transmitted by its original resolution (number of bits/sample). As a result, there are some lost in embedded data may be happened because these data rounding. In other word, an extracted secret message at the receiver side might have some errors. This paper presents an analysis in-term of full message recovery for some audio steganography that based on wavelet transform. In addition, we implemented and tested several audio steganography algorithms to find the Bit Error Rate (BER) in the retrieved data after saving the audio stego-signals (host signal that consists

embedded information) as a WAV file in 16 bits/sample of resolution, and then we use them as an input signal to the recovery algorithm. The results show that all convolution based DWT audio steganography methods have lost in their retrieved secret message especially for high embedding rate. The reason for this information lost in message recovery is the data type conversions. However, we find all audio steganography methods that employ integer to integer lifting scheme based DWT have error-free in the retrieved data for various embedding rate.

Khondker Jahid Reza, Nobel Feature Extraction Method for Neural Network Based UWB Breast Cancer Detection System

Ultra-Wideband(UWB) microwave technology so far performed better to detect breast tumor in its early stage. Detection principle of breast tumor is depending upon the difference of dielectric properties between the affected tissue and the healthy tissue. Injurious tissues are more viscous and reflected more signals rather than the normal tissue. The proposed system consists of single transmitter and single receiver, where transmitter throws a train of UWB pulses and at the opposite position receiver waits for receiving scattered pulses from the breast phantom.

Breast phantom model is prepared to mimic the real breast and used for training and testing purposes. Minimum tumor size used for this research is 1mm and maximum is 9mm. In total, 13 different tumor sizes are used for training, testing and verification of the work. Feedforward back-propagation neural network is being used for pattern recognition. The previous contribution of this research was to predict the tumor's availability, size estimation and location identification using Principle Feature Analysis for feature extraction from large amount of Discrete Cosine Transform (DCT) values. DCT is used in this whole research to transform from time domain continuous signal to discrete values. In general, larger amount of featured values may slow down the training process and neural network will be overwhelmed with the huge data. So all time, it is tried to reduce the input featured values. This abstract introduces a new feature extraction strategy, where only four distinctive characteristic values are considered rather than using 50-300 larger DCT values like previous study. Four features are the mean, standard deviation, maximum and minimum DCT values. To manoeuvre the size detection process smoothly, whole data sets are divided in to three categories. (i) 70% data (3150 data points) are reserved for training , (ii) 15% data (675 data points) for validation and (iii) 15% data (675 data points) are used for testing purposes. Availability of tumor in the phantom, can be determined with 100% accuracy in the both feature extraction strategies. On the other hand, previous feature extraction method, may identify the tumor size with 95.8% accuracy but using proposed feature extraction strategy, the accuracy climbed up to 99.9%. At the same time, required time for training and testing is reduced more than three times than the previous. Also, three dimensional location identification is currently studying and it is assumed to be the better result than previous.

Siti Nurzalikha Zaini Bt Husni Zaini, Sound Attraction In Swiftlet House

This research about the analysis of attraction sound for swiftlets to enter the swiftlets house. There are important thing for industry to attract swiftlets enter and build their nests in man-made house. Swiftlet house usually house fitted bird-call recording from original sound in the cave to attract attention bird go inside house to be doing nest. Therefore, this study analyzes sound features that have attracted attention bird. The samples of swiftlets sound were analyzed by using Fast Fourier Transform in MATLAB software to identify sound characteristic that attract swiftlets. Specific sound characteristic for swiftlets attraction on frequency of original sound and noise have been identified.

Hussam Mubarak Mohmmmed, Nursyarizal Mohd Nor, Vijanth S.Asirvadam and M. F. Abdullah Power system harmonics estimation using sliding window LMS

In recent decades, widespread of using the power electronics technology have increased the nonlinear loads in power system grid, the nonlinear loads leads to distortion in power system voltage and current waveforms Which are not pure sinusoids represented as a combination of the fundamental frequency with various high-frequencies components that are integer multiple of fundamental frequency known as harmonics. Harmonics are source of several problems in power system grid and have considerable impact on power system efficiency, performance reliability and economic operation to the grid. The eddy current loss, corona loss, skin effect and electrical parameters directly related to frequency therefore, harmonic cause overheating, frequent fuse blowing, capacitor failures, excessive neutral currents, metering inaccuracy, disturb the protective relay functions and communication interference. Therefore, accurate harmonic estimation is a very important tool to eliminate the harmful effects of harmonics, avoids the unwanted losses and maintains the delivered power with high quality which recommended in some standards such as IEEE standard 519-1992 and IEC 61000 series of standards. Several techniques have been proposed in the literature on harmonic estimation. Fast Fourier transforms (FFT) most commonly used over last many decades, however, (FFT) has many limitations and demerits which Spectral leakage, aliasing and picket fence effect. As a result of (FFT) drawbacks several algorithms and methods are introduced in the literature. In this paper, a new algorithm for the estimation of harmonic amplitude and phases using least mean square (LMS) with sliding window introduced to work with noisy system and to give good estimation in different signal to noise ratio SNR. Because of its simplicity The LMS is the most popular algorithm and has been widely applied in many areas such as communication and digital signal processing adaptive algorithm. However, the LMS algorithm suffers from slow convergence, data-dependent behaviour and sensitive to the noise to increase the convergence rate of LMS and to work in noisy data moving average search direction (sliding window) introduced in this paper to improve the performance of LMS as well as the estimation of harmonic in noisy system that can be found in modern power system environment.

Mithila a/p SevaBala Sundaram and Yasmin Hanum Md Thayoob, Classification of Transformer Core and Winding Conditions from SFRA Measurement Using Statistical Parameter

In Malaysia the main supplier of electricity is Tenaga Nasional Berhad (TNB). In the distribution process the main equipment used is transformer to step down the voltage. However, transformer has its duration of life span and detection of any kind of defect or malfunction at early stages could prolong the usage of a transformer. Among the most vital parts of a transformer is the core and winding. Hence, in this project, a defect and non-defect transformer data are used to perform analysis to determine simple and suitable methods to verify if a specific transformer faces a malfunction related to the core and winding. The scope of this project involves obtaining the raw data from TNB Distribution to be used for the analysis. Existence of mechanical or electrical faults due to the core and winding deformation can be determined at various frequency sub-bands of the Sweep Frequency Response measurement data of the transformers. Upon determining the frequency sub-bands, the numerical parameter that has been determined is used to obtain the required results in SPSS. The results obtained are then used to detect the defect transformers and classification is done for each transformer to determine its condition whether it is in good state and the specific fault is diagnosed. All these data is displayed in a table and the required analysis is done in SPSS. This software is suitable to perform statistical analysis and classification for the transformers. From the analysis that was carried out, PPU Seksyen 23 is classified as having defect in accordance to the interpretation of the specific frequency sub-bands. The problem faced by the transformer is identified to be at the core and winding and this is validated by the results from the visual inspection carried out on the transformer. Hence, this work has demonstrated that SPSS is suitable to be used to analyze data from the transformers as it eliminates prediction and definite

results in graphical form is obtained to determine the condition of the transformers. In addition, limits could be set for future reference to perform analysis. As such, this method is simple and could be used to provide accurate results for the classification of these transformers.

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Parallel Session 1B:

Phooi Yee Lau, Paulo Lobato Correia, Paulo Fonseca and Aida Campos, Underwater Video Analysis at the Depth of 400 meters and Beyond off Portuguese Coast

This work discusses the various underwater video acquisition and analysis required for different depths images. Three video acquisitions methods will be discussed: (1) Depth of 400 meters; (2) Depth of 750 meters; (3) Depth of about 500 meters. This study discusses the benthic characteristics, in all sample sites, at the depth of 400 meters and beyond, off the Portuguese coast, in particular, and uses those characteristics to analyze, identify and count Norway lobsters and their burrows.

Amal Seralkhatem Osman Ali, Vijanth Sagayan, Aamir Saeed Malik, and Azrina Aziz, Real Time Age-invariant Face Recognition

Human faces undergo considerable amounts of variations with aging. While face recognition systems have proven to be sensitive to factors such as illumination and pose, their sensitivity to facial aging effects is yet to be studied. The FRVT (Face Recognition Vendor Test) report estimated a decrease in performance by approximately 5% for each year of age difference. Therefore, the development of an age-invariant capability remains an important issue for robust face recognition. This research study proposed a geometrical model based on multiple triangular features for the purpose of handling the challenge of face age variations that affect the process of face recognition. The system is aim to serve in real time applications were the test images are usually taken in random scales that may not be of the same scale as the probe image, along with orientation, lighting ,illumination, and pose variations. Geometrical approaches have proved to be robust to lighting and illumination variations. Furthermore geometrical methods in general do not hold computational complexity and have the benefit of fast processing time, which make them appropriate for real time applications; multiple mathematical equations where developed and used in the process of forming distinct subjects clusters. These clusters hold the results of applying the developed mathematical models over the FGNET face aging database.

M. R. Khammar, M. H. Marhaban, M. I. Saripan, A. J. Ishak, A novel approach to remove high density salt and pepper noise from image and video

Removal of salt and pepper noise with high density using primary methods like standard median filter which doesn't lead to appropriate response, it means that if the density of noise increase rapidly, the quality of image tremendously decrease. In this paper, an optimal way proposed based on a nonlinear filter and decision based approach in order to suppress the noise with high density properly. We assume a 3×3 fix window to scan the image from top left to bottom right of the image line by line. This size of window will guarantee to save more details and avoid image blurring. There are two steps, detection corrupted pixels and then restoration. Detection is provided using statistical analysis in each window and appropriate replacement for noisy pixel are conducted from selective values inside current window or adjacent windows based on maximum correlation and minimum distance. Experimental results on some benchmark images and video clips show that this method is a successful algorithm for suppression of salt and pepper noise with high density and also the computational complexity and time consuming are reasonable.

Lee Jia Hui, Tan Ching Soon, Leong Chun Farn, Maylor Leung Kar Hang, Object Finder for the Visually Impaired

In the advancement of technology nowadays, there is a small group of people who are not able to make fully utilization of the technology the disabled. Thus, there is an interest to invent assistive technology to help this group of people. In this project, a head-mounted camera and a computer vision application was proposed and designed to assist the visually impaired to detect both the object and users hand, it is followed by tracking and guiding the users hand to reach the object of interest. As an initial stage of this project, context based template matching technique was implemented and only objects with different colors will be classified and recognized instead of classes of object. In the first step of the system, a particular hand posture is recognized using adaboost and SIFT, as a sign for the system to switch the object color. In this case, four different colors, red, green, blue and yellow will be switched in turn. Once the color is selected, a contextual template of finger based on visible individual fingers will be detected and recognized by the system. Next, the system will keep tracking both the object and users finger by matching the template to the input image. In the meanwhile, the system will also keep giving guidance in the form of voice commands to the end-user to reach the targeted object. As a final delivery of the system, the machine is successfully guiding the visually impaired to reach the targeted object with simple voice guidance.

Zaid Omar, Tania Stathaki, An Introduction To Image Fusion

In real world applications where various optical sensors are used for image acquisition, it is often difficult to obtain a good quality image from a single sensor alone. Decisions pertaining to system conditions are very rarely made upon the measurement of a single parameter. This condition remains true across many branches of modern technology be it medicine, geoinformatics or surveillance.

A simple example would be of the UN Camp sequence set in Figure 1. A landscape is captured during night time using two image acquisition techniques. An NIR camera that detects strong thermal presence, such as humans, comprises one input. In general though, NIR sensors suffer from lower image resolution, prevalent image noise and the lack of availability of data sets which render them unsuitable for solitary use. The second input is a standard image of the same scene, which is taken by a visual camera that captures strong textural background details but is severely limited in sparse illumination conditions. In this case the purpose is to enhance the lighting conditions in the scene and improve image qualities, so as to facilitate the detection of various moving objects and isolate pre-specified objects of interest.

Depending on user requirements, a good image must possess the ability to detect the human figure against the detailed backdrop of terrain and forestry. The formation of a good quality image is crucial as it enables us to have a proper understanding of the scenery context, which may prove decisive in real world surveillance and target recognition systems.

Therein lays the concept of fusion. As part of the grand challenge in image processing, image fusion aims to merge the salient aspects of two or more source images from these sensors to produce a singular output image that contains all pertinent image features and has a higher visual and numerical quality than any input, which may be essential in critical applications such as military surveillance.

Parallel Session 2A
3.30pm – 4.30pm BA-4-050
Chair: Norliza Mohd Noor, *Universiti Teknologi Malaysia (UTM)*

Title	Presenter
Band Aggregation of LTE-Advanced Technology	Aws Zuheer Yonis
Acoustic Analysis of Tool Sound Using Hilbert Huang Transform for Machine Tool Condition Monitoring	Emerson Raja J
Low Peak to Average Ration in Single Carrier Frequency Division Multiple Access	Mayada Faris Ghanim
Road Sign Identification With Robustness To Partial Occlusion	Nursabillilah binti Mohd Ali
A Framework For Feature Based Map Building	Yunusa Ali Said.

Parallel Session 2B
3.30pm – 4.30pm BA-4-051
Chair: Nor'aini Abdul Jalil, *Universiti Teknologi MARA (UiTM)*

Title	Presenter
Natural Image Denoising Based On Non-Linear Threshold Filtering In Multiwavelet Domain	Asem Khmag
Energy-Efficient and Low Complexity Image Compression Scheme Based on Lifting Wavelet Transform and Embedded Hierarchical Structures for Wireless Devices Applications	Khamees Khalaf Hasan
Steps in Raindrop Detection Method Outdoor Machine Vision	Mohd Helmy Abd Wahab, Nasriah Zakaria, Rosalina Abdul Salam
Evaluation of Reconfigurable Technique for Heterogeneous Multi-core Processors with FPGA Platform	Yasir Amer Abbas
Processing hand-drawn avatars for forensics	Dianne Cheong Lee Me

Parallel Session 2A:
A. Z. Yonis and M. F. L. Abdullah, Band Aggregation of LTE-Advanced Technology

The potential to reach high data rates requirements is to aggregate multiple Long Term Evolution (LTE) carrier. Two or more component carrier are aggregated in order to support wider transmission bandwidths up to 100 MHz. However initial LTE-Advanced 3rd Generation Partnership Project (3GPP) Release 10 deployments will likely be limited to the use of maximum two component carrier, where the maximum Downlink/Uplink bandwidth will be 40 MHz for Frequency Division Duplex (FDD) this will not preclude higher number of aggregated carriers been specified in 3GPP Release 11 and/or higher. In order to support LTE Release 8 terminals it is required that each of the component carriers (CC) can be configured to be a LTE Release 8 carrier. Adjacent or non-adjacent component carrier aggregation is supported which ensures the highest flexibility in spectrum usage according to individual network operator needs. A relatively simple way to further increase individual data transmission speeds is to increase the channel bandwidth. To remain backward compatible with 3GPP Release 8, the maximum carrier bandwidth of 20 MHz is not

altered. Instead, carrier aggregation is used to combine the capacity of several individual carriers. The aggregated carriers can be adjacent or non-adjacent; they can be in a single band and also in different bands. An individual carrier is referred to in the standards as CC. One configuration, for example, is to combine carriers in LTE bands 7 (2600 MHz band) and 3 (1800 MHz band) to potentially achieve a total carrier bandwidth of 40 MHz in the downlink direction. However the peak data rate is improved depending on the number of aggregated carriers, with a related impact on the User Equipment (UE) complexity.

Emerson Raja J, Acoustic Analysis of Tool Sound Using Hilbert Huang Transform for Machine Tool Condition Monitoring

The only link we have with the unexplained reality is the signals. Hence, signal analysis is the only way using which we can come to know the underlying processes of any given phenomenon. The strength and the quality of the signal processing is mostly depend on the kind of algorithm used for the analysis. FFT, Wavelet analysis and Wigner-ville distributions are some of the well-established signal processing algorithms widely used by the researchers. But all these algorithms are mostly based on a priori basis approach, performing convolution of data with the established basis. The necessary condition to represent non-linear and non-stationary data is to have an adaptive basis which means the definition of the basis has to be data-dependent. Hence data analysis method should use posteriori-defined basis (derived from data) not priori defined basis.

Hilbert-Huang Transform (HHT) is a new data processing technology developed by NASA Goddard Space Flight Center. The HHT is derived from the principles of empirical mode decomposition (EMD) and the Hilbert Transform. It is a two-step process, first, the EMD will decompose the given signal into a set of complete and almost orthogonal components called intrinsic mode function (IMF). Since the IMF is almost mono-component it can determine all the instantaneous frequencies from nonlinear and non-stationary signal. Second the local energy of each instantaneous frequency can be derived through the Hilbert Transform. Hence the result is a HHT spectrum which has an energy-frequency-time distribution of the signal. From the HHT spectrum one can localize any event on its occurring time as well as its instantaneous frequency.

In this study, the relationship between emitted sound signal and the growth of tool wear was investigated and a new method is proposed for tool flank wear classification during turning operation. For this purpose, experiments were conducted in a turning machine in the university mechanical workshop by using fresh, slightly worn and severely worn carbide inserts while machining steel work piece. The emitted sound signal data was obtained by using a microphone. Tool wear was measured by a toolmakers microscope. The features namely, the instantaneous frequencies and their amplitudes, required for the competitive neural network to classify the state of the tool, were extracted from each emitted sound signal by using the new signal processing technique Hilbert Huang Transform. Each emitted sound signal is decomposed into several intrinsic mode functions (IMFs) using Empirical mode decomposition (EMD). The Hilbert transform is then applied on each IMF to obtain the instantaneous frequencies with time and their amplitudes. From the marginal spectrum plots, it is found that the increase in tool flank wear resulted in an increase of the sound pressure amplitude. This correlation enabled the competitive neural network to perform tool wear classification with 83.3% of accuracy. It can be concluded from the results that the tool sound based monitoring strategy proposed in this study can be successfully implemented for tool condition monitoring in turning machines in manufacturing industries.

M. F. Ghanim, M. F. L. Abdullah, and A. Z. Yonis, Low Peak to Average Ration in Single Carrier Frequency Division Multiple Access

The wireless mobile communication technology is moving fast from the Third Generation to the latest Fourth Generation (4G) communication. Recently, much attention has been focused on techniques such as MC-CDMA, WiMAX and LTE. In addition to the subcarrier spacing, the major difference between the two standards is that 4G adopts the Single Carrier Frequency Division

Multiple Access (SC-FDMA) system for uplink transmission, rather than the commonly used Orthogonal Frequency Division Multiple Access (OFDMA) system. Peak-to-Average Power Ratio (PAPR) indicates that a power backoff is required to operate in linear region of the power amplifier and high PAPR reduces the efficiency performance of transmission power. Sufficiently low PAPR of the transmitted waveform is important to avoid excessive cost, size and power consumption of the UE Power Amplifier (PA); therefore it greatly benefits the mobile terminal in terms of transmit power efficiency and terminal costs. SC-FDMA scheme guarantees low PAPR; for this reason 4G uplink has suitable power efficiency of the mobile terminal transmitter and certain amount of flexibility in resource allocation and scheduling because of DFT-spread OFDM in the uplink.

Nursabillilah binti Mohd Ali, Road Sign Identification With Robustness To Partial Occlusion

In recent years, automatic road sign identification system has attracted numerous research works with the possibility of using in autonomous or driver assistance system (ADAS). Research in road sign identification with occlusion, however is still lacking. Many existing techniques up to now that have been developed algorithms with the existence of occlusions produce inaccuracy that needs to be improved. Even though the occurrences of road signs with presence of occlusion are small, yet it is problem that needs to be addressed. An intelligent system for road sign identification that incorporated several different algorithms is proposed in the research to solve the problems. The algorithms consist of proposed HSV and RGB colors in detection part and ANN and PCA techniques in recognition part. The proposed algorithms able to detect the three standard types of colored images namely Red, Yellow and Blue. These algorithms are then compared with each other to evaluate their performance. The hypothesis of the research is that road sign images can be used to detect and identify signs that are involved with existence of occlusions and rotational changes. Each sign features are then extracted using global feature extraction technique whereby the vertical and dimension size of sign are fixed to a standard size. These input features are used to be applied into neural network according to feed forward neural network technique using backpropagation training function. PCA is known as feature extraction technique that reduces dimensional size. The sign image can be easily identified by the PCA method as it has been used in many application areas. Based on the experimental result, it shows that the HSV is robust in road sign detection with minimum of 88% and 77% successful rate for non-partial and partial occlusions images rather than RGB color segmentation. For successful recognition rates using ANN can be achieved starts from 75-92% whereas PCA is in the range of 94-98%. The occurrences of all classes are recognized successfully is between 5% and 10% level of occlusions using PCA, whereas only 5% level of occlusions successful recognized using ANN.

Yunusa Ali Said., M. Hamiruce Marhaban, Abdul Rahman Ramli, Siti A Ahmad, Mohammed Reza Khammar, Muhammad Aqel, Norhayati Binti Mohd Suaib and Reza Shoorangiz, A Framework For Feature Based Map Building

Map building is the task of creating the awareness concerning environment which will then be used for localization. This knowledge of the environment is then stored in a map. The research work encounters the problem of localization and mapping for a Golem in an indoor environment using vision and laser range finder sensor information. However the existing techniques are not robust to reduce computational complexity and handle data association problems. Under this framework, we propose to implement the scale invariant feature transform (SIFT) as a method of extracting and describing keypoints which are robustly invariant to common image transform. The approach will reduce the computational cost and data association problem through finding correct features matching.

Parallel Session 2B:

Asem Ib Mohamed Khmag, Natural Image Denoising Based On Non-Linear Threshold Filtering In Multiwavelet Domain

The search for efficient image denoising methods is still a valid challenge at the crossing of functional analysis and statistics. In spite of the sophistication of the recently methods, most algorithms have not yet attained a desirable level of applicability. All the algorithms show a high outstanding Performance when the image model corresponds to the algorithm assumptions but it fails in general and create artifacts or change the main structures of the original image. De-noising of natural images corrupted by white Gaussian noise using wavelet techniques is very effective because of its ability to capture the energy of the signal in few energy transform values or coefficients. This method performs well under a number of applications because wavelet transform has the compaction property of having only a small number of large coefficients where the remaining wavelet coefficients are very small. In this study, new method called semi soft thresholding will be proposed, this method overcome the drawbacks in both types of thresholding techniques (hard and soft) like killing so much coefficients in hard thresholding and the extra smoothing that affect the reconstructed image in soft one. In addition, the main focus on the proposed technique is to increase the performance of the wavelet thresholding and lifting scheme in PSNR, MSE and visual quality, especially for the images with rich texture features such as symmetric and periodic images that contaminated with different types of noise.

Khamees Khalaf Hasan, Umi Kalthum Ngah, Mohd Fadzli Mohd Salleh, Energy-Efficient and Low Complexity Image Compression Scheme Based on Lifting Wavelet Transform and Embedded Hierarchical Structures for Wireless Devices Applications

Wireless sensor network (WSN) consists of tiny sensing nodes that harvesting information from the monitored site over a wireless channel. It is densely deployed without communication infrastructures. Several primary concern points should be deliberated in the WSN design. Memory boundaries and irreplaceable battery-operated supply are present strong limits at the sensor nodes. The huge data provided by the cameras joint with the networks maintain limits require finding new way for data processing and communication. Hence, if the size of data could be minimized, image compression would reduce the memory requirement and thus communication costs.

Recently, transform-based image compression methods are still very attractive and popular. These methods are mainly based either on Discrete Cosine Transform (DCT) such as JPEG or Discrete Wavelet Transform (DWT) as JPEG2000. DCT based algorithms are fast with low-complexity and low-memory. However, they often cause annoying blocking artifacts in the low bit rate transmission. The low complexity DWT -based coders becoming definitive in the design of WSNs. These coders generate a bit stream that can be decoded at multiple transmission bit rates with an acceptable quality of the reconstructed image at the reception. Set Partitioning in Hierarchical Trees (SPIHT), a vastly refined version of Embedded Zero tree Wavelet (EZW) structure and Embedded Block Coding with Optimized Truncation (EBCOT) are among the most popular quality-scalable wavelet based image coders. However, with fewer bits to transmit using the SPIHT coder, this technique will be suitable to the restricted property with limited resources platforms such as the context of WSN at the sensor node. In this paper, the lifting scheme implementation of wavelets is also investigated.

Mohd Helmy Abd Wahab, Nasriah Zakaria, Rosalina Abdul Salam, Steps in Rain-drop Detection Method Outdoor Machine Vision

Nowadays, the trend has taking place that outdoor machine vision has been used in many applications such as driver assistant system, camera surveillance system as well as high speed camera for speeding applications to improve the visibility during bad weather. Currently, the challenge for this fields are cleaning raindrop from video for moving vehicle and image for surveillance camera.

However, the focus of the presentation concern on the steps in raindrop detection on still image using image processing techniques. Detection process is a challenging process due to the system need to classify the captured image into two types i) Image with clear background ii) image with complex background. The method of raindrop detection involves histogram equalization, binarization and shape checking. Detected raindrops are then removed to improve the visibility during bad weather.

Yasir Amer Abbas, Razali Jidin, Pooria Varahram, Evaluation of Reconfigurable Technique for Heterogeneous Multi-core Processors with FPGA Platform

Nowadays most new electronic devices such as digital camera, smart phones, tablets and games consoles require a heterogeneous system architecture that executes efficiently with image processing applications in real-time. To meet this challenging requirement, heterogeneous multi-core processor is the likely platform to host the different application of tasks. However, there are many hardware/software challenges on multi-core processor heterogeneous design that can include; sharing of resources, tasks balancing, throughput, communication and scheduling. This paper presents an evaluation of static, dynamic and partial reconfiguration for heterogeneous multi-cores processors with Field Programmable Gate Arrays (FPGAs) hardware platform. Recently, different reconfigurable methodology like a mapping application, bus-base, run-time task assignment, and task migration are minimizing the communication overhead and improve the performance of heterogeneous multi-core processor design. The FPGA-based design provides efficient platform for developing hardware/software multi-cores system design for reconfigurable heterogeneous multi-cores processors. The reconfigurable technique improves heterogeneous multi-cores processor performance in term of latency, design area, power consumption and execution time.

Dianne Cheong Lee Me, Processing hand-drawn avatars for forensics

Hand-drawn avatars as online self-representation can be used for criminal investigation in cyber space. Hand-drawn avatars are important as supporting evidence for other physical evidence in forensic investigation. They can be used in the process of investigating cyber crime cases, and for data mining of cyber crime; classification, clustering, association, and detection of crime types, crime cases, evidences and criminals. It is necessary to collect cyber evidence together with general evidence so as to classify documents for effective investigation, including document retention and exchange. Moreover, general cyber crime is connected with general crime by evidence from digital data and cyber space. This paper identifies hand-drawn avatars as online self-representation which may indicate identity. Informal knowledge about avatars as online self-representation is acquired by considering the broadest possible categories of hand-drawn avatars among the young adults of ages between 21 and 22 years old. These young adults from a homogeneous cultural background have no prior knowledge of readily available avatars from online games. They were asked to draw a graphical image as a self-representation. Additionally, they were briefed with the following exclusions when drawing: context around the avatar is not allowed; text labels are not allowed; and large black areas are not allowed; Above all, the avatar is easily recognisable.

About IEEE Signal Processing Society Malaysia

The IEEE Signal Processing Society Malaysia section was established in August 2002 with the objective of bringing the Malaysian Signal Processing community together to interact, network and collaborate. As of January 2012 there are over 120 members, covering various institutions, ethnicities and nationalities. The executive committee has been drawn from various public and private universities. Since inception the society, with the active involvement of its members, has been involved in conducting various activities.

The IEEE Signal Processing Society (Malaysia Section) (<http://spsocmalaysia.org/>) was awarded the IEEE Signal Processing Society Chapter of the Year 2010 award in 2011. Its Chair, Mohammad Faizal Ahmad Fauzi, received the award on behalf of the chapter at ICASSP 2011 at Tokyo, Japan. This achievement was in recognition of the many activities successfully carried out by IEEE SPS (Malaysia Section), including international conferences, free workshops, technical visits, social programmes, membership drives and administrative duties.

Conferences and Workshops

The chapter started its flagship conference, the IEEE International Conference on Signal and Image Processing Applications (ICSIPA) in 2009. This biennial conference were major successes in 2009 and 2011, attracting over 50% and 70% international participation, respectively. This year, IEEE ICSIPA 2013 (<http://spsocmalaysia.org/icsipa2013>) will be held on October 8 - 10, 2013 in the Historical City of Melaka (Malacca), a UNESCO World Heritage Site in Malaysia. Calls for Papers have been distributed and the dedicated organizing committee members led by the General Chair, Rajasvaran Logeswaran, are working tirelessly towards making it a greater success than its predecessors.

One of the most successful education programs organized by the chapter since 2010 is the Image Processing, Image Analysis and Real-Time Imaging (IPIARTI) symposium. The annual chapter-sponsored event is open free of charge to all IEEE members and non-members with the aim of bringing the university and industry communities together to share and discuss the latest trends and technology in the image processing and computer vision fields. This event also aims to promote IEEE Signal Processing Society to the participants. The 1-day symposium comprises of 3 keynote presentations, with at least one being a Distinguished Lecturer Programme (DLP) talk and several invited presentations in a conference style setting. The most recent was held on August 30, 2012 at Universiti Teknologi Mara, Shah Alam, Malaysia.

To facilitate more fundamental training in various aspects related to signal processing, the chapter regularly organizes hands-on workshops annually. These include such topics as “Signal Processing with MATLAB,” “Image Processing with MATLAB” and “Real-time Video Processing.” Short course such as those on “Data Compression Strategies”, and technical talks at various institutions are also conducted. All these help to meet the signal processing training needs of students, academia, and the industry.

Challenges and Opportunities

The chapter, having consolidated its position in Malaysia, in particular, and Asia, in general, is now setting its sights on bringing flagship conferences to Malaysia. To this end, the executive committee has been working closely with the Malaysian Conferences and Exhibition Bureau (MyCEB). A team comprising of two executive committee members (M. Iqbal Saripan and Rajasvaran Logeswaran) presented a bid for MMSP 2014 at the MMSP 2012 that was held at Banff, Canada.

The chapter is eagerly spreading its wings both in terms of activities as well as in terms of geographical involvement. There is much to be achieved and the coming years are expected to see many more successful activities and collaborations by the chapter.

About *CSPaCS*

The Signal Processing and Control Systems research group was elevated to Center for Signal Processing and Control Systems (*CSPaCS*) in April 2012. It consists of over 20 members from the departments of Electronics & Communication Engineering, Electrical Power Engineering and Mechanical Engineering of the College of Engineering, Universiti Tenaga Nasional.

Vision

To be a leading center of excellence in signal processing and control systems.

Mission

We are committed to nurturing, creating value and promoting excellence in energy research while facilitating a stronger link between academia and industry.

Objectives

The main objectives of the center are

- to develop and nurture expertise in Signal Processing (SP) & Control Systems (CS),
- to be a one-stop shop for expertise & resources in SP & CS,
- to work with other bodies (internally & externally) through strategic collaborations,
- to serve as a conduit for obtaining research grants, and
- to help network with professional bodies.

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