

2017 the Second International Workshop on Pattern Recognition

May 1-3, 2017, Singapore



Nanyang Executive Centre

<http://www.ntu.edu.sg/NEC/Pages/default.aspx>

Address: 60 Nanyang View, Singapore 639673

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Welcome Letter

Dear Participants,

Welcome to IWPR 2017 in Singapore!

We are confident that over the three days you will get the theoretical grounding, practical knowledge, and personal contacts that will help you build a long-term, profitable and sustainable communication among researchers and practitioners in a wide variety of scientific areas with a common interest on pattern recognition.

We wish to thank our outstanding speakers, Assoc. Prof. Xudong Jiang, Assoc. Prof. Julian Fierrez, Prof. Masayuki Arai, Assoc. Prof. Kin Hong Wong, Assoc. Prof. Andrew B. J. Teoh, Prof. Jiande Sun, Dr. Bo Jiang, Dr. Juno Kim and other distinguished professors for sharing their deep insights on IWPR 2017.

Special thanks to all the researchers and students who with their work and participate in the conference.

Hope you enjoy the conference, the food, the hospitality, and the beautiful and charming environment of Singapore!

IWPR 2017 Organizing Committees

Agenda at a glance

Note: Function Hall 2 is located in the 4th floor.

Lecture Room 4, 5, 6 are located in the 3rd floor.

May 1	10:00-17:00	Arrival and Registration at Lobby	
May 2	9:00-9:05	Opening Remark: Assoc. Prof. Xudong Jiang Nanyang Technological University, Singapore	Function Hall 2
	9:05-9:45	Keynote Speech I: Assoc. Prof. Julian Fierrez Universidad Autonoma de Madrid, Spain <i>Title: Behavioral Biometrics with Application to the FinTech Sector</i>	
	9:45-10:25	Keynote Speech II : Assoc. Prof. Xudong Jiang Nanyang Technological University, Singapore <i>Title: Feature Extraction and Dimensionality Reduction: Solving Over-Fitting in Pattern Recognition</i>	
	10:25-10:55	Group Photo & Coffee Break	
	10:55-11:25	Plenary Speech I: Prof. Masayuki Arai Teikyo University, Japan <i>Title: General Introduction of Our Recent Research</i>	
	11:25-11:55	Plenary Speech II: Assoc. Prof. Kin Hong Wong The Chinese University of Hong Kong, Hong Kong <i>Title: 3-D Computer Vision and Applications</i>	
	11:55-13:25	Lunch at restaurant	
	13:25-13:45	Invited Speech I: Assoc. Prof. Andrew B. J. Teoh Yonsei University, South Korea <i>Title: Advances in Analytic Manifold for Structured Pattern Recognition Problems</i>	Function Hall 2

	13:25-13:45	Invited Speech II: Prof. Jiande Sun Shandong Normal University, China <i>Title: Video-Based Gaze Tracking: Methods and Applications</i>	Lecture Room 4
	13:25-13:45	Invited Speech III: Dr. Bo Jiang Nanjing University of Posts and Telecommunications, China <i>Title: Aesthetic QR Code Generation: Principles and Methods</i>	Lecture Room 5
	13:25-13:45	Invited Speech IV: Dr. Juno Kim University of New South Wales, Australia <i>Title: Image Properties for Material Appearance</i>	Lecture Room 6
	13:45-16:00	Session 1: Face Recognition-9 Presentations	Function Hall 2
	13:45-16:00	Session 2: Image Analysis and Transformation-9 Presentations	Lecture Room 4
	13:45-16:00	Session 3: Image Processing and Application-9 Presentations	Lecture Room 5
	13:45-16:00	Session 4: Signal Analysis and Processing-9 Presentations	Lecture Room 6
	16:00-16:15	Coffee Break	Foyer
	16:15-18:00	Session 5: Target Recognition-7 Presentations	Function Hall 2
	16:15-18:00	Session 6: Feature Detection and Matching-7 Presentations	Lecture Room 4
	16:15-18:00	Session 7: Image Segmentation and Video Processing Technology-7 Presentations	Lecture Room 5
	16:15-18:00	Session 8: Computer Theory and Application-7 Presentations	Lecture Room 6
	9:00-18:00	Poster Session	Function Hall 2
	18:00-20:30	Dinner at Restaurant	
May 3	9:30-11:00	Academic Visiting	
	9:00-17:00	One-day Tour of Singapore	

Detailed Schedule

May 1, 2017

10:00—17:00	Arrival and Registration	Lobby
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Registration Guide

Arrive at the Conference Venue→Inform the conference staff of your paper ID→Sign your name on the Participants List→Check your conference materials.

Checklist:

1 receipt, 1 name card, 1 printed conference abstract, 1 lunch coupon, 1 dinner coupon, 1 USB (papers collection), 1 computer bag.

Devices Provided by the Conference Organizer:

Laptops (with MS-Office & Adobe Reader)
Projectors & Screen
Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF files

Duration of each Presentation:

Regular Oral Session: 15 Minutes of Presentation including 2-3 Minutes of Q&A

Notice:

- *Certificate of Listener can be collected in front of the registration counter.
- *Certificate of Presentation can be collected from the session chair after each session.
- *The organizer will not provide accommodation, so we suggest you make an early reservation.

Contact:

IWPR 2017: Ms. Nancy Huang (iwpr2016@vip.163.com)
Tel: +86-130-9633-3337

May 2, 2017 (Morning)

Function Hall 2 (4th floor)

Opening Remark

Assoc. Prof. Xudong Jiang, Nanyang Technological University, Singapore

9:00-9:05

Keynote Speeches



**Assoc. Prof. Julian Fierrez,
Universidad Autonoma de
Madrid, Spain**

9:05-9:45

Julian Fierrez received the M.Sc. and the Ph.D. degrees in telecommunications engineering from Universidad Politecnica de Madrid, Spain, in 2001 and 2006, respectively. Since 2002 he has been affiliated with the Biometric Recognition Group (ATVS), first at Universidad Politecnica de Madrid, and since 2004 at Universidad Autonoma de Madrid, where he is currently an Associate Professor. From 2007 to 2009 he was a visiting researcher at Michigan State University in USA under a Marie Curie fellowship. His research interests include general signal and image processing, pattern recognition, and biometrics, with emphasis on signature and fingerprint verification, multi-biometrics, biometric databases, system security, and forensic applications of biometrics. Dr. Fierrez is actively involved in multiple EU projects focused on biometrics (e.g. TABULA RASA and BEAT), has attracted notable impact for his research (more than 6,000 citations with h-index = 42 in Google Scholar), and is the recipient of a number of distinctions, including: Best Paper Awards at AVBPA 2003, ICB 2006, ICPR 2008, and ICB 2015; Best PhD Thesis Award in Computer Vision and Pattern Recognition in 2005-2007 by the IAPR Spanish liaison (AERFAI), EBF European Biometric Industry Award 2006, EURASIP Best PhD Award 2012, Medal in the Young Researcher Awards 2015 by the Spanish Royal Academy of Engineering, and the Miguel Catalan Award to the Best Researcher under 40 in the Community in Madrid in the general area of Science and Technology.

Behavioral Biometrics with Application to the FinTech Sector

Abstract—Services are migrating from the physical to the digital domain in the information society. Examples of this conversion to the digital domain can be seen in: e-government, banking, education, health, commerce and leisure. In this context, identity authentication has become a fundamental need to ensure proper use and access to digital resources. Biometric technologies have emerged to fill the gap of traditional recognition technologies based on passwords or cards. The advantages of biometric systems are clear in terms of security and convenience of use, which has led these technologies to take on a leading role in the last years. The most popular biometric technologies (such as fingerprint, face or iris) are linked in general to access control applications or forensic science. These technologies typically require specific one-shot imaging sensors, reducing this way their universality and interoperability. Moreover, there is currently an increasing demand for remote authentication solutions that cannot be adequately met with the

already mentioned biometric technologies, e.g., web-based authentication. Therefore, there is a need for new technologies better suited for remote authentication. In this talk we will overview recent advances in biometric authentication based on user behavior and actions while interacting with certain devices or applications (such as common tasks with a smartphone). We will focus in behavioral biometrics like handwriting, keystroking and swipe touch interaction, with a practical application to the FinTech sector.



Assoc. Prof. Xudong Jiang,
Nanyang Technological
University, Singapore

9:45-10:25

Dr. Xudong Jiang received the B.Sc. and M.Sc. degree from the University of Electronic Science and Technology of China, and received the Ph.D. degree from Helmut Schmidt University Hamburg, Germany. From 1986 to 1993, he worked as Lecturer at UESTC where he received two Science and Technology Awards from the Ministry for Electronic Industry of China. He was a recipient of the German Konrad-Adenauer Foundation young scientist scholarship. From 1993 to 1997, he was with Helmut Schmidt University Hamburg, Germany as scientific assistant. From 1998 to 2004, He worked with the Institute for Infocomm Research, A*Star, Singapore, as Senior Research Fellow, Lead Scientist and appointed as the Head of Biometrics Laboratory where he developed an software that achieved the fastest and the second most accurate fingerprint verification in the International Fingerprint Verification Competition (FVC2000). He joined Nanyang Technological University, Singapore as a faculty member in 2003 and served as the Director of the Centre for Information Security from 2005 to 2011. Currently, Dr. Jiang is a tenured Association Professor in Nanyang Technological University. Dr. Jiang has published over 120 research papers, including 20 papers in top IEEE journals: TPAMI, TIP, TSP and SPM, which are well-cited on Web of Science. He is also an inventor of 7 patents (3 US patents). Dr. Jiang is a senior member of IEEE, elected voting member of IFS technical committee of IEEE Signal Processing Society, Associate editor of IEEE Signal Processing Letters and IET Biometrics. He has been serving as General Chair, Technical Program Committee Chair, Keynote Speaker and Session Chair of multiple international conferences. His research interest includes pattern recognition, computer vision, machine learning, image analysis, signal processing, machine learning and biometrics.

Feature Extraction and Dimensionality Reduction: Solving Over-Fitting in Pattern Recognition

Abstract—Feature extraction and dimensionality reduction are critical steps in pattern recognition system. We understand well about various traditional approaches in handcrafted feature extraction while the objectives and purposes of machine learning to extract effective features may not be so straightforward. It is thus not a surprise that approaches of the learning-based dimensionality reduction emerge in various research journals, many of which are in prestige journals. Many researchers and engineers find it difficult and even confused in choosing a proper approach from numerous diverse techniques due to a lack of thorough understanding of the roles of feature extraction and dimensionality reduction in the statistical inference and recognition. The different roles and effects of various dimensionality reduction techniques on facilitating a better detection and recognition have not been studied. Many fundamental yet critical issues are still outstanding or not thoroughly analyzed. This talk analyzes the fundamental problems of feature extraction and dimensionality reduction for automated data analysis. Based on this, the speech clarifies doubts, confusions and misunderstandings about roles of the learning-based dimensionality reduction. It aims

at helping audience have an in-depth understanding and gain a clear picture of machine learning-based feature extraction. A total novel concept will be presented in this talk: “Removing misleading information” to replace the conventional “Extracting discriminative information” in machine learning-based data analysis.

Coffee Break and Group Photo (10:25-10:55)



Plenary Speeches



Prof. Masayuki Arai, Teikyo University, Japan

10:55-11:25

Professor in the Graduate School of Sciences and Engineering at Teikyo University. He received his B.E. degree from Tokyo University of Science in 1981 and Dr. Eng. degree from Utsunomiya University in 1995. His research interests include pattern recognition, natural language processing, and information visualization. He is a member of the Information Processing Society of Japan and IEEE.

General Introduction of Our Recent Research

Abstract—We have been studying pattern recognition, natural language processing and information visualization. In this speech, I'd like to introduce our recent research. First of all, I'd like to talk about following pattern recognition systems we've developed lately: followable user interface to hand behavior, textbook page recognition for self-study in distance learning, and pedestrian detection. Second, I'd like to introduce following TCP/IP protocol visualization tools: visualization tool for understanding the control method of TCP packet arrival order, visualization tool for understanding the difference between TCP and UDP, TCP/IP application protocol visualization tool, and secure socket layer visualization tool.



Assoc. Prof. Kin Hong Wong, The Chinese University of Hong Kong, Hong Kong

11:25-11:55

Dr. Wong Kin Hong is an Associate Professor of the Department of Computer Science and Engineering of the Chinese University of Hong Kong. He received a PhD from the Department of Engineering of the University of Cambridge. His major research interest is in 3-D computer vision especially in pose estimation, structure from motion and tracking. He has investigated and developed many useful techniques in computer vision such as the four-point pose estimation algorithm and Kalman-trifocal pose estimation methods which are useful in many application areas such as automatic driving and virtual reality. He is also interested in pattern recognition, embedded applications, and computer music.

3-D Computer Vision and Applications

Abstract— In this seminar, I will talk about various 3-D pose estimation and structure from motion techniques in engineering applications. First, I will discuss the general approaches of feature based pose estimation and structure from motion. Then I will introduce the techniques of Kalman filtering and trifocal tensor for real time pose tracking. Issues of 3-D vision approaches for virtual reality, projector-camera systems and automatically driving will be elaborated. During the talk, I will also give video demonstrations of some interesting vision based systems we developed in recently years. Finally the opportunities and challenges of 3-D computer vision in the modern mobile era will be discussed.



11:55-13:25 (Lunch coupon is needed.)

Location ➤ **Restaurant**

May 2, 2017 (Afternoon)

Invited Speeches



Assoc. Prof. Andrew B.J. Teoh, Yonsei University, South Korea

13:25-13:45

Venue: Function Hall 2 (4th floor)

Andrew Beng Jin Teoh obtained his BEng (Electronic) in 1999 and Ph.D degree in 2003 from National University of Malaysia. He is currently an associate professor in Electrical and Electronic Engineering Department, College Engineering of Yonsei University, South Korea.

His research, for which he has received funding, focuses on biometric applications and biometric security. His current research interests are Machine Learning and Information Security. He has published more than 250 international refereed journal papers, conference articles, edited several book chapters and edited book volume. He served and is serving as a guest editor of IEEE Signal Processing Magazine, associate editor of IEEE Biometrics Compendium and editor-in- chief of IEEE Biometrics Council Newsletter. He was a program co-chair of ICONIP 2014, area chair of ICPR 2016, track chair and TPC for several conferences related to computer vision, pattern recognition and biometrics.

Advances in Analytic Manifold for Structured Pattern Recognition Problems

Abstract—Statistical learning on analytic manifolds (Lie Group, Riemannian, Stiefel and Grassmann Manifolds) is a new emerging and powerful means for solving structured pattern recognition problems. Analytic manifold learning is particular useful for many applications whereby input is framed by structured patterns such covariance matrices, linear dynamic models and linear subspaces. Analytic manifold learning can be reliable and accurate for inference, clustering, classification as well as prediction problems. This talk gives an overview of common analytic manifolds employed in various pattern recognition and computer vision problems. In particular, we will showcase a solution based on Grassmann manifold for multi-view gait recognition.



Prof. Jiande Sun, Shandong Normal University, China

13:25-13:45

Venue: Lecture Room 4

(3rd floor)

Jiande Sun received the Ph.D. degree in communication and information system from Shandong University, Jinan, China, in 2005. He did the Postdoc work in both Peking University and Hisense Ltd from 2010 to 2013. He has been a visiting researcher in Technical University of Berlin, University of Konstanz, and Carnegie Mellon University. He is a full professor with the School of Information Science and Engineering, Shandong Normal University. He has published more than 60 journal and conference papers. He is the co-author of two books. He was authorized 17 patents. His research interests include multimedia content analysis, video hashing, gaze tracking, image/video watermarking, 2D to 3D conversion, and so on.

Video-Based Gaze Tracking: Methods and Applications

Abstract—Gaze tracking technologies have been traditionally used in the fields of psychological and medical diagnosis, design evaluation, etc., and recently in human-computer interaction, biometrics recognition, virtual reality, and so on. In this talk, I will mainly introduce the video-based gaze tracking methods with the consideration of its application in HCI, which are dominate in this field at present. The technical evolution from the methods with normal calibration, to with reduced calibration, and finally to without calibration will be introduced. And the analysis on some factors in gaze tracking, such as light sources, head movement, etc., will be provided. In addition, I will introduce the applications of gaze tracking in personal mobile terminals and biometrics recognition respectively, and the potential research directions in this field.



Dr. Bo Jiang, Nanjing University of Posts and Telecommunications, China

Dr. Bo Jiang joined the Department of Digital Media Technology, School of Education Science and Technology, Nanjing University of Posts and Telecommunications as lecturer since Jul. 2014. Before that, he finished my Ph.D. study at State Key Lab of CAD & CG, Zhejiang University under the supervision of Prof. Xinguo Liu in Mar. 2014. He received my Bachelor's degree in School of Computer Science and Technology from Nanjing University of Posts and Telecommunications in 2006. In Sep. 2007, he became a Master student in State Key Lab of CAD & CG. Starting from Sep. 2008, he transferred to the Ph.D. program. During Nov. 2010 - Nov. 2011, he visited the Manufacturing System Research Lab, General Motors Research & Development at Warren, MI, USA

13:25-13:45

Venue: Lecture Room 5

(3rd floor)

under the supervision of Dr. Wuhua Yang (Sponsored by China Scholarship Council and General Motors).

His research interests include digital geometry processing, shape analysis, computer vision based applications and virtual/augmented reality.

Aesthetic QR Code Generation: Principles and Methods

Abstract—QR (Quick Response) code is a kind of two dimensional barcode that was first developed in automotive industry. Nowadays, QR code has been widely used in commercial applications like product promotion, mobile payment, product information management, etc. Traditional QR codes in accordance with the international standard are reliable and fast to decode, but are lack of aesthetic appearance to demonstrate visual information to customers. In recent years, various approaches have been proposed to make aesthetic QR code. In this talk, basic principles of QR code and its beautification strategies will be presented first. Then, recent advances in QR code beautification methods will be summarized, including the speaker's work. Finally, future work to improve the visual quality of aesthetic QR code will be shown.



Dr. Juno Kim, University of New South Wales, Australia

13:25-13:45

Venue: Lecture Room 6

(3rd floor)

Dr. Kim is a Senior Research Fellow based in the School of Optometry and Vision Science at the University of New South Wales. Since completing his PhD in Psychology in 2005 (University of Sydney), he undertook postdoctoral studies on the perception of object form and motion at the University of Wollongong, the University of New South Wales, and the University of Sydney. In 2015, Dr Kim commenced an Australian Research Council (ARC) Future Fellowship awarded for his ongoing research on material appearance, which has collectively generated outputs featuring in Current Biology, i-Perception, Attention Perception & Psychophysics, Journal of Vision, and on the cover of Nature Neuroscience.

Image Properties for Material Appearance

Abstract—Surfaces reflect light that provides valuable information about their physical properties of 3D shape, colour, gloss and transparency. A major challenge for computational vision science is to understand how we perceive the material composition of objects from single images. Some researchers have proposed that image statistics can account for this experience, but evidence suggests that material perception can only be explained by theories that consider the structure of luminance variations in images. The presentation takes a revealing look at some of the geometric constraints that appear to account for our visual experience of objects and their material properties. The understanding to be gained has direct practical applications to the design of psychophysically-based artificial systems that can model human visual performance in a variety of real-world tasks (e.g., medical diagnosis and coordinating industrial processes using robotics).

Panel Sessions

✧ Tips:

Please arrive at conference room 15 minutes earlier, in case some authors are not able to make the presentation on time.

There will be a session group photo part at the end of each session.

The best paper will be chosen after each session and the certificate will be awarded by the chair. Good Luck!

Session 1: Face Recognition-9 Presentations

Chair: Assoc. Prof. Kin Hong Wong, The Chinese University of Hong Kong, Hong Kong

Time: 13:45-16:00

Venue: Function Hall 2 (4th floor)

<p>WR0033 13:35-14:00</p>	<p>Finessing Filter Scarcity Problem in Face Recognition via Multi-Fold Filter Convolution Cheng-Yaw Low and Andrew Beng-Jin Teoh Yonsei University, Korea</p> <p>Abstract—The deep convolutional neural networks for face recognition, from DeepFace to the recent FaceNet, demand a sufficiently large volume of filters for feature extraction, in addition to being deep. The shallow filter-bank approaches, e.g., principal component analysis network (PCANet), binarized statistical image features (BSIF), and other analogous variants, endure the <i>filter scarcity problem</i> that not all PCA and ICA filters available are discriminative to abstract noise-free features. This paper extends our previous work on multi-fold filter convolution (\mathcal{M}-FFC), where the pre-learned PCA and ICA filter sets are exponentially diversified by \mathcal{M} folds to instantiate PCA, ICA, and PCA-ICA offspring. The experimental results unveil that the 2-FFC operation solves the filter scarcity state. The 2-FFC descriptors are also evidenced to be superior to that of PCANet, BSIF, and other face descriptors, in terms of rank-1 identification rate (%).</p>
<p>WR0053 14:00-14:15</p>	<p>Method for secure electronic voting system: Face recognition based approach Muhammad Affan Alim, Misbah Mubeen Baig, Shahzain Mehboob, Imran Naseem PAF-Karachi Institute of Economic & Engineering, Pakistan</p> <p>Abstract—In this paper, we propose a framework for low cost secure electronic voting system based on face recognition. Essentially Local Binary Pattern (LBP) is used for face feature characterization in texture format followed by chi-square distribution is used for image classification. Two parallel systems are developed based on smart phone and web applications for face learning and verification modules. The proposed system has two tire security levels by using person ID followed by face verification. Essentially class specific threshold is associated for</p>

	controlling the security level of face verification. Our system is evaluated three standard databases and one real home based database and achieve the satisfactory recognition accuracies. Consequently our propose system provides secure, hassle free voting system and less intrusive compare with other biometrics.
WR0080 14:15-14:30	<p>Video-based face recognition via convolutional neural networks Tianlong Bao, Chunhui Ding, Saleem Karmoshi and Ming Zhu University of Science and Technology of China, China</p> <p>Abstract—Face recognition has been widely studied recently while video-based face recognition still remains a challenging task because of the low quality and large intra-class variation of video captured face images. In this paper, we focus on two scenarios of video-based face recognition: 1)Still-to-Video(S2V) face recognition, i.e., querying a still face image against a gallery of video sequences; 2)Video-to-Still(V2S) face recognition, in contrast to S2V scenario. A novel method was proposed in this paper to transfer still and video face images to an Euclidean space by a carefully designed convolutional neural network, then Euclidean metrics are used to measure the distance between still and video images. Identities of still and video images that group as pairs are used as supervision. In the training stage, a joint loss function that measures the Euclidean distance between the predicted features of training pairs and expanding vectors of still images is optimized to minimize the intra-class variation while the inter-class variation is guaranteed due to the large margin of still images. Transferred features are finally learned via the designed convolutional neural network. Experiments are performed on COX face dataset. Experimental results show that our method achieves reliable performance compared with other state-of-the-art methods.</p>
WR0082 14:30-14:45	<p>Upright Detection of In-Plain Rotated Face Images with Complicated Background for Organizing Photos Yoshihiro Shima Meisei University, Japan</p> <p>Abstract—Digital cameras and smart-phones with orientation sensors allow auto-rotation of portrait images. Auto-rotation of portrait is done by using the image file's metadata, exchangeable image file format (EXIF). The output of these sensors is used to set the EXIF orientation flag to reflect the positioning of the camera with respect to the ground. Unfortunately, software program support for this feature is not widespread or consistently applied. Our research goal is to create the EXIF orientation flag by detecting the upright direction of face images having no orientation flag and is to apply the software of organizing photos. In this paper, we propose a novel upright detection scheme for face images that relies on generation of rotated images in four direction and part-based face detection with Haar-like features. Inputted images are frontal faces and these images are in-plain rotated in four possible direction. The process of upright detection is that among four possible rotated images, if only one rotated image is accepted in face detection and other three rotated images are rejected, the upright direction is obtained from the accepted direction. Rotation angle of EXIF orientation is, 0 degree, 90 degree clockwise, 90 degree counter-clockwise, or 180 degree. Experimental results on 450 face image samples show that proposed method is very effective in detecting upright of face images with background</p>

	variations.
WR0084 14:45-15:00	<p>Application of OpenCV in Asus Tinker Board for Face Recognition Wei-Yu Chen, Frank Wu and Chung-Chiang Hu Chinese Culture University, Taiwan</p> <p>Abstract—The rise of the Internet of Things to promote the development of technology development board, the processor speed of operation and memory capacity increases, more and more applications, can already be completed before the data on the board computing, combined with the network to sort the information after Sent to the cloud for processing, so that the front of the development board is no longer simply retrieve the data device. This study uses Asus Tinker Board to install OpenCV for real-time face recognition and capture of the face, the acquired face to the Microsoft Cognitive Service cloud database for artificial intelligence comparison, to find out what the face now represents the mood. The face of the corresponding person name, and finally, and then through the text of Speech to read the name of the name to complete the identification of the action. This study was developed using the Asus Tinker Board, which uses ARM-based CPUs with high efficiency and low power consumption, plus improvements in memory and hardware performance for the development board.</p>
WR0100 15:00-15:15	<p>Multimodal Recognition Based on Face and Ear Using Local Feature Ruyin Yang, Zhichun Mu, Long Chen, and Tingyu Fan University of Science and Technology Beijing, China</p> <p>Abstract—The pose issue which may cause loss of useful information has always been a bottleneck in face and ear recognition. To address this problem, we propose a multimodal recognition approach based on face and ear using local feature, which is robust to large facial pose variations in the unconstrained scene. Deep learning method is used for facial pose estimation, and the method of a well-trained Faster R-CNN is used to detect and segment the region of face and ear. Then we propose a weighted region-based recognition method to deal with the local feature. The proposed method has achieved state-of-the-art recognition performance especially when the images are affected by pose variations and random occlusion in unconstrained scene.</p>
WR0097 15:15-15:30	<p>Real Time Multimodal Emotion Recognition System using Facial Landmarks and Hand over Face Gestures Mahesh Krishnananda Prabhu and Dinesh Babu Jayagopi International Institute of Information Technology, Bangalore, India</p> <p>Abstract—Over the last few years, emotional intelligent systems have changed the way humans interact with machines. The main intention of these systems is not only to interpret human affective states but also to respond in real time during assistive human to device interactions. In this paper we propose a method for building a Multimodal Emotion Recognition System (MERS), which combine mainly face cues and hand over face gestures which work in near real time with an average frame rate of 14 Fps. Although there are many state of the art emotion recognition systems using facial landmarks, we claim that our proposed system is one of the very few which also include hand over face gestures, which are commonly expressed during</p>

	emotional interactions.
WR0101 15:30-15:45	<p>Face pose tracking using the four-point algorithm Ho Yin Fung, <i>Kin Hong Wong</i>, Ying Kin Yu, Kwan Pang Tsui, and Ho Chuen Kam The Chinese University of Hong Kong, Hong Kong</p> <p>Abstract—In this paper, we have developed an algorithm to track the pose of a human face robustly and efficiently. Face pose estimation is very useful in many applications such as building virtual reality systems and creating an alternative input method for the disabled. Firstly, we have modified a face detection toolbox called DLib for the detection of a face in front of a camera. The detected face features are passed to a pose estimation method, known as the four-point algorithm, for pose computation. The theory applied and the technical problems encountered during system development are discussed in the paper. It is demonstrated that the system is able to track the pose of a face in real time using a consumer grade laptop computer.</p>
WR0043 15:45-16:00	<p>Real Time Eye Tracking using Kalman Extended Spatio-Temporal Context Learning <i>Farzeen Munir</i>, Fayyaz Ul Amir Afsar Minhas, Abdul Jalil and Moongu Jeon Gwangju Institute of Science and Technology, Korea</p> <p>Abstract—Real time eye tracking has numerous applications in human computer interaction such as a mouse cursor control in a computer system. It is useful for persons with muscular or motion impairments. However, tracking the movement of the eye is complicated by occlusion due to blinking, head movement, screen glare, rapid eye movements, etc. In this work, we present the algorithmic and construction details of a real time eye tracking system. Our proposed system is an extension of Spatio-Temporal context learning through Kalman Filtering. Spatio-Temporal Context Learning offers state of the art accuracy in general object tracking but its performance suffers due to object occlusion. Addition of the Kalman filter allows the proposed method to model the dynamics of the motion of the eye and provide robust eye tracking in cases of occlusion. We demonstrate the effectiveness of this tracking technique by controlling the computer cursor in real time by eye movements.</p>

Session 2: Image Analysis and Transformation-9 Presentations

Chair: Dr. Juno Kim, University of New South Wales, Australia

Time: 13:45-16:00

Venue: Lecture Room 4 (3rd floor)

WR0009 13:45-14:00	<p>Single image super-resolution based on image patch classification <i>Ping Xia</i>, Hua Yan, Jing Li, and Jiande Sun Shandong University of Finance and Economics, China</p> <p>Abstract—This paper proposed a single image super-resolution algorithm based on image patch</p>
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	<p>classification and sparse representation where gradient information is used to classify image patches into three different classes in order to reflect the difference between the different types of image patches. Compared with other classification algorithms, gradient information based algorithm is simpler and more effective. In this paper, each class is learned to get a corresponding sub-dictionary. High-resolution image patch can be reconstructed by the dictionary and sparse representation coefficients of corresponding class of image patches. The result of the experiments demonstrated that the proposed algorithm has a better effect compared with the other algorithms.</p>
WR0014 14:00-14:15	<p>Research on image registration based on D-Nets Cengceng Wu, Zhaoguang Liu, and Hongtan Cheng Shandong University of Finance and Economics, China</p> <p>Abstract—Image registration is the key technology of digital imaging applications, it is used widely. We researched the image registration techniques in this paper. Based on the basis of D-Nets image registration algorithms, we propose a new innovation. We turn first to process image, so we can get synthetic images of original images and enhanced images. Then we extract SIFT feature in the original image. Next, in order to reduce noise of the image, we use the Gauss filter to process the synthesized image. Then we do experiments with synthetic images in the process of image registration. In this process, we use the D-Nets algorithm to achieve. Compared to the existing method, it can greatly improve the accuracy and recall.</p>
WR0032 14:15-14:30	<p>Blind Technique using Blocking Artifacts and Entropy of Histograms for Image Tampering Detection Manu V.T. and B.M. Mehtre Institute for Development and Research in Banking Technology, India</p> <p>Abstract—The tremendous technological advancements in recent times has enabled people to create, edit and circulate images easily than ever before. As a result of this, ensuring the integrity and authenticity of the images has become challenging. Malicious editing of images to deceive the viewer is referred to as image tampering. A widely used image tampering technique is image splicing or compositing, in which regions from different images are copied and pasted. In this paper, we propose a tamper detection method utilizing the blocking and blur artifacts which are the footprints of splicing. The classification of images as tampered or not, is done based on the standard deviations of the entropy histograms and block discrete cosine transformations. We can detect the exact boundaries of the tampered area in the image, if the image is classified as tampered. Experimental results on publicly available image tampering datasets show that the proposed method outperforms the existing methods in terms of accuracy.</p>
WR0051 14:30-14:45	<p>Smart Mapping for Quick Detection of Dissimilar Binary Images Adnan Mustafa Kuwait University, Kuwait</p> <p>Abstract—In previous work, a probabilistic image matching model for binary images was developed that predicts the number of mappings required to detect dissimilarity between any pair of binary images based on the amount of similarity between them. The model showed that dissimilarity can be detected quickly by randomly comparing corresponding points between two</p>

	<p>binary images. In this paper, we improve on this quickness for images that have dissimilarity concentrated near their centers. We apply smart mapping schemes to different image sets and analyze the results to show the effectiveness of this mapping scheme for images that have dissimilarity concentrated near their center. We compare three different smart mapping schemes with three different mapping densities to find the best mapping / best density performance.</p>
<p>WR0087 14:45-15:00</p>	<p>A new non-uniformity correction method based on unidirectional variational model Jing Hu, Fan Liu, and Liuting Yan Huazhong University of Science and Technology, China</p> <p>Abstract—Scanning infrared imaging system often suffers from stripe non-uniformity. Considering the geometric characteristic of stripe non-uniformity in scanning images, the gradient of pixels cross scanning direction is much more than that in scanning direction, and the latter is more similar to the real scene. The reason for the above phenomenon is that pixels in scanning direction have uniformity parameters and those cross scanning direction have non-uniformity parameters. Therefore, a homogenization method based on a unidirectional variation model is proposed in this paper. The unidirectional variation model can minimize the gradient cross scanning direction. And the homogenization method is used to preserve the edge and detailed information in scanning direction. Experimental results demonstrate a good performance of our proposed method for stripe non-uniformity images.</p>
<p>WR0094 15:00-15:15</p>	<p>Part-based Deep Representation for Product Tagging and Search Keqing Chen Tsinghua University, China</p> <p>Abstract—Despite previous studies, tagging and indexing the product images remain challenging due to the large inner-class variation of the products. In the traditional methods, the quantized hand-crafted features such as SIFTs are extracted as the representation of the product images, which are not discriminative enough to handle the inner-class variation. For discriminative image representation, this paper firstly presents a novel deep convolutional neural networks (DCNNs) architect true pre-trained on a large-scale general image dataset. Compared to the traditional features, our DCNNs representation is of more discriminative power with fewer dimensions. Moreover, we incorporate the part-based model into the framework to overcome the negative effect of bad alignment and cluttered background and hence the descriptive ability of the deep representation is further enhanced. Finally, we collect and contribute a well-labeled shoe image database, i.e., the TBShoes, on which we apply the part-based deep representation for product image tagging and search, respectively. The experimental results highlight the advantages of the proposed part-based deep representation.</p>
<p>WR0095 15:15-15:30</p>	<p>Comparing the Performance of Different Ultrasonic Images Enhancement for Speckle Noise Reduction in Ultrasound Images Using Techniques: A Preference Study Md. Shohel Rana, Kaushik Sarker, Touhid Bhuiyan, Md. Maruf Hassan Daffodil International University, Bangladesh</p> <p>Abstract—Diagnostic ultrasound (US) is an important tool in today's sophisticated medical diagnostics. Nearly every medical discipline benefits itself from this relatively inexpensive</p>

	<p>method that provides a view of the inner organs of the human body without exposing the patient to any harmful radiations. Medical diagnostic images are usually corrupted by noise during their acquisition and most of the noise is speckle noise. To solve this problem, instead of using adaptive filters which are widely used, No-Local Means based filters have been used to de-noise the images. Ultrasound images of six organs such as Abdomen, Ortho, Liver, Kidney, Brest and Prostrate of a Human body have been used and applied comparative analysis study to find out the output. These images were taken from Siemens SONOLINE G60 S System and the output was compared by matrices like SNR, RMSE, PSNR IMGQ and SSIM. The significance and compared results were shown in a tabular format.</p>
WR0104 15:30-15:45	<p>Interactive QR code beautification with full background image embedding Lijian Lin, Song Wu, Sijiang Liu and Bo Jiang Nanjing University of Posts and Telecommunications, China</p> <p>Abstract—QR (Quick Response) code is a kind of two dimensional barcode that was first developed in automotive industry. Nowadays, QR code has been widely used in commercial applications like product promotion, mobile payment, product information management, etc. Traditional QR codes in accordance with the international standard are reliable and fast to decode, but are lack of aesthetic appearance to demonstrate visual information to customers. In this work, we present a novel interactive method to generate aesthetic QR code. By given information to be encoded and an image to be decorated as full QR code background, our method accepts interactive user's strokes as hints to remove undesired parts of QR code modules based on the support of QR code error correction mechanism and background color thresholds. Compared to previous approaches, our method follows the intention of the QR code designer, thus can achieve more user pleasant result, while keeping high machine readability.</p>
WR0015 15:45-16:00	<p>The Filling-in Function of the Bayesian AutoEncoder Network Kaneharu Nishino and Mary Inaba The University of Tokyo, Japan</p> <p>Abstract—We developed the Bayesian AutoEncoder (BAE) to construct a multi-layer restricted Bayesian Network by extracting features from a training dataset. Networks constructed using BAE have hidden variables that represent features of the data and can execute inferences for each feature. In this paper, we show that a network constructed by BAE can not only recognize features but can also fill in lacking data. We performed experiments and confirmed this filling-in ability.</p>

Session 3: Image Processing and Application-9 Presentations

Chair: Prof. Pedro Furtado, University of Coimbra, Portugal

Time: 13:45-16:00

Venue: Lecture Room 5 (3rd floor)

<p>WR0049</p> <p>13:45-14:00</p>	<p>Color Vision Deficiency Compensation for Visual Processing Disorder using Hardy-Rand-Rittler Test and Color Transformation</p> <p>Jessie R. Balbin, Jasmine Nadja J. Pinugu, Joshua Ian C. Bautista, Pauline D. Nebres, Cipriano M. Rey Hipolito IV, Jose Anthony A. Santella</p> <p>Mapua Institute of Technology, Philippines</p> <p>Abstract—Visual processing skill is used to gather visual information from the environment but there are cases that Visual Processing Disorder (VPD) occurs. The so called visual figure-ground discrimination is a type of VPD where color is one of the factors that contributes on this type. In line with this, color plays a vital role in everyday living, however individuals that have limited and inaccurate color perception suffers from Color Vision Deficiency (CVD) and still are not aware on their case. To resolve this case, this study focuses on the design of a Head-Mounted Display (HMD) device that can assess whether a user has a CVD or not thru the standard Hardy-Rand-Rittler (HRR) test. This test uses pattern recognition in order to evaluate the user. In addition, color transformation on Augmented Reality (AR) system is also a concern of this research. The outcome of the color transformation leads to the enhancement of images to meet the requirement of users with CVD in perceiving image's details thru RGB to HSV and HSV to RGB conversion algorithm. Structural Similarity Index Method (SSIM) was also used for the calibration of the Color Transformation. Moreover, the study only focused on the red-green color deficiency which is the most common category of CVD. The HRR assessment and AR system was implemented on the HMD device using a Raspberry Pi 3 model B through Python language with OpenCV library. Thus, due to its form factor and portability, this device would be beneficial in the field of medicine and technology.</p>
<p>WR0050</p> <p>14:00-14:15</p>	<p>Pattern Recognition of Concrete Surface Crack Defects using Integrated Image Processing Algorithms</p> <p>Jessie Balbin, Carlos Hortinela IV, Ramon Garcia, Sunnycille Baylon, Alexander Joshua Ignacio, Marco Antonio Rivera, and Jaime Sebastian</p> <p>Mapua Institute of Technology, Philippines</p> <p>Abstract—Pattern recognition of concrete surface crack defects is very important in determining stability of structure like building, roads or bridges. Surface crack is one of the subjects in inspection, diagnosis, and maintenance as well as life prediction for the safety of the structures. Flaw detection is the process of identifying and sizing sub-surface defects in materials. Traditionally determining defects voids, and cracks on concrete surfaces are done manually by inspection on the other hand any internal defects on the concrete would require destructive</p>

	<p>testing for detection. The researchers created an automated surface crack detection for concrete using image processing techniques including Hough transform, LoG weighted, Dilation, Grayscale, Canny Edge Detection and Haar Wavelet Transform. An automatic surface crack detection robot is designed to capture the concrete surface by sectoring method. Surface crack classification was done with the use of Haar trained cascade object detector that uses both positive samples and negative samples which proved that it is possible to effectively identify the surface crack defects.</p>
<p>WR0028 14:15-14:30</p>	<p>Facades Structure Detection by Geometric Moment Diqiong Jiang, Hui Chen, Rui Song and Lei Meng Shandong University, China</p> <p>Abstract—This paper presents a novel method for extracting facades structure from real-world pictures by using local geometric moment. Compared with existing methods, the proposed method has shown superior robustness to noises, such as uneven illumination, shadow, and shade from other objects. Besides, our method is faster, easy-to-implement and has a lower space complexity, making it feasible for mobile devices or in situations where real-time data processing is required. Specifically, our algorithm has four key steps. First, a noise reduction method is proposed for the recognition of doors and floors, which is based on a self-adapted local thresholding and the prior knowledge on facades structure modality. Secondly, the picture of the building is divided into many individual areas, each of which represents a door or a window in the picture. Thirdly, the geometric moment and centroid for each individual areas are calculated in order to identifying those collinear ones based on the feature vectors, each of which is thereafter replaced with a line. Lastly, the facades structure of the building is obtained by taking into account all geometric moments and centroids. The performance of our algorithm are compared with other methods with some real-world pictures especially which taken in bad environmental conditions. Our system is designed for two applications, i.e, the reconstruction of facades based on higher resolution ground-based on imagery, and the positional system based on recognize the urban building.</p>
<p>WR0092 14:30-14:45</p>	<p>Experiments on Automatic Classification of Tissue Malignancy in the Field of Digital Pathology Joao Pereira, Ricardo Barata and Pedro Furtado University of Coimbra, Portugal</p> <p>Abstract—Automated analysis of histological images helps diagnose and further classify breast cancer. Totally automated approaches can be used to pinpoint images for further analysis by the medical doctor. But tissue images are especially challenging for either manual or automated approaches, due to mixed patterns and textures, where malignant regions are sometimes difficult to detect unless they are in very advanced stages. Some of the major challenges are related to irregular and very diffuse patterns, as well as difficulty to define winning features and classifier models. Although it is also hard to segment correctly into regions, due to the diffuse nature, it is still crucial to take low-level features over individualized regions instead of the whole image, and to select those with the best outcomes. In this paper we report on our experiments building a region classifier with a simple subspace division and a feature selection model that improves results over image-wide and/or limited feature sets. Experimental results show modest accuracy</p>

	for a set of classifiers applied over the whole image, while the conjunction of image division, per-region low-level extraction of features and selection of features, together with the use of a neural network classifier achieved the best levels of accuracy for the dataset and settings we used in the experiments. Future work involves deep learning techniques, adding structures semantics and embedding the approach as a tumor finding helper in a practical Medical Imaging Application.
WR0071 14:45-15:00	<p>Improved Convolutional Networks in Forest Species Identification Task Kar Fai Siew, Xin Jie Tang and Yong Haur Tay Universiti Tunku Abdul Rahman, Malaysia</p> <p>Abstract—Forest species identification is a special case of texture classification problem that can be solved with hand-crafted features. Convolutional Networks (ConvNet) is able to learn features adaptively and it has achieved impressive result in complicated recognition tasks. This paper presents an improvement to ConvNet-based approach in1 for forest species identification. Due to the small amount of training data, we proposed the addition of dropout layer to ConvNet architecture and data augmentation to increase the size of training data. New classification process of combining the ConvNet outputs of each image patches is proposed. Our improved ConvNet-based method has achieved promising results.</p>
WR0010 15:00-15:15	<p>Training Strategy for Convolutional Neural Networks in Pedestrian Gender Classification Choon-Boon Ng, Yong-Haur Tay and Bok-Min Goi Universiti Tunku Abdul Rahman, Malaysia</p> <p>Abstract—In this work, we studied a strategy for training a convolutional neural network in pedestrian gender classification with limited amount of labeled training data. Unsupervised learning by k-means clustering on pedestrian images was used to learn the filters to initialize the first layer of the network. As a form of pre-training, supervised learning for the related task of pedestrian classification was performed. Finally, the network was fine-tuned for gender classification. We found that this strategy improved the network's generalization ability in gender classification, achieving better test results when compared to random weights initialization and slightly more beneficial than merely initializing the first layer filters by unsupervised learning. This shows that unsupervised learning followed by pre-training with pedestrian images is an effective strategy to learn useful features for pedestrian gender classification.</p>
WR0074 15:15-15:30	<p>Facial Fluid Synthesis for Assessment of Acne Vulgaris Using Luminescent Visualization System through Optical Imaging and Integration of Fluorescent Imaging System Jessie R. Balbin, Jennifer C. Dela Cruz, Clarisse O. Camba, Angelo D. Gozo, Sheena Mariz B. Jimenez, Aivje C. Tribiana Mapua Institute of Technology, Philippines</p> <p>Abstract—Acne vulgaris, commonly called as acne, is a skin problem that occurs when oil and dead skin cells clog up in a person's pores. This is because hormones change which makes the skin oilier. The problem is people really do not know the real assessment of sensitivity of their skin in terms of fluid development on their faces that tends to develop acne vulgaris, thus having more complications. This research aims to assess Acne Vulgaris using luminescent visualization</p>

	<p>system through optical imaging and integration of image processing algorithms. Specifically, this research aims to design a prototype for facial fluid analysis using luminescent visualization system through optical imaging and integration of fluorescent imaging system, and to classify different facial fluids present in each person. Throughout the process, some structures and layers of the face will be excluded, leaving only a mapped facial structure with acne regions. Facial fluid regions are distinguished from the acne region as they are characterized differently.</p>
<p>WR0004-A 15:30-15:45</p>	<p>Improved Wiener Filter- and Regression-based Up-sampling for Asymmetrical Resolution Stereoscopic Video Coding by Exploiting the Interviewed-spatial Correlation Kuo-Liang Chung, Chih-Yi Chiu, Shin-Bei Tsai and Jie Jeng National Taiwan University of Science and Technology, Taiwan</p> <p>Abstract—In asymmetric resolution stereoscopic video coding (ARSVC), a stereoscopic video consists of two kinds of images, the full-sized images in the left-view and the downsampled images in the right-view, leading to the bitrate reduction effect. The downsampled image is a quarter the size of the full-sized image, and the downsampled image will be upsampled by the decoder for 3-D display. In this paper, we propose a novel upsampling method for ARSVC and the contribution of the proposed method is threefold : (1) employ the resolution and texture consistency approach into the Wiener filter-based interpolation scheme to estimate the missing pixels, (2) employ the regression technique into the interview correlation to estimate the missing pixels, and (3) propose a mechanism to blend the Wiener filter- and regression-based upsampling schemes to enhance the quality of upsampling image. Based on seven typical test videos, experimental results demonstrate that under the same bitrate condition, the proposed upsampling method achieves substantial quality improvement when compared with several state-of-the-art upsampling methods for the ARSVC model.</p>
<p>WR0056 15:45-16:00</p>	<p>Video Error Concealment Using Block Matching and Frequency Selective Extrapolation Algorithms Rajani P. K. and Arti Khaparde Pimpri Chinchwad College of Engineering, Pune, India</p> <p>Abstract—Error Concealment (EC) is a technique at the decoder side to hide the transmission errors. It is done by analyzing the spatial or temporal information from available video frames. It is very important to recover distorted video because they are used for various applications such as video-telephone, video-conference, TV, DVD, internet video streaming, video games etc .Retransmission-based and resilient-based methods, are also used for error removal. But these methods add delay and redundant data. So error concealment is the best option for error hiding. In this paper, the error concealment methods such as Block Matching error concealment algorithm is compared with Frequency Selective Extrapolation algorithm. Both the works are based on concealment of manually error video frames as input. The parameter used for objective quality measurement was PSNR (Peak Signal to Noise Ratio) and SSIM(Structural Similarity Index). The original video frames along with error video frames are compared with both the Error concealment algorithms. According to simulation results, Frequency Selective Extrapolation is showing better quality measures such as 48% improved PSNR and 94% increased SSIM than Block Matching Algorithm.</p>

Session 4: Signal Analysis and Processing-9 Presentations

Chair: Prof. Mei Li, China University of Geosciences, China

Time: 13:45-16:00

Venue: Lecture Room 6 (3rd floor)

<p>WR0057 13:45-14:00</p>	<p>Mining Maximal Approximate Numerical Frequent Patterns from Uncertain Data and Application for Emitter Entity Resolution Xin Xu Nanjing Research Institute of Electronics Engineering, China</p> <p>Abstract—Numerous fuzzy pattern mining methods have been proposed to address the uncertainty and incompleteness of quantitative data. Traditional fuzzy pattern mining methods generally have to transform the original quantitative values into either crystal items or fuzzy regions first, which is hard to apply without comprehensive domain knowledge. In addition, existing numerical pattern mining methods generally suffer high computational cost. Inspired by the above problems, we put forward an efficient maximal approximate numerical frequent pattern mining (<i>MANFPM</i>) method without fuzzy item or region specification. Experimental results have validated its scalability and effectiveness for application in emitter entity resolution.</p>
<p>WR0063 14:00-14:15</p>	<p>Assessing Effect of meditation on Cognitive workload using EEG signals Narendra Jadhav, Ramchandra Manthalkar and Yashwant Joshi SGGSIE&T, Nanded, India</p> <p>Abstract—Recent research suggests that meditation affects the structure and function of the brain. Cognitive load can be handled in effective way by the meditators. EEG signals are used to quantify cognitive load. The research of investigating effect of meditation on cognitive workload using EEG signals in pre and post-meditation is an open problem. The subjects for this study are young healthy 11 engineering students from our institute. The focused attention meditation practice is used for this study. EEG signals are recorded at the beginning of meditation and after four weeks of regular meditation using EMOTIV device. The subjects practiced meditation daily 20 minutes for 4 weeks. The 7 level arithmetic additions of single digit (low level) to three digits with carry (high level) are presented as cognitive load. The cognitive load indices such as arousal index, performance enhancement, neural activity, load index, engagement, and alertness are evaluated in pre and post meditation. The cognitive indices are improved in post meditation data. Power Spectral Density (PSD) feature is compared between pre and post-meditation across all subjects. The result hints that the subjects were handling cognitive load without stress (ease of cognitive functioning increased for the same load) after 4 weeks of meditation.</p>
	<p>Fault Prevention by Early Stage Symptoms Detection for Automatic Vehicle Transmission using Pattern Recognition and Curve Fitting Jessie R. Balbin, Febus Reidj G. Cruz, Jon Ervin A. Abu, Carlo G. Siño, Paolo E. Ubaldo, Christelle Jianne T. Zulueta</p>

WR0070 14:15-14:30	<p>Mapua Institute of Technology, Philippines</p> <p>Abstract—Automobiles have become essential parts of our everyday lives. It can correlate many factors that may affect a vehicle primarily those which may inconvenient or in some cases harm lives or properties. Thus, focusing on detecting an automatic transmission vehicle engine, body and other parts that cause vibration and sound may help prevent car problems using MATLAB. By using sound, vibration, and temperature sensors to detect the defects of the car and with the help of the transmitter and receiver to gather data wirelessly, it is easy to install on to the vehicle. A technique utilized from Toyota Balintawak Philippines that every car is treated as panels(a, b, c, d, and e) 'a' being from the hood until the windshield of the car and 'e' the rear shield to the back of the car, this was applied on how to properly place the sensors so that precise data could be gathered. Data gathered would be compared to the normal graph taken from the normal status or performance of a vehicle, data that would surpass 50% of the normal graph would be considered that a problem has occurred. The system is designed to prevent car accidents by determining the current status or performance of the vehicle, also keeping people away from harm.</p>
WR0077 14:30-14:45	<p>Cloud Storage Based Mobile Assessment Facility for Patients with Post-Traumatic Stress Disorder Using Integrated Signal Processing Algorithm Jessie R. Balbin, Jasmine Nadja J. Pinugu, Abigail Joy S. Basco, Myla B. Cabanada, Patrisha Melrose V. Gonzales, Juan Carlos C. Marasigan Mapua Institute of Technology, Philippines</p> <p>Abstract—The research aims to build a tool in assessing patients for post-traumatic stress disorder or PTSD. The parameters used are heart rate, skin conductivity, and facial gestures. Facial gestures are recorded using OpenFace, an open-source face recognition program that uses facial action units in to track facial movements. Heart rate and skin conductivity is measured through sensors operated using Raspberry Pi. Results are stored in a database for easy and quick access. Databases to be used are uploaded to a cloud platform so that doctors have direct access to the data. This research aims to analyze these parameters and give accurate assessment of the patient.</p>
WR0090-A 14:45-15:00	<p>The efficacy of using machine learning to estimate blood glucose levels with photoplethysmography (PPG) signals Jeff Guo, Alex Ong, and Gao Xing Republic Polytechnic, Singapore</p> <p>Abstract—Aims: To investigate the efficacy of using machine learning to estimate the blood glucose levels with photoplethysmography (PPG) signals. Methods: Ninety (90) subjects participated in this study. A blood glucometer was used to determine the blood glucose level, and a PPG sensor was used to record both the forearm distal-end of the dorsum of the wrist in each subject. Based on the actual blood glucometer readings, each subject's PPG signals were labelled as one of the 3 categories: “low” (6 mmol/L and below), “normal” (6 mmol/L to 9 mmol/L) and “high” (9 mmol/L and above). Four machine learning approaches, namely random forests, multi-layer neural networks, support vector</p>

	<p>machines and adaptive boosting, were used to estimate the glucose levels. Classification and regression models were used to examine the accuracy of the 4 approaches.</p> <p>Results: In the classification model analysis, the balanced accuracy reaches 83.3% for “high”, 75% for “normal” and 75% for “low”. In the regression model analysis, a glucose estimation distribution through a Clarke error grid analysis shows 51.9% of the testing data points in zone A, 48.1% in zone B.</p> <p>Conclusion: The random forest approach is most efficacious in estimating blood glucose levels with PPG signals.</p>
WR5001-A 15:00-15:15	<p>Improved Correlation Identification of Subsurface Using All Phase FFT Algorithm Mei Li, Kaiyan Xing, Kaixue Hao, and Lishan Qiu China University of Geosciences, China</p> <p>Abstract—The correlation identification of the subsurface is a novel electrical prospecting method which could suppress stochastic noise. This method is increasingly being utilized by geophysicists. It achieves the frequency response of the underground media through division of the cross spectrum of the input & output signal and the auto spectrum of the input signal. This is subject to the spectral leakage when the cross spectrum and the auto spectrum is computed from cross correlation and autocorrelation function by Discrete Fourier Transformation (DFT). To obtain accurate frequency response of the earth system, we propose an improved correlation identification method which uses all phase Fast Fourier Transform (APFFT) to acquire the cross spectrum and the auto spectrum. Simulation and engineering application results show that compared to existing correlation identification algorithm the new approach acquire more precise frequency response especially the phase response of the system under identification.</p>
WR0011 15:15-15:30	<p>Analytic Radar micro-Doppler Signatures Classification Beom-Seok Oh, Zhaoning Gu, Guan Wang, Kar-Ann Toh and Zhiping Lin Nanyang Technological University, Singapore</p> <p>Abstract—Due to its capability of capturing the kinematic properties of a target object, radar micro-Doppler signatures (m-DS) play an important role in radar target classification. This is particularly evident from the remarkable number of research papers published every year on m-DS for various applications. However, most of these works rely on the support vector machine (SVM) for target classification. It is well known that training an SVM is computationally expensive due to its nature of search to locate the supporting vectors. In this paper, the classifier learning problem is addressed by a total error rate (TER) minimization where an analytic solution is available. This largely reduces the search time in the learning phase. The analytically obtained TER solution is globally optimal with respect to the classification total error count rate. Moreover, our empirical results show that TER outperforms SVM in terms of classification accuracy and computational efficiency on a five-category radar classification problem.</p>
WR0012 15:30-15:45	<p>An Improved MTI Filter for Ground Clutter Reduction in UAV Classification Fangyuan Wan, Qinglai Liu, Chen Wang, Xin Guo and Zhiping Lin Nanyang Technological University, Singapore</p>

	<p>Abstract—In recent years, Unmanned Aerial Vehicles (UAVs) have increasingly been used in many civil applications. However, they also pose a significant threat in restricted zones. Radar can be used to detect and discriminate UAVs. Due to the low flying altitude of the UAVs, it is found that the radar signals also include some unwanted echoes, reflected by building, ground, trees and grasses etc. Consequently, it has not been possible to get the clean UAVs characteristics for further classification. In this paper, the MTI filter is applied to cancel the ground clutter and based this, an improved MTI filter is further proposed. Compared with the traditional MTI filter, the improved one significantly enhances ground clutter rejection capability while maintaining most of the target power. As the result, the cleaner UAVs classification characteristics can be obtained. The effectiveness of the proposed method has been verified by an experimental CW radar dataset, collected from a helicopter UAV.</p>
WR0017 15:45-16:00	<p>Almost Minimax Design of FIR Filter Using an IRLS Algorithm without Matrix Inversion Ruijie Zhao, Zhiping Lin, Kar-Ann Toh, Lei Sun and Xiaoping Lai Nanyang Technological University, Singapore</p> <p>Abstract—An iterative reweighted least squares (IRLS) algorithm is presented in this paper for the minimax design of FIR filters. In the algorithm, the resulted subproblems generated by the weighted least squares (WLS) are solved by using the conjugate gradient (CG) method instead of the time-consuming matrix inversion method. An almost minimax solution for filter design is consequently obtained. This solution is found to be very efficient compared with most existing algorithms. Moreover, the filtering solution is flexible enough for extension towards a broad range of filter designs, including constrained filters. Two design examples are given and the comparison with other existing algorithms shows the excellent performance of the proposed algorithm.</p>



Coffee Break: 16:00-16:15

Session 5: Target Recognition-7 Presentations

Chair: Prof. Kar-Ann Toh, Yonsei University, Korea

Time: 16:15-18:00

Venue: Function Hall 2 (4th floor)

<p>WR0005 16:15-16:30</p>	<p>Artificial Intelligence tools for pattern recognition Elena Acevedo, Antonio Acevedo, Federico Felipe, and Pedro Avilés Instituto Politécnico Nacional, Mexico</p> <p>Abstract—In this work, we present a system for pattern recognition that combines the power of genetic algorithms for solving problems and the efficiency of the morphological associative memories. We use a set of 48 tire prints divided into 8 brands of tires. The images have dimensions of 200 x 200 pixels. We applied Hough transform to obtain lines as main features. The number of lines obtained is 449. The genetic algorithm reduces the number of features to ten suitable lines that give thus the 100% of recognition. Morphological associative memories were used as evaluation function. The selection algorithms were Tournament and Roulette wheel. For reproduction, we applied one-point, two-point and uniform crossover.</p>
<p>WR0025 16:30-16:45</p>	<p>Eye Movement Identification Based on Accumulated Time Feature Baobao Guo, Qiang Wu, Jiande Sun, Hua Yan Shandong University, China</p> <p>Abstract—Eye movement is a new kind of feature for biometrical recognition, it has many advantages compared with other features such as fingerprint, face, iris and many others, it is not only a sort of static characteristics, but also a combination of brain activity and muscle behavior, making it effective to prevent spoofing attack. In addition, eye movements can be incorporated with faces, iris and other features recorded from the face region into multimode systems. This paper uses the eye movement datasets provided by Komogortsev in 2011 and different data mining methods to conduct biometrical identification. The time of saccade and fixation and other characters were extracted from the eye movement data as the eye movement features. Furthermore, for different classification methods such as the BP neural network, RBF neural network, ELMAN neural network and SVM (support vector machine), the performance analysis was conducted in order to provide a reference for subsequent research of eye movement recognition. The result shows that, when the sample size is low (less than 5), the ELMAN model has the highest accuracy, while when the user sample increases, ELMAN and RBF fail firstly. In conclusion, BP neural network and SVM are more suitable for identification with eye movement features.</p>
<p>WR0030 16:45-17:00</p>	<p>A natural approach to convey numerical digits using hand activity recognition based on hand shape features H Chidananda and Dr T Hanumantha Reddy Rao Bahadur Y Mahabaleswarappa Engg Colege, Ballari, India</p>

	<p>Abstract—This paper presents a natural representation of numerical digit(s) using hand activity analysis based on number of fingers out stretched for each numerical digit in sequence extracted from a video. The analysis is based on determining a set of six features from a hand image. The most important features used from each frame in a video are the first fingertip from top, palm-line, palm-center, valley points between the fingers exists above the palm-line. Using this work user can convey any number of numerical digits using right or left or both the hands naturally in a video. Each numerical digit ranges from 0 to 9. Hands (right/left/both) used to convey digits can be recognized accurately using the valley points and with this recognition whether the user is a right / left handed person in practice can be analyzed. In this work, first the hand(s) and face parts are detected by using YCbCr color space and face part is removed by using ellipse based method. Then, the hand(s) are analyzed to recognize the activity that represents a series of numerical digits in a video. This work uses pixel continuity algorithm using 2D coordinate geometry system and does not use regular use of calculus, contours, convex hull and datasets.</p>
WR0035 17:00-17:15	<p>Multiclass Multiple Kernel Learning for HRRP-based Radar Target Recognition Yu Guo, Huaitie Xiao, Hongqi Fan and Yongfeng Zhu National University of Defense Technology, China</p> <p>Abstract—A novel machine learning method named multiclass multiple kernel learning based on support vector data description with negative (MMKL-NSVDD) is developed to classify the FFT-magnitude feature of complex high-resolution range profile (HRRP), motivated by the problem of radar automatic target recognition (RATR). The proposed method not only inherits the close nonlinear boundary advantage of SVDD-neg model, which is applied with no assumptions regarding to the distribution of data and prior information, but also incorporates multiple kernel into the mode, avoiding fussy choice of kernel parameters and fusing multiple kernel information. Hence, it leads to a remarkable improvement of recognition rate, demonstrated by experimental results based on HRRPs of four aircrafts. The MMKL-NSVDD is ideal for HRRP-Based radar target recognition.</p>
WR0039 17:15-17:30	<p>Towards Discrete Wavelet Transform based Human Activity Recognition Manish Khare and Moongu Jeon Gwangju Institute of Science and Technology, Korea</p> <p>Abstract—Providing accurate recognition of human activities is a challenging problem for visual surveillance applications. In this paper, we present a simple and efficient algorithm for human activity recognition based on a wavelet transform. We adopt discrete wavelet transform (DWT) coefficients as a feature of human objects to obtain advantages of its multi-resolution approach. The proposed method is tested on multiple levels of DWT. Experiments are carried out on different standard action datasets including KTH and i3D Post. The proposed method is compared with other state-of-the-art methods in terms of different quantitative performance measures. The proposed method is found to have better recognition accuracy in comparison to the state-of-the-art methods.</p>

WR0062 17:30-17:45	<p>Recognizing Chinese characters in digital ink from non-native language writers using hierarchical models Hao Bai and Xi-Wen Zhang Beijing Language and Culture University, China</p> <p>Abstract—While Chinese is learned as a second language, its characters are taught step by step from their strokes to components, radicals to components, and their complex relations. Chinese Characters in digital ink from non-native language writers are deformed seriously, thus the global recognition approaches are poorer. So a progressive approach from bottom to top is presented based on hierarchical models. Hierarchical information includes strokes and hierarchical components. Each Chinese character is modeled as a hierarchical tree. Strokes in one Chinese characters in digital ink are classified with Hidden Markov Models and concatenated to the stroke symbol sequence. And then the structure of components in one ink character is extracted. According to the extraction result and the stroke symbol sequence, candidate characters are traversed and scored. Finally, the recognition candidate results are listed by descending. The method of this paper is validated by testing 19815 copies of the handwriting Chinese characters written by foreign students.</p>
WR0091 17:45-18:00	<p>Research and Implementation of Finger - vein Recognition Algorithm Zengyao Pang, Jie Yang, Yilei Chen and Ying Liu Wuhan University of Technology, China</p> <p>Abstract—In finger vein image preprocessing, finger angle correction and ROI extraction are important parts of the system. In this paper, we propose an angle correction algorithm based on the centroid of the vein image, and extract the ROI region according to the bidirectional gray projection method. Inspired by the fact that features in those vein areas have similar appearance as valleys, a novel method was proposed to extract center and width of palm vein based on multi-directional gradients, which is easy-computing, quick and stable. On this basis, an encoding method was designed to determine the gray value distribution of texture image. This algorithm could effectively overcome the edge of the texture extraction error. Finally, the system was equipped with higher robustness and recognition accuracy by utilizing fuzzy threshold determination and global gray value matching algorithm. Experimental results on pairs of matched palm images show that, the proposed method has a EER with 3.21% extracts features at the speed of 27ms per image. It can be concluded that the proposed algorithm has obvious advantages in grain extraction efficiency, matching accuracy and algorithm efficiency.</p>

Session 6: Feature Detection and Matching-7 Presentations

Chair: Assoc. Prof. Zhiping Lin, Nanyang Technological University, Singapore

Time: 16:15-18:00

Venue: Lecture Room 4 (3rd floor)

<p>WR0055 16:15-16:30</p>	<p>Content-Based Image Retrieval using Scale Invariant Feature Transform and Gray Level Cooccurrence Matrix Prashant Srivastava, Manish Khare, and Ashish Khare University of Allahabad, India</p> <p>Abstract—The rapid growth of different types of images has posed a great challenge to the scientific fraternity. As the images are increasing everyday, it is becoming a challenging task to organize the images for efficient and easy access. The field of image retrieval attempts to solve this problem through various techniques. This paper proposes a novel technique of image retrieval by combining Scale Invariant Feature Transform (SIFT) and Co-occurrence matrix. For construction of feature vector, SIFT descriptors of gray scale images are computed and normalized using z-score normalization followed by construction of Gray-Level Cooccurrence Matrix (GLCM) of normalized SIFT keypoints. The constructed feature vector is matched with those of images in database to retrieve visually similar images. The proposed method is tested on Corel-1K dataset and the performance is measured in terms of precision and recall. The experimental results demonstrate that the proposed method outperforms some of the other state-of-the-art methods.</p>
<p>WR0064 16:30-16:45</p>	<p>Automatic Bone Outer Contour Extraction from B-Modes Ultrasound Images Based on Local Phase Symmetry and Quadratic Polynomial Fitting Tita Karlita, Eko Mulyanto Yuniarno, I Ketut Eddy Purnama, Mauridhi Hery Purnomo Institut Teknologi Sepuluh Nopember, Indonesia</p> <p>Abstract—Analyzing ultrasound (US) images to get the shapes and structures of particular anatomical regions is an interesting field of study since US imaging is a non-invasive method to capture internal structures of a human body. However, bone segmentation of US images is still challenging because it is strongly influenced by speckle noises and it has poor image quality. This paper proposes a combination of local phase symmetry and quadratic polynomial fitting methods to extract bone outer contour (BOC) from two dimensional (2D) B-modes US image as initial steps of three-dimensional (3D) bone surface reconstruction. By using local phase symmetry, the bone is initially extracted from US images. BOC is then extracted by scanning one pixel on the bone boundary in each column of the US images using first phase features searching method. Quadratic polynomial fitting is utilized to refine and estimate the pixel location that fails to be detected during the extraction process. Hole filling method is then applied by utilize the polynomial coefficients to fill the gaps with new pixel. The proposed method is able to estimate the new pixel position and ensures smoothness and continuity of the contour path. Evaluations</p>

	<p>are done using cow and goat bones by comparing the resulted BOCs with the contours produced by manual segmentation and contours produced by canny edge detection. The evaluation shows that our proposed methods produces an excellent result with average MSE before and after hole filling at the value of 0.65.</p>
WR0068 16:45-17:00	<p>Profiling and Sorting Mangifera Indica Morphology for Quality Attributes and Grade Standards Using Integrated Image Processing Algorithms</p> <p>Jessie R. Balbin, Janette C. Fausto, John Michael M. Janabajab, Daryl James L. Malicdem, Reginald N. Marcelo, Jan Jeffrey Z. Santos</p> <p>Mapua Institute of Technology, Philippines</p> <p>Abstract—Mango production is highly vital in the Philippines. It is very essential in the food industry as it is being used in markets and restaurants daily. The quality of mango can affect the income of a mango farmer, thus incorrect time of harvesting will result to loss of quality mangoes and income. Scientific farming is much needed nowadays together with new gadgets because wastage of mangoes increase annually due to uncouth quality. This research paper focuses on profiling and sorting of Mangifera Indica using image processing techniques and pattern recognition. The image of a mango is captured on a weekly basis from its early stage. In this study, the researchers monitor the growth and color transition of a mango for profiling purposes. Actual dimensions of the mango are determined through image conversion and determination of pixel and RGB values covered through MATLAB. A program is developed to determine the range of the maximum size of a standard ripe mango. Hue, light, saturation (HSL) correction is used in the filtering process to assure the exactness of RGB values of a mango subject. By pattern recognition technique, the program can determine if a mango is standard and ready to be exported.</p>
WR0107 17:00-17:15	<p>A Curriculum-Based Approach for Feature Selection</p> <p>Deepthi Kalavala and Chakravarthy Bhagvati</p> <p>University of Hyderabad, India</p> <p>Abstract—Curriculum learning is a learning technique in which a classifier learns from easy samples first and then from increasingly difficult samples. On similar lines, a curriculum based feature selection framework is proposed for identifying most useful features in a dataset. Given a dataset, first, easy and difficult samples are identified. In general, the number of easy samples is assumed larger than difficult samples. Then, feature selection is done in two stages. In the first stage a fast feature selection method which gives feature scores is used. Feature scores are then updated incrementally with the set of difficult samples. The existing feature selection methods are not incremental in nature; entire data needs to be used in feature selection. The use of curriculum learning is expected to decrease the time needed for feature selection with classification accuracy comparable to the existing methods. Curriculum learning also allows incremental refinements in feature selection as new training samples become available. Our experiments on a number of standard datasets demonstrate that feature selection is indeed faster without sacrificing classification accuracy.</p>

WR0103 17:15-17:30	<p>Lane marking detection based on waveform analysis and CNN Yang Yang Ye, Hou Jin Chen, and Xiao Li Hao Beijing Jiaotong University, China</p> <p>Abstract—Lane markings detection is a very important part of the ADAS to avoid traffic accidents. In order to obtain accurate lane markings, in this work, a novel and efficient algorithm is proposed, which analyses the waveform generated from the road image after inverse perspective mapping (IPM). The algorithm includes two main stages: the first stage uses an image preprocessing including a CNN to reduce the background and enhance the lane markings. The second stage obtains the waveform of the road image and analyzes the waveform to get lanes. The contribution of this work is that we introduce local and global features of the waveform to detect the lane markings. The results indicate the proposed method is robust in detecting and fitting the lane markings.</p>
WR0041 17:30-17:45	<p>SVM-Based Automatic Diagnosis Method for Keratoconus Yuhong Gao, Qiang Wu, Jing Li, Jiande Sun and Wenbo Wan Shandong University, China</p> <p>Abstract—Keratoconus is a progressive cornea disease that can lead to serious myopia and astigmatism, or even to corneal transplantation, if it becomes worse. The early detection of keratoconus is extremely important to know and control its condition. In this paper, we propose an automatic diagnosis algorithm for keratoconus to discriminate the normal eyes and keratoconus ones. We select the parameters obtained by Oculyzer as the feature of cornea, which characterize the cornea both directly and indirectly. In our experiment, 289 normal cases and 128 keratoconus cases are divided into training and test sets respectively. Far better than other kernels, the linear kernel of SVM has sensitivity of 94.94% and specificity of 97.38% with all the parameters training in the model. In single parameter experiment of linear kernel, elevation with 92.03% sensitivity and 98.61% specificity and thickness with 97.28% sensitivity and 97.82% specificity showed their good classification abilities. Combining elevation and thickness of the cornea, the proposed method can reach 97.43% sensitivity and 99.19% specificity. The experiments demonstrate that the proposed automatic diagnosis method is feasible and reliable.</p>
WR0111 17:45-18:00	<p>Comparison Expert and Novice Scan Behavior for Using E-learning Felisia Novita Sari, Paulus Insap Santosa and Sunu Wibirama Universitas Gadjah Mada, Indonesia</p> <p>Abstract—E-Learning is an important media that must have by an education institution. Successful information design for e-learning depends on its user's characteristics. This study explores differences between novice and expert users' eye movement data. This differences between expert and novice users were compared and identified based on gaze features. Each participant must do three main task of e-learning. This paper gives the result that there are differences between gaze features of experts and novices.</p>

Session 7: Image Segmentation and Video Processing Technology-7 Presentations

Chair: Prof. Yoshihiro Shima, Meisei University, Japan

Time: 16:15-18:00

Venue: Lecture Room 5 (3rd floor)

<p>WR0038 16:15-16:30</p>	<p>Development of Intelligent Surveillance System (ISS) in Region of interest(ROI) using Kalman filter and Camshift on Raspberry pi 2 Junghun Park and Kicheon Hong University of Suwon, Korea</p> <p>Abstract—Due to the improvement of the picture quality of closed-circuit television (CCTV), the demand for CCTV has increased rapidly and its market size has also increased. The current system structure of CCTV transfers compressed images without analysis received from CCTV to a control center. The compressed images are suitable for the evidence required for a criminal arrest, but they cannot prevent crime in real time, which has been considered a limitation. Thus, the present paper proposes a system implementation that can prevent crimes by applying a situation awareness system at the back end of the CCTV cameras for image acquisition to prevent crimes efficiently. In the system implemented in the present paper, the region of interest (ROI) is set virtually within the image data when a barrier, such as fence, cannot be installed in actual sites and unauthorized intruders are tracked constantly through data analysis and recognized in the ROI via the developed algorithm. Additionally, a searchlight or alarm sound is activated to prevent crime in real time and the urgent information is transferred to the control center. The system was implemented in the Raspberry Pi 2 board to be run in real time. The experiment results showed that the recognition success rate was 85% or higher and the track accuracy was 90% or higher. By utilizing the system, crime prevention can be achieved by implementing a social safety network.</p>
<p>WR0108 16:30-16:45</p>	<p>Gaze inspired subtitle position evaluation for MOOCs videos Hongli Chen, Mengzhen Yan, Sijiang Liu and Bo Jiang Nanjing University of Posts and Telecommunications, China</p> <p>Abstract—Online educational resources, such as MOOCs, is becoming increasingly popular, especially in higher education field. One most important media type for MOOCs is course video. Besides traditional bottom-position subtitle accompany to the videos, in recent years, researchers try to develop more advanced algorithms to generate speaker-following style subtitles. However, the effectiveness of such subtitle is still unclear. In this paper, we investigate the relationship between subtitle position and the learning effect after watching the video on tablet devices. Inspired with image based human eye tracking technique, this work combines the objective gaze estimation statistics with subjective user study to achieve a convincing conclusion { speaker-following subtitles are more suitable for online educational videos.</p>

WR0007 16:45-17:00	<p>Multiple images segmentation based on saliency map Xiaolan Ning, Cheng Xu, Siqi Li, Shiyong Li, and Zhiqi Li Hunan University, China</p> <p>Abstract—Aiming at discovering and segmenting out common objects from multiple images, co-segmentation is a effective method. It is more accurate to make full use of the relationships between images in segmenting than only single image. The first step is to deal with single image with employing hierarchical segmentation to get a Contour Map, saliency detection to obtain the saliency map and object detection to find the possible common part. Then, constructing a digraph with the multiple local regions, and dealing with the digraph. When a digraph is constructed, the corresponding between adjacent two images is influential to the co-segmentation results. This paper develops a method to sort the images to co-segment. Also, we test the method on ICOSSEG and MSRC datasets, and compare it with four proposed method. And the results show that it is efficient in co-segmentation with higher precision than many existing and conventional co-segmentation methods.</p>
WR0036 17:00-17:15	<p>Degraded Chinese rubbing images thresholding based on local first-order statistics Fang Wang, Ling-Ying Hou, Han Huang Nanchang Institute of Technology, China</p> <p>Abstract—It is a necessary step for Chinese character segmentation from degraded document images in Optical Character Recognizer (OCR); however, it is challenging due to various kinds of noising in such an image. In this paper, we present three local first-order statistics method that had been adaptive thresholding for segmenting text and non-text of Chinese rubbing image. Both visual inspection and numerically investigate for the segmentation results of rubbing image had been obtained. In experiments, it obtained better results than classical techniques in the binarization of real Chinese rubbing image and PHIBD 2012 datasets.</p>
WR0065 17:15-17:30	<p>Carotid Artery B-Mode Ultrasound Image Segmentation based on Morphology, Geometry and Gradient Direction I Made Gede Sunarya, Eko Mulyanto Yuniarno, Mauridhi Hery Purnomo, Tri Arief Sardjono, Ismoyo Sunu, I Ketut Eddy Purnama Institut Teknologi Sepuluh Nopember, Indonesia</p> <p>Abstract—Carotid Artery (CA) is one of the vital organs in the human body. CA features that can be used are position, size and volume. Position feature can used to determine the preliminary initialization of the tracking. Examination of the CA features can use Ultrasound. Ultrasound imaging can be operated dependently by an skilled operator, hence there could be some differences in the images result obtained by two or more different operators. This can affect the process of determining of CA. To reduce the level of subjectivity among operators, it can determine the position of the CA automatically. In this study, the proposed method is to segment CA in B-Mode Ultrasound Image based on morphology, geometry and gradient direction. This study consists of three steps, the data collection, preprocessing and artery segmentation. The data used in this study were taken directly by the researchers and taken from the Brno university's signal processing lab database. Each data set contains 100 carotid artery</p>

	<p>B-Mode ultrasound image. Artery is modeled using ellipse with center c, major axis a and minor axis b. The proposed method has a high value on each data set, 97% (data set 1), 73 % (data set 2), 87% (data set 3). This segmentation results will then be used in the process of tracking the CA.</p>
<p>WR0072 17:30-17:45</p>	<p>Automated Segmentation and Isolation of Touching Cell Nuclei in Cytopathology Smear Images of Pleural Effusion Using Distance Transform Watershed Method Khin Yadanar Win, Somsak Choomchuay and Kazuhiko Hamamoto King Mongkut's Institute of Technology Ladkrabang, Thailand</p> <p>Abstract—The automated segmentation of cell nuclei is critical for diagnosis and classification of cancers in pleural fluid. This task is essential since the morphology of cell nuclei such as the size, shape and stained color are mainly associated with cells proliferation and malignancy. It remains challenging due to the inconsistent stained color, poor contrast, the variety of cells, and a lot of cells overlapping and other microscopic imaging artifacts. In this paper, we proposed a watershed-based method that is capable to segment the nuclei of the variety of cells from microscopic cytology pleural fluid images. Firstly the original image is converted into the grayscale image and enhanced by adjusting and equalizing the intensity using histogram equalization. Next, the cell nuclei are segmented using OTSU thresholding as the binary image. The undesirable artifacts are eliminated using morphological operations. Finally, the distance transform based watershed method is applied to isolate the touching and overlapping cell nuclei. The proposed method is tested with 25 Papanicolaou (Pap) stained pleural fluid images. The sensitivity of our proposed method is 94%. The method is relatively simple and the results are very promising.</p>
<p>WR0078 17:45-18:00</p>	<p>Automatic Airline Baggage Counting Using 3D Image Segmentation Deyu Yin, Qingji Gao and Qijun Luo Civil Aviation University of China, China</p> <p>Abstract—The baggage number needs to be checked automatically during baggage self-check-in. A fast airline baggage counting method is proposed by using image segmentation on the height map projected by scanned baggage 3D point cloud. The actual edge of baggage is detected by edge detection operator according to its height drop. And then, edges are linked to form closed chains by using morphological processing. Finally, the number of connected regions segmented by closed chains is taken as the baggage number. The validity of the method under the common multi-bag placement mode is verified by experiments.</p>

Session 8: Computer Theory and Application-7 Presentations

Chair: Prof. Bok-Min Goi, Universiti Tunku Abdul Rahman, Malaysia

Time: 16:15-18:00

Venue: Lecture Room 6 (3rd floor)

<p>WR0008 16:15-16:30</p>	<p>Mining strong jumping emerging patterns with a novel list data structure Xiangtao Chen and <i>Ziping Guan</i> Hunan University, China</p> <p>Abstract—Strong Jumping Emerging Patterns (SJEPs) are data mining patterns which have strong discriminating abilities in classification. However, SJEPs mining algorithms in current years are usually achieved by the data structure, tree. These existing algorithms using the tree structure are difficult to achieve excellent performance. In this paper, we propose a novel method of mining SJEPs named PPSJEP. This algorithm is based on a novel data structure called NSJEP-list, which is improved from the N-list. We use the NSJEP-lists to replace the tree structure. First, we get the individual items' NSJEP-lists from the tree. Then we use the intersection of NSJEP-lists to get the longer itemsets' NSJEP-lists which includes the information of the position and the count in each class. And we mine the SJEPs through the information. Experiments are performed on six UCI datasets. Compared with existing algorithm in running time and classification accuracy, the experimental results show that our algorithm uses less time to mine SJEPs and get the same classification accuracy, especially in lower minimum support threshold.</p>
<p>WR0042 16:30-16:45</p>	<p>Study of the Similarity Function in Indexing-First-One Hashing Y.-L. Lai, Z. Jin, <i>Bok-Min Goi</i>, T.-Y. Chai Universiti Tunku Abdul Rahman, Malaysia</p> <p>Abstract—The recent proposed Indexing-First-One (IFO) hashing is a latest technique that is particularly adopted for eye iris template protection, i.e. IrisCode. However, IFO employs the measure of Jaccard Similarity (JS) initiated from Min-hashing has yet been adequately discussed. In this paper, we explore the nature of JS in binary domain and further propose a mathematical formulation to generalize the usage of JS, which is subsequently verified by using CASIA v3-Interval iris database. Our study reveals that JS applied in IFO hashing is a generalized version in measure two input objects with respect to Min-Hashing where the coefficient of JS is equal to one. With this understanding, IFO hashing can propagate the useful properties of Min-hashing, i.e. similarity preservation, thus favorable for similarity searching or recognition in binary space.</p>
<p>WR0096 16:45-17:00</p>	<p>Heterogeneous Computing for a Real-Time Pig Monitoring System <i>Younchang Choi</i>, Jinseong Kim, Jaehak Kim, Yeonwoo Chung, Yongwha Chung, Daihee Park and Hakjae Kim Korea University, Korea</p>

	<p>Abstract—Video sensor data has been widely used in automatic surveillance applications. In this study, we present a method that automatically detects pigs in a pig room by using depth information obtained from a Kinect sensor. For a real-time implementation, we propose a means of reducing the execution time by applying parallel processing techniques. In general, most parallel processing techniques have been used to parallelize a specific task. In this study, we consider parallelization of an entire system that consists of several tasks. By applying a scheduling strategy to identify a computing device for each task and implementing it with OpenCL, we can reduce the total execution time efficiently. Experimental results reveal that the proposed method can automatically detect pigs using a CPU-GPU hybrid system in real time, regardless of the relative performance between the CPU and GPU.</p>
WR0098 17:00-17:15	<p>Progressive 3D Shape Abstraction via Hierarchical CSG Tree Xingyou Chen, Jin Tang, and Chenglong Li Anhui University, China</p> <p>Abstract—A constructive solid geometry (CSG) tree model is proposed to progressively abstract 3D geometric shape of general object from 2D image. Unlike conventional ones, our method applies to general object without the need for massive CAD models, and represents the object shapes in a coarse-to-fine manner that allows users to view temporal shape representations at any time. It stands in a transitional position between 2D image feature and CAD model, benefits from state-of-the-art object detection approaches and better initializes CAD model for finer fitting, estimates 3D shape and pose parameters of object at different levels according to visual perception objective, in a coarse-to-fine manner. Two main contributions are the application of CSG building up procedure into visual perception, and the ability of extending object estimation result into a more flexible and expressive model than 2D/3D primitive shapes. Experimental results demonstrate the feasibility and effectiveness of the proposed approach.</p>
WR0105 17:15-17:30	<p>Deep learning application: rubbish classification with aid of an android device Sijiang Liu, Bo Jiang and Jie Zhan Nanjing University of Posts and Telecommunications, China</p> <p>Abstract—Deep learning is a very hot topic currently in pattern recognition and artificial intelligence researches. Aiming at the practical problem that people usually don't know correct classifications some rubbish should belong to, based on the powerful image classification ability of the deep learning method, we have designed a prototype system to help users to classify kinds of rubbish. Firstly the CaffeNet Model was adopted for our classification network training on the ImageNet dataset, and the trained network was deployed on a web server. Secondly an android app was developed for users to capture images of unclassified rubbish, upload images to the web server for analyzing backstage and retrieve the feedback, so that users can obtain the classification guide by an android device conveniently. Tests on our prototype system of rubbish classification show that: an image of one single type of rubbish with origin shape can be better used to judge its classification, while an image containing kinds of rubbish or rubbish with changed shape may fail to help users to decide rubbish's classification. However, the system still shows promising auxiliary function for rubbish classification if the network training strategy can be optimized further.</p>

WR0026-A 17:30-17:45	<p>Network Traffic Pattern Classification using Multi-class 3D Active Shape Models Panchamy Krishnakumari, Oded Cats and Hans van Lint Delft University of Technology, Netherlands</p> <p>Abstract—Identifying and classifying traffic and congestion patterns are important steps towards producing traffic predictions, which are necessary to provide proactive transportation services. Depending on the prediction horizons, this may be an hourly, daily or weekly pattern classification at link level (single road segment) or network level (city-wide predictions). For network-level pattern classification, the main challenge is the dimensionality of the data. Creating a traffic pattern profile for each link in the network is not scalable and does not consider the spatial-temporal correlations, which are relevant for traffic phenomena. We propose to use 3D statistical shape models as a low-dimensional representation of the variations of each pattern within a class, and develop an active shape model algorithm coupled with a logistic classifier to classify the patterns. One of the recent practices to reduce dimensionality is to partition the network into homogeneous regions. In this work, we employ these 3D regions as shapes that, in different combinations, can reproduce a wide variety of traffic patterns. This is the first work to use 3D shape models for building a multi-class classifier in such a way. We demonstrate the application potential of the proposed methodology using one month of speed profiles collected using camera data in the Netherlands.</p>
WR0086 17:45-18:00	<p>Driver face tracking using semantics-based feature of eyes on single FPGA Ying-Hao Yu, Ji-An Chen, Yi-Siang Ting and Ngaiming Kwok National Chung Cheng University, Taiwan</p> <p>Abstract—Tracking driver's face is one of the essentialities for driving safety control. This kind of system is usually designed with complicated algorithms to recognize driver's face by means of powerful computers. The design problem is not only about detecting rate but also from parts damages under rigorous environments by vibration, heat, and humidity. A feasible strategy to counteract these damages is to integrate entire system into a single chip in order to achieve minimum installation dimension, weight, power consumption, and exposure to air. Meanwhile, an extraordinary methodology is also indispensable to overcome the dilemma of low-computing capability and real-time performance on a low-end chip. In this paper, a novel driver face tracking system is proposed by employing semantics-based vague image representation (SVIR) for minimum hardware resource usages on a FPGA, and the real-time performance is also guaranteed at the same time. Our experimental results have indicated that the proposed face tracking system is viable and promising for the smart car design in the future.</p>

Poster Session

Time: 09:00-18:00

Venue: Function Hall 2 (4th floor)

WR0059	<p>Action description using point clouds Wenping Liu, Yongfeng Jiang, Haili Wang, and Liang Zhang Civil Aviation University of China, China</p> <p>Abstract—An action description method named as Motion History Point Cloud (MHPC) is proposed in this paper. MHPC compresses an action into a three-dimensional point cloud in which depth information is required. In MHPC, the spatial coordinate channels are used to record the motion foreground, and the color channels are used to record the temporal variation. Due to containing depth information, MHPC can depict an action more meticulous than Motion History Image (MHI). MHPC can serve as a pre-processed input for various classification methods, such as Bag of Words and Deep Learning. An action recognition scheme is provided as an application example of MHPC. In this scheme, Harris3D detector and Fast Point Feature Histogram (FPFH) are used to extract and describe features from MHPC. Then, Bag of Words and multiple classification Support Vector Machine (SVM) are used to do action recognition. The experiments show that rich features can be extracted from MHPC to support the subsequent action recognition even after downsampling. The feasibility and effectiveness of MHPC are also verified by comparing the above scheme with two similar methods.</p>
WR0066	<p>Long-range correlation and wavelet transform analysis of solar magnetic activity Linhua Deng Yunnan Observatory, Chinese Academy of Sciences, China</p> <p>Abstract—Statistical data processing has been one of the most important activities in many fields of scientific studies, and has become the only way through which one can deal with the underlying processes of the given phenomenon. The two classical techniques to solar time series analysis are related to the space domain and the spectral. In the present paper, the relative phase relationship of sunspot unit area on both hemispheres is investigated by the long-range correlation and the wavelet transform analysis. It is found that, (1) the north-south asynchrony of sunspot unit area cannot be regarded as a stochastic phenomenon because its behavior exhibits a long-term tendency; (2) The leading hemisphere of sunspot unit area is the southern hemisphere before the year of 1962, and then the northern hemisphere till the year of 2008; (3) the sunspot unit area should be used to represent the long-term solar magnetic activity. Our analysis results could be instructive to put further research on the physical mechanisms of north-south asynchrony of magnetic activity on the Sun. Moreover, the long-range correlation analysis and the wavelet transform technique of solar time series provide crucial information to understand, describe, and predict long-term solar variability.</p>

May 2, 2017 (Evening)



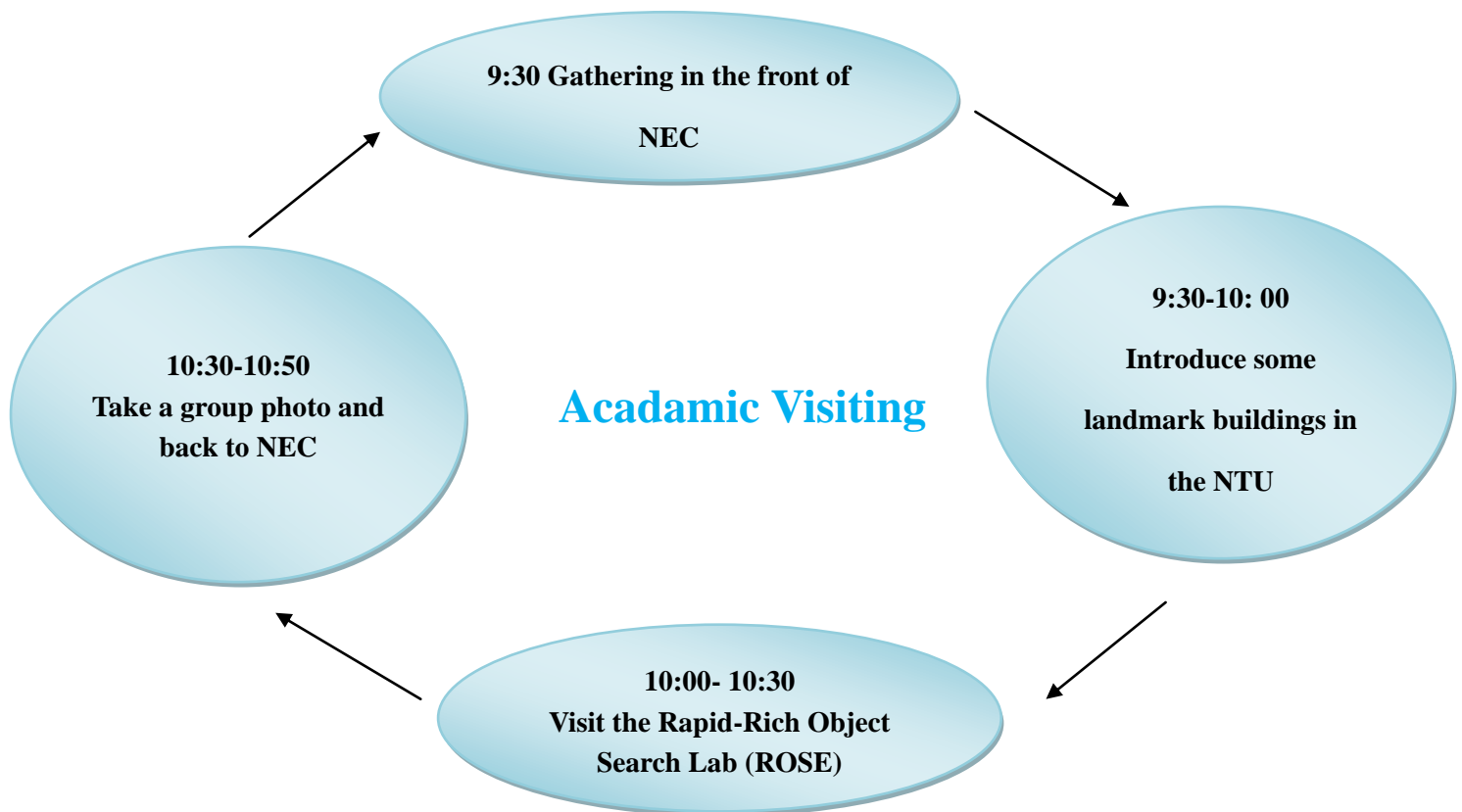
18:00—20:30 (Dinner coupon is needed.)

Location



Restaurant

May 3, 2017



May 3, 2017

One-day Tour of Singapore

8:45 Gathering at NEC lobby

9:00 Setting out and 35 minutes' drive to Merlion Park

9:35-10:10 Merlion Park

Merlion Park is a Singapore landmark and major tourist attraction, located at One Fullerton, Singapore, near the CBD. The Merlion is a mythical creature with a lion's head and the body of a fish that is widely used as a mascot and national personification of Singapore. Two Merlion statues are located at the park. The original Merlion structure measures 8.6 meters tall and spouts water from its mouth. It has subsequently been joined by a Merlion cub, which is located near the original statue and measures just 2 metres tall.

5 minutes' walk to Esplanade Theatre

10:15-11:00 Esplanade Theatre

Esplanade Theatre is a 60,000 square metres performing arts centre located in Marina Bay near the mouth of the Singapore River. Named after the nearby Esplanade Park, it consists of a concert hall which seats about 1,800 and a theatre with a capacity of about 2,000 for the performing arts.

5 minutes' walk back to Merlion Park, then about 10 minutes' drive to Clarke Quay

11:10-11:50 Clarke Quay

Clarke Quay is a historical riverside quay in Singapore, located within the Singapore River Planning Area. The quay is situated upstream from the mouth of the Singapore River and Boat Quay.

10 minutes' drive to Chinatown

12:00-13:00 Lunch time at Chinatown (Please pay by yourself)

13:00-14:10 Chinatown (You can shopping here or visit the Chinatown Heritage Centre, ticket fee is 15S/P, please pay by yourself)

The Chinatown Heritage Centre is the gateway for all visitors to trace the footsteps of Singapore's early pioneers and discover the personal stories of people who made Chinatown their home.

Located within three beautifully-restored shophouses on Pagoda Street, the Chinatown Heritage Centre is the only place in Singapore that has recreated the original interiors of its shophouse tenants in the 1950s, offering a rare glimpse into the lives of Chinatown's early residents.

15 minutes' drive to Gardens by the Bay**14:25-15:30 Gardens by the Bay**

Gardens by the Bay is a nature park spanning 101 hectares (250 acres) of reclaimed land in central Singapore, adjacent to the Marina Reservoir. The park consists of three waterfront gardens: Bay South Garden, Bay East Garden and Bay Central Garden. The largest of the gardens is Bay South Garden at 54 hectares (130 acres). Gardens by the Bay is part of a strategy by the Singapore government to transform Singapore from a "Garden City" to a "City in a Garden". The stated aim is to raise the quality of life by enhancing greenery and flora in the city.

15 minutes' drive to St Andrew's Cathedral**15:45-16:30 St Andrew's Cathedral**

St Andrew's Cathedral is an Anglican cathedral in Singapore, the country's largest cathedral. It is located near City Hall, MRT Interchange in the Downtown Core, within the Central Area in Singapore's central business district. It is the Cathedral church of the Anglican Diocese of Singapore and the mother church of her 27 parishes and more than 55 congregations here. The logo of the Cathedral is the St Andrew's Cross. The Year 2006 marks the 150th Anniversary of the St Andrew's Church Mission since 1856.

17:00 30 minutes' drive back to Nanyang Technological University

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