2019 Asia Symposium on Image Processing (ASIP 2019)

August 16-18, 2019

Singapore

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Welcome Message from Organizing Committee

It is our great pleasure to invite you to join our international conferences - 2019 Asia Symposium on Image Processing (ASIP 2019). This event will provide a unique opportunity for editors and authors to get together and share their latest research findings and results. We look forward to welcoming you at Singapore.

We're confident that over the two days you'll get the theoretical grounding, practical knowledge, and personal contacts that will help you build long-term, profitable and sustainable communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in Information Technology and Computer Communications.

On behalf of all the conference committees, we would like to thank all the authors as well as the technical program committee members and reviewers. Their high competence, their enthusiasm, their time and expertise knowledge, enabled us to prepare the high-quality final program and helped to make the conference become a successful event.

We truly hope you'll enjoy the conference and get what you expect from the conference.

Organizing Committee

2019.8.16

Table of Contents

Keynote Speakers Introductions

Keynote Speaker I

Prof. Yulin Wang
Wuhan University, China

Prof. Yulin Wang is a full professor and PhD supervisor in International School of Software, Wuhan University, China. He got PhD degree in 2005 in Queen Mary, University of London, UK. Before that, he has worked in high-tech industry for more than ten years. He has involved many key projects, and hold 8 patents. He got his master and bachelor degree in 1990 and 1987 respectively from Xi-Dian University, and Huazhong University of Science and Technology(HUST), both in China. His research interests include digital rights management, digital watermarking, multimedia and network security, and signal processing. In recently 10 years, Prof. Wang has published as first author 3 books, 40 conference papers and 45 journal papers, including in IEEE Transactions and IEE proceedings and Elsevier Journals. Prof. Wang served as editor-in-chief for International Journal of Advances in Multimedia in 2010. He served as reviewer for many journals, including IEEE Transactions on Image Processing, IEEE Signal Processing Letters, Elsevier Journal of Information Sciences. He served as reviewer for many research funds, including National High Technology Research and Development Program of China ('863' project). Prof. Wang was the external PhD adviser of Dublin City University, Ireland during 2008-2010. He was the keynote speakers in many international conferences. He has been listed in Marcus 'who's who in the world' since 2008.

Keynote Speaker II

Prof. Yan Li
University of Southern Queensland (USQ), Australia

Prof. Yan Li received her PhD degree from the Flinders University of South Australia, Australia. She is currently a Professor in the School of Agricultural, Computational and Environmental Sciences at the University of Southern Queensland (USQ), Australia. Her research interests lie in the areas of Artificial Intelligence, Machine Learning, Big Data Technologies, Internet Technologies, and Signal/Image Processing etc. Prof Yan Li has published more than 170 publications, supervised dozens of PhD completions, and obtained more than 2 million research grants through international collaborations. Prof Yan Li is the leader of USQ Data Science Programs and the recipient of many research and teaching excellence awards, including 2012 Australia prestigious National Learning and Teaching Citation Award, 2008 Queensland Government Smart State-Smart Women Award, 2009 USQ Teaching Excellence Award, 2009 USQ Research Excellence Award, and 2015-2017 Research Publication Excellence Awards.   Prof Yan Li has served as an elected academic leader in many high-level university committees, such as USQ Academic Board Executive Committee and USQ Research Committee etc.

Keynote Speaker III

Prof. Xudong Jiang
Nanyang Technological University, Singapore

Xudong Jiang received the B.Sc. and M.Sc. degree from the University of Electronic Science and Technology of China, in 1983 and 1986, respectively, and received the Ph.D. degree from Helmut Schmidt University Hamburg, Germany in 1997, all in electrical and electronic engineering. From 1986 to 1993, he worked as Lecturer at the University of Electronic Science and Technology of China 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 a fingerprint verification algorithm 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 2004 and served as the Director of the Centre for Information Security from 2005 to 2011. Currently, Dr Jiang is a tenured Associate Professor in School of Electrical and Electronic Engineering, Nanyang Technological University. Dr Jiang has published over hundred research papers in international refereed journals and conferences, some of which are well cited on Web of Science. He is also an inventor of 7 patents (3 US patents), some of which were commercialized. Dr Jiang is a senior member of IEEE and has been serving as Editorial Board Member, Guest Editor and Reviewer of multiple international journals, and serving as 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/image processing, machine learning and biometrics.

Conference Introductions

Welcome to 2019 ASIP Singapore conference. This conference is organized by ACM Chapter Singapore. The objective of the conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Electronics Communication.

Papers will be published in the following proceeding:

International Conference Proceedings Series by ACM (ISBN: 978-1-4503-7228-2), which will be archived in the ACM Digital Library, and indexed by Ei Compendex, Scopus and submitted to be reviewed by Thomson Reuters Conference Proceedings Citation Index (CPCI).

Conference website and email： http://www.asip.net and asip@acm-sg.org

Conference Venue

NTU@one-north Executive Centre (ONEC)

Add: 11 Slim Barracks Rise(off North Buona Vista Road),
one-north Executive Centre #09-01, Singapore 138664

NTU@one-north comprises two wings with respective educational and alumni house facilities.

The educational facilities include function halls, 215-seat auditorium, a 80-seat lecture theatre, 45-seat lecture theatres, 20 to 50-seat seminar rooms, 23-seat computer room and 6-seat discussion rooms. There are also tenants such as Wealth Management Institute, Centre for Professional and Continuing Education, European Union Centre, Alumni Club, Confucius Institute and French National Centre for Scientific Research. Alumni House facilities include a fun pool, restaurant, tennis courts, dance studio, bar, reading room, gymnasium and SPA.

How to Arrive There

Nanyang Technological University

NTU@one-north Executive Centre

11, Slim Barracks Rise (off North Buona Vista Road)
Singapore 138664

Route to NTU@ one-north campus, Executive Centre

Vehicle Route from AYE

Vehicle Route from Commonwealth Avenue
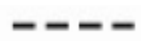
Pedestrian Path from Buona Vista MRT Station(Exit D) via North Buona Vista Road

Registration Guide

August 16, 2019 (Friday)

Time: 13:00~17:00

Venue: NTU@one-north Executive Centre (ONEC)

Registration Steps

1. Arrive at NTU@one-north Executive Centre (ONEC);

2. Inform the conference staff of your paper ID;

3. Sign your name on the Participants list;

4. Sign your name on Lunch & Dinner requirement list;

5. Check your conference kits: (1 conference program, 1 lunch coupon, 1 dinner coupon, 1 receipt, 1 name

   card, 1 flash disk (papers collection), 1 laptop bag);

Finish registration.

Tips: Please arrive at the conference to upload or copy Slides (PPT) into the laptop room 10 minutes before the session begins.

Note:

(1) The organizer doesn't provide accommodation, and we suggest you make an early reservation.

(2) One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on August 17, 2019.

(3) One day tour includes lunch but does not include attractions tickets, and participants need to take care of themselves.

Presentation Instructions

Instructions for Oral Presentations

Devices Provided by the Conference Organizer:

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

Duration of each Presentation (Tentatively):

Regular Oral Presentation: about 13 Minutes of Presentation and 2 Minutes of Question and Answer

Instructions for Poster Presentation

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award

One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on August 17, 2019.

Dress code

Please wear formal clothes or national representative of clothing.

Schedule for Conference

NTU@one-north Executive Centre (ONEC) Conference Center Lobby August 16 (13:00-17:00)
Arrival and Registration
Meeting Room RS901, August 17 (9:00-11:50)
Opening Remark (9:00-9:10) Prof. Xudong Jiang, Nanyang Technological University, Singapore
Keynote Speech I (9:10-9:55) **Title: Image Authentication and Tamper Localization** Prof. Yulin Wang, Wuhan University, China
Keynote Speech II (9:55-10:40) **Title: Artificial Intelligence in Health and Brain Science** Prof Yan Li, University of Southern Queensland (USQ), Australia
Coffee Break & Group Photo (10:40-11:00)
Keynote Speech III (11:00-11:45) **Title: Sematic Image Segmentation by Deep Machine Learning** Prof. Xudong Jiang, Nanyang Technological University, Singapore
Lunch (11:50-13:00) Cafe of Four Seasons
August 17 (14:00-18:00)
Session 1 (13:00-15:15) **Computer Applications** Chair: Prof. Yan Li **Conference Center – Meeting Room RS901**
Coffee Break (15:15-15:45)
Session 2 (15:45-18:00) **Data Mining and Data Analysis** Chair: Prof. Xudong Jiang **Conference Center – Meeting Room RS901**
Dinner (18:00-19:00) Cafe of Four Seasons
August 17 (10:40-15:50)
Poster Session
August 18 (9:00-17:00)
One-Day Tour

Morning Session

Morning, August 17, 2019 (Saturday)

Time: 9:00~11:50

Venue: NTU@one-north Executive Centre (ONEC)

Opening Remarks (9:00~9:10)
Addressed by Prof. Xudong Jiang from Nanyang Technological University, Singapore

Keynote Speech I (9:10~9:55)

Title: Image Authentication and Tamper Localization

Prof. Yulin Wang

Wuhan University, China

Abstract—Image authentication can be used in many fields, including e-government, e-commerce, national security, news pictures, court evidence, medical image, engineering design, and so on. Since some content-preserving manipulations, such as JPEG compression, contrast enhancement, and brightness adjustment, are often acceptable—or even desired—in practical application, an authentication method needs to be able to distinguish them from malicious tampering, such as removal, addition, and modification of objects. Therefore, the traditional hash-based authentication is not suitable for the application. As for the semi-fragile watermarking technique, it meets the requirements of the above application at the expense of severely damaging image fidelity. In this talk, we propose a hybrid authentication technique based on what we call fragile hash value. The technique can blindly detect and localize malicious tampering, while maintaining reasonable tolerance to conventional content-preserving manipulations. The hash value is derived from the relative difference between each pair of the selected DCT coefficient in a central block and its counterpart which is estimated by the DC values of the center block and its adjacent blocks. In order to maintain the relative difference relationship when the image undergoes legitimate processing, we make a pre-compensation for the coefficients. Finally, we point out the direction using deep leaning technique for image authentication.

Keynote Speech II (9:55~10:40)

Title: Artificial Intelligence in Health and Brain Science

Prof. Yan Li

University of Southern Queensland (USQ), Australia

Abstract—The rise of digital disruption and its related technologies has opened a wealth of opportunities and challenges. The availability of huge amounts of data and high speed computers is making artificial intelligence (AI) a mainstream technology.   AI is driving for improvements and innovations in all areas, which are changing the way we live, work and play. Understanding the role of AI (and machine learning) and their impacts on the future is critical. We are just beginning to grasp the potential of AI, automation, high speed communication, drones, big data and cloud computing.
Firstly, this talk will overview the current AI application trends and research directions in health and medical areas. AI is fast overtaking human tasks ranging from medical imaging to risk analysis and management, and to health diagnostics and healthcare. Secondly, I will showcase the performance of several advanced techniques based on brain networks, modelling, deep learning and brain big data analysis algorithms. Some of the technologies are being commercialised for detecting brain tumours and clots in cerebral arteries, and for analysing sleep patterns for sleep disorders.

Coffee Break & Group Photo Taking 10:40~11:00

Keynote Speech III (11:00~11:45)

Title: Sematic Image Segmentation by Deep Machine Learning

Prof. Xudong Jiang

Nanyang Technological University, Singapore

Abstract—Scene image segmentation is a challenging task as it need classify every pixel in the image. It is crucial to exploit discriminative context and aggregate multi-scale features to achieve better segmentation. Context is essential for semantic segmentation. Due to the diverse shapes of objects and their complex layout in various scene images, the spatial scales and shapes of contexts for different objects have very large variation. It is thus ineffective or inefficient to aggregate various context information from a predefined fixed region. In this talk, I will first present a novel context contrasted local feature that not only leverages the informative context but also spotlights the local information in contrast to the context. The proposed context contrasted local feature greatly improves the parsing performance, especially for inconspicuous objects and background stuff. Furthermore, I will present a scheme of gated sum to selectively aggregate multi-scale features for each spatial position. The gates in this scheme control the information flow of different scale features. Their values are generated from the testing image by the proposed network learnt from the training data so that they are adaptive not only to the training data, but also to the specific testing image. Finally, I will present a scale- and shape-variant semantic mask for each pixel to confine its contextual region. To this end, a novel paired convolution is proposed to infer the semantic correlation of the pair and based on that to generate a shape mask. Using the inferred spatial scope of the contextual region, a shape-variant convolution is controlled by the shape mask that varies with the appearance of input. In this way, the proposed network aggregates the context information of a pixel from its semantic-correlated region instead of a predefined fixed region. In addition, this work also proposes a labeling denoising model to reduce wrong predictions caused by the noisy low-level features. This talk is based on two papers: H. Ding, X. Jiang, et al,"Context contrasted feature and gated multi-scale aggregation for scene segmentation,"CVPR'2018 Oral, andH. Ding, X. Jiang, et al, "Semantic Correlation Promoted Shape-Variant Context for Segmentation,"CVPR'2019 Oral.

Lunch 11:50~13:00

Oral Presentation Abstracts

Session 1- Computer Applications

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0042 Presentation 1 (13:00-13:15)
Time Series based Air Pollution Forecasting using SARIMA and Prophet Model
Korra Sathya Babu, K. Krishna Rani Samal, Santosh Kumar Das and Abhirup Acharaya
Department of CSE, NIT Rourkela, India.

Abstract—Air pollution severely affects many countries around the world causing serious health effects or death. Increasing dependency on fossil fuels through the last century has been responsible for the egradation in our atmospheric condition. Pollution emitting from various vehicles also cause an immense amount of pollution. Pollutants like RSPM, SO2, NO2, SPM, etc. are the major contributors to air pollution which can lead to acute and chronic effects on human health. The research focus of this paper is to identify the usefulness of analytics models to build a system that is capable of giving a rough estimate of the future levels of pollution within a considerable confidence interval. Rendered linear regression techniques are found to be insufficient for the timedependent data. In this regard, we have used time series forecasting approach for predicting the future levels of various pollutants within a considerable confidence interval. The experimental analysis of the forecasting for the air pollution levels of Bhubaneswar City indicates the effectiveness of our proposed method using SARIMA and Prophet model.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0013 Presentation 2 (13:15-13:30)
Design of Modular Learning Analytics Framework for Early Childhood Education: A Case Study
Atchara Rueangprathum and Suntorn Witosurapot
Prince of Songkla University, Thailand

Abstract—On the provision of early childhood education, education-oriented software for enabling parent and teacher collaboration becomes popular. However, by providing merely on the asynchronous communication support, this sort of software overlooks a feature allowing parents (or teachers) to trace their child's physical development or learning progress. In this paper, it is argued that the missing feature is indeed necessary, and should be realized through the use of learning analytics technology. In this regard, a service-oriented design framework for rapid application development is suggested by a means of web mashup of open source software. Based on the minimum viable product, it is clearly the graph visualization of learning analytics can potentially empower parents on their early childhood education so that actions can be taken in time accordingly if necessary.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0027 Presentation 3 (13:30-13:45)
Child Attention Detection through Facial Expression Recognition using SVM Algorithm
John Paul Tomas, Frances Neele Vergonio and Aika Patricia Baldovino
Mapua University, Philippines

Abstract—Determining the ability of children to focus in a very young age is something that is very important for adults to know for them to understand the child's learning capability. The proposed system shows that basing from a child's facial expression, it can determine their attention skills which has given accurate results. A total of forty (40) grade one (1) students took part in this research. The data gathered was in the form of a recorded video obtained from the web camera. Each video was processed frame by frame to extract necessary facial features that is needed in determining the facial expression through OpenFace application. SVM algorithm was used in training and testing the model's validity. The model is written in a Java Programming Language and has an output of a subtitle file which will be imported into the recorded video. From there, the subtitle file has a label of the student's facial expression, thus their attention. To determine the predictive power of the model, K-fold cross validation method was used.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0010 Presentation 4 (13:45-14:00)
High-Throughput Re-configurable content addressable memory on FPGAs
Muhammad Irfan[1], **Ray C. C. Cheung**[1], and Zahid Ullah[2]
1. Natioal Pingtung University, Taiwan 2. CECOS University of IT & Emerging Sciences, Peshawar, Pakistan

Abstract—Content-addressable memory (CAM) is a searching memory which provides the address of the search key in a single clock cycle. High speed lookup operation of CAM makes it extremely attractive in security, in-memory computing, distributed systems and networking applications. Field programmable gate arrays (FPGAs) are famous for hardware-like performance and software-like re-configurability, but it does not have built-in CAM. Researchers have used different hardware components, like Block random-access memory (RAM), distributed RAM, flip-flops etc., to emulate the functionality of CAM inside FPGAs. This paper presents the design space exploration of gate-based area efficient ternary content addressable memory (GAETCAM) which uses flip-flops as memory elements on FPGA and can be configured as binary as well as ternary CAM. By configuring G-AETCAM as binary CAM, due to the redundancy of masking bits, half of the resources on FPGA are saved. We have implemented different sizes of G-AETCAM on Xilinx Virtex-5, Virtex-6 and Virtex-7 FPGAs and provided the results in detail for the designers to choose according to the application's requirements. Throughput, as a critical performance metric, is improved by 28% compared to other FPGA-based TCAM counterparts. Moreover, scalability is shown as a trade-off of G-AETCAM due to the routing complexity of the architecture and the factors limiting the largest possible size on each FPGA device are reported in this work.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0020 Presentation 5 (14:00-14:15)
Prioritization Strategy for Government's Website Information Quality. Case Study : Indonesia National Public Procurement Agency
Mieke Eka Putri, and Yova Ruldeviyani
Universitas Indonesia, Jakarta, Indonesia

Abstract—National Public Procurement Agency (NPPA) is one of Indonesian Government Agency which uses website as their service to citizen to share information related with regulation, organizations profile, and function. Information quality (IQ) in government website has becomes one of key determinant to user satisfaction. Therefore in this study, we aim to investigate which IQ characteristics that users find important, affect user's satisfaction, and should be prioritized to optimized user's satisfaction. In this study, we use Importance Performance Analysis (IPA) quadrant to find prioritized IQ characteristics then we do theory analysis to find it's relation to user overall satisfaction. The result shows that most important IQ characteristics are believability, reliability, and validity of information. This study also finds that comprehensiveness, currency, flexibility, and value added in information should be prioritized to be improved. Furthermore, believability of information, reliability of information, information accuracy, validity of information, robustness of information, amount of uptime information, credible source of information, perceived value of information, type of language used is interpretable, essentialness of information, efficiency of information, information has added value which significantly and positively contribute to user overall satisfaction. This paper raises idea to do further research in IQ characteristics for e-government.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0036 Presentation 6 (14:15-14:30)

Energy Efficient Resource Allocation for Full-Duplex Enabled Cooperative NOMA with SWIPT Communication

Zhenwei Zhang[1], Hua Qu[1], Jihong Zhao[2] and Wei Wang[1]

1. School of Electronic and Information Engineering, Xi'an Jiaotong University, Xi'an Shaanxi, 710049, China
2. Xi'an University of Posts and Telecommunications, China

Abstract—This paper investigates an energy efficient resource allocation problem for full duplex cooperative communication with non-orthogonal multiple access and simultaneous wireless information and power transfer (FD-CNOMA-SWIPT) network. There are two group users randomly deployed in a base station (BS) coverage area, the center users and the edge users. To satisfy the quality of service (QoS) of the edge user and increase the spectrum efficiency of the dense wireless network, the BS would schedule a center user to cooperatively communicating with the edge user in non-orthogonal multiple access. The center user receives both information and energy from BS simultaneously by using power splitting, and then decodes and forwards the edge user's data in full duplex mode, which brings in self-interference. To increase the energy harvest efficiency at the center user, we can use self-energy recycling technology at the center user. On the purpose of increasing system energy efficiency and spectrum efficiency of the network, we design a low complexity strategy to solve the problem of power allocation sub-problem and resource allocation sub-problem efficiently. The simulation results show our proposed strategy has 12% performance gain than the convention NOMA strategy and more than 95% performance gain over the half duplex (HD) strategy when the residual self-interference coefficient of the FD strategy is smaller than -60dB.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0038 Presentation 7 (14:30-14:45)
Energy Harvesting PUF oriented ID Generation Method and its Evaluation System
Yusuke Nozaki and Masaya Yoshikawa
Meijo University, 1-501 Shiogamaguchi, Tenpaku-ku, Nagoya, Aichi, Japan

Abstract—The energy harvesting physical unclonable function (EH PUF), which uses the power generation time variance due to production variations for the authentication, has been proposed as authentication technology to ensure the security of energy harvesting IoT devices. However, the evaluation using multiple energy harvesters has not been studied. This study develops a new evaluation system for the EH PUF, and evaluates power generation times of several energy harvesters using photovoltaic power generation. This study also proposes a new ID generation method for authentication of multiple energy harvesters. Experiments evaluate the validity of the developed evaluation system and the proposed ID generation method for EH PUF.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT0039 Presentation 8 (14:45-15:00)
Communicating Fact to Combat Fake: Analysis of Fact-Checking Websites
Anjan Pal and Cliff Loke
Nanyang Technological University, Singapore

Abstract—Online falsehood has now become a pressing problem. One way to tackle it lies in investigating the veracity of dubious claims and disseminating the facts to the online community. Several fact-checking websites (e.g., Snopes.com, FactCheck.org) are now serving the purpose of communicating facts by determining the veracity of fake news. However, the scholarly understanding of fact-checking websites is currently limited. To plug this research gap, the objective of this paper is to identify the features of fact-checking websites. For this purpose, it reviews the literature to identify possible dimensions of information work, namely, Acquisition, Disclosure, Verification, Presentation, Interaction, and Diffusion that could be associated with fact-checking websites. After that, it analyzes 22 fact-checking websites to figure out features that help manifest each dimension of information work. The relevant features are identified and discussed. The paper contributes towards developing a framework of the fact-checking websites. The findings have practical implications in terms of design strategies for such websites.

Oral Presentation Abstracts

Session 1- Computer Applications

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Afternoon, August 17, 2019 (Saturday)

Time: 13:00-15:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Yan Li

IT3001 Presentation 9 (15:00-15:15)
Humanitarian Logistics Information System for Natural Disaster: A Case Study on East Java, Under the Coordination of Indonesian Red Cross
Djoni H. Setiabudi and I Gede A. Wydiadana
Petra Christian University, Jl. Siwalankerto 121-131, Surabaya, Indonesia

Abstract—Indonesia is known as a country with high disaster risk. Many disasters occur such as earthquakes, tsunami, landslides, and floods. Therefore, an efficient and effective disaster management system becomes a priority among the government programs. One element of disaster management system is the humanitarian logistics, which is important in handling the logistics of the stuff needed by the victims of the disaster. There are red cross application from many countries, however only few application that relate donor, volunteer and logistics. By implementing this system, the victims of the disaster can receive any stuff needed on time and in sufficient quantity. Information system is an important factor in handling an efficient logistics. Therefore, this paper is discussing a humanitarian information system that has been developed. The system is developed using deep interview process, on side visitation and modelling process. The information system is developed using an integrated web-based model under the coordination of Red Cross Indonesia (IRC), East Java province.   In this research, the integration system involves many parties such as supermarkets, donors, volunteers, and disaster posts. The result of this research is a logistics information system design including Web-based User Interface for the administrator, donors, shelters, supermarkets and mobile device user interface designed for volunteers. The user interface will help Indonesia Red Cross to collect stuffs and distribute them to victims more efficient after the user interfaces have been approved the head of Indonesia Red Cross.

Coffee Break 15:15~15:45

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

AS0002 Presentation 10 (15:45-16:00)
Human Action Recognition Using Convolutional Neural Network and Depth Sensor Data

Zeeshan Ahmad, Kandasamy Illanko, Naimul Khan, and Dimitri Androutsos
Ryerson University, Canada

Abstract— The paper proposes a technique for Human Action Recognition (HAR) that uses a Convolutional Neural Network (CNN). Depth data sequences from the motion sensing devices are converted into images and fed into a CNN rather than using any conventional or statistical method. The initial data was obtained from 10 actions performed by six subjects captured by the Kinect v2 sensor as well as 20 actions performed by 7 subjects from the MSR 3D Action data set. A custom CNN architecture consisting of three convolutional and three max pooling layers followed by a fully connected layer was used. Training, validation, and testing was carried out on a total of 39715 images. An accuracy of 97.23% was achieved on the Kinect data set. On the MSR data set the accuracy was 87.1%.

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

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Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

AS0008 Presentation 11 (16:00-16:15)
Automated optic disc localization algorithm by combining a blob of corner patterns, brightness and circular structures models

Sirikan Chucherd[1] and Annupan Rodtook[2]
1. Mae Fah Luang University, Thailand; 2. Ramkhamheang University, Thailand

Abstract— Automatic localization of optic disc (OD) is an important step of diabetic retinopathy (DR) detection. This paper presents a methodology to locate the optic disc within the field of view (FOV) of retina image. The information taken from corner patterns of branching and cross-over points of blood vessels, the brightness and circular structure are combined to identify the location of OD. Moreover, a step of the FOV background estimation is designed to increase robustness of the proposed method due to the incomplete circular shape of OD caused by vascular tortuosity effect. The method was evaluated on the three public datasets as DIARETDB0, DIARETDB1, and MESSIDOR. The accuracy rate was 99.23%, 100%, and 99.25%, respectively. It obtained valid locations of OD in 615 out of the 619 images of the three datasets.

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

AS0014 Presentation 12 (16:15-16:30)

3D Multi-poses Face Expression Recognition Based on Action Units

Bai Jingxin, Lu Yinan and Zhang Shuo

Jilin University, China

Abstract— This paper presents a new 3D multi-poses facial expression recognition method based on action units. Firstly, automatic landmark detection is carried out according to the detected position of nose tips. Then a new feature descriptor is created to describe facial features involving geometric, topological and texture information. AUs are detected by classifying the fused features, and further used for recognizing the facial expressions. The method achieves good performance on Bosphorus database.

Oral Presentation Abstracts

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Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

IT0003 Presentation 13 (16:30-16:45)
Uncertain Programming Models for Logistics Network Optimization with Uncertain Data
Jin Peng
Huanggang Normal University

Abstract—Logistics network is scientifically to describe the mathematical structure of a logistics system, and logistics network optimization is to study the problems how to optimize the characteristic structure or some descriptive measures of logistics network efficiently. In the real word, logistics network runs with uncertain information represented by uncertain data. In this paper, we address the methodology of modeling logistics network optimization in the presence of uncertain data. A case study of express logistics delivery under uncertain conditions is provided to prove the practicality of the model.

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

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Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

IT0030 Presentation 14 (16:45-17:00)
Development of a Model that Detects Student's Disengagement in an Online Lecture Presentation through Eye Tracking and/or Head Movement
Andrea Ranaika Basinillo, Raphael Magno, Byron Matthew Oracion and **Larry Vea**
School of IT Mapua University Makati City, Philippines

Abstract—Technologies such as online lecture presentations are now provided to students to cater their learning through digital means. Unfortunately, student's engagement during online classes is uncertain. To partially address this problem, we developed models that can detect student disengagement using some well-known decision tree classifiers. Results showed that Random Forest using Information Gain criterion provided the highest accuracy rate of 91.73% and kappa statistic of 0.74. It was also observed that majority of the internal nodes of the tree models are features extracted from eye tracking. This includes: the time duration of the eye seen, the distance of the iris from the center of the eye, and the distance travelled by the iris. It implies that eye features are more likely to be determinants in detecting student disengagement rather than head movement features. Finally, we significantly noticed that: in every 450 video frames, if the eye is seen for less than 76 frames and an average angle of head pitch is less than or equal to 46.5 degrees, the student is most likely disengaged. We suggest that the model should be embedded in a computational system that automatically provides feedback to teachers conducting online classes which could aid the teacher in maintaining the class' engagement and help pave way to future studies regarding any individuals' engagement.

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

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Afternoon, August 17, 2019 (Saturday)

Time: 16:45-18:15

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

IT0011 Presentation 15 (17:00-17:15)
A Study on Lightweight Anonymous CP-ABE Access Control for Secure Data Protection in Cloud Environment

Yong-Woon Hwang and Im-Yeong Lee
Department of Computer Science and Engineering Soonchunhyang University Asan, South Korea

Abstract—Recently, with the development of cloud computing technology, people can use the cloud to store their own data and share it with others. However, since the cloud is networked, there are various security threats in the network environment. To solve this problem, the CP-ABE access control scheme, which is an attribute-based encryption scheme, is used. However, a third party can deduce the attribute of the user who wants to access the data through the access policy specified in the cipher text, which can infringe the user's privacy. An anonymous CP-ABE scheme that protects user's privacy by giving anonymity to the access policy is being studied. However, since the size of the ciphertext increases as the number of attributes increases in the previously proposed anonymous CP-ABE scheme, the efficiency of the cloud storage space can be wasted. Also, the amount of computation of the user to decode is inefficient in proportion to the number of attributes. In this paper, we increase the efficiency of storage space by fixing the size of ciphertext regardless of the number of attributes. And we propose a anonymous CP-ABE access control technique that can increase the efficiency of the user's computation amount by supporting outsourcing techniques.

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

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Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

IT0016-A Presentation 16 (17:15-17:30)
Understanding Employee Needs Using Data Mining Approaches

Yu-Hsiang Hsiao[1], Li-Fei Chen[2], and Chia-Yu Hsu[2]
1. Department of Business Administration, National Taipei University, Taiwan
2. Department of Business Administration, Fu Jen Catholic University, Taiwan

Abstract—Understanding and then fulfilling employees' needs can improve employees' job satisfaction and turnover intention. The importance and effects of different needs on job satisfaction and turnover intention are inherently heterogeneous to different employees. In order to effectively using limited resources to establish a satisfied working environment, it is important for organizations to identify employees' needs that are valued by different employees and bring the most impact. For this purpose, data mining approaches were applied to investigate the interrelationship among employee characteristics, employee needs, and the employee outcomes. The results provide references for human resource management to clarify how to fulfill critical employee needs and develop strategies and policies to create an ideal job environment and generate positive effects on employees' outcomes.

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

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Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

IT0018 Presentation 17 (17:30-17:45)
Analysis of Rescue Request Tweets in the 2018 Japan Floods
Shuji Nishikawa, Osamu Uchida and **Keisuke Utsu**
Tokai University, 2-3-23 Takanawa, Japan

Abstract—Large-scale natural disasters are a frequent occurrence in Japan. During and after such disasters, numerous messages (i.e., tweets) related to the disaster are posted on Twitter. For recent disasters, such as the 2017 Northern Kyushu Floods in Japan and the 2018 Japan Floods (the July 2018 heavy rain disaster in Japan), victims who needed to be rescued used the hashtag #救助 (meaning #Rescue) in the tweets they posted to request a rescue. As only a few studies have investigated the effectiveness of such hashtags, an investigation into the circumstances of the posted tweets with rescue request hashtags needs to be conducted to enable better rescue and relief activities. In this paper, we collect and analyze tweets with rescue request hashtags that were posted during and after the 2018 Japan Floods.

Oral Presentation Abstracts

Session 2- Data Mining and Data Analysis

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Afternoon, August 17, 2019 (Saturday)

Time: 15:45-18:00

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

Session Chair: Prof. Xudong Jiang

IT0021 Presentation 18 (17:45-18:00)
Australian Online BNPL Services Research - Building Gain Value Model of Individual Credit Background
YongKang Xing[1] **HaiQi Chen[2]** and XiaoHeng Zhuang[2]
1 Guangdong University of Finance, Guangzhou, China
2 Nanfang College of Sun Yat-sen University, Guangzhou, China

Abstract—With e-Business rapidly expands out in recent years, there is a significant trend that consumers require more financial support from online 'Buy Now, Pay Later'(BNPL) service providers in Australia. However, the initial development concept for these financial products contains many potential financial risks to Australian. This paper starts with introducing an overview of the online BNPL mode and its background verify working flow. Our research will focus on how the working flow causes potential financial risk. Besides, the research will cover other nations' success BNPL mode products which can provide reliable references to our research. By collecting the research data on several aspects, the paper will analyze the weights of different factors (gender, location, occupation, etc.) which may cause the client break the contract. Finally, the paper summarizes the contributions and concludes with a possible gain value model of individual credit background verify flow. The gain value model will help the future BNPL research in system architecture and interactive design aspect.

Dinner 18:00-19:00

Poster session

August 17, 2019 (Saturday)

Time: 10:40-15:50

Venue: NTU@one-north Executive Centre (ONEC) – Meeting Room RS901

IT0012 Poster 1
Ontology-Powered Hybrid Extensional-Intensional Learning

A.C.M. Fong and Guanyue Hong
Department of Computer Science Western Michigan University, Kalamazoo, MI 49009, USA

Abstract—Deep learning has made headlines in the past few years due to successes in tasks, such as self driving vehicles and board games, which were previously thought difficult or impossible. The successes have generated much interest in artificial intelligence among researchers and members of the public. However, deep learning algorithms generally require very large labelled data sets to work well and large labelled data sets are not always readily available. In addition, most machine learning techniques, including deep learning, often perform well statistically but can fail miserably when, for example, data are deliberately perturbed in an adversarial attack. Another criticism of deep learning techniques is a relative lack of explainability. This paper proposes the use of intentional learning to simultaneously address these issues. Preliminary evaluation on the MNIST data set has shown promising results. Specifically, by combing extensional and intensional learning, it is possible to achieve similar accuracy result as extensional learning only using only one-sixth of the original training data set.

IT0040 Poster 2
The Customized PCB ColorChecker: When Color Restoration Meets Machine Learning

Yingbo Wang, Min Qi, and Yuelei Xu
Northwestern Polytechnical University, China

Abstract—Color restoration of printed circuit board (PCB) images is an important part of the display module in three-dimensional solder paste inspection (3D SPI) systems. Accurate color information can show users images that reflect true PCB colors and provides important data for texture mapping when displaying realistic solder paste models [1]. In real-time imaging systems, such as black and white industrial cameras, accurate color restoration is an arduous task because of changeable imaging conditions [2]. Moreover, complex production environment of PCBs brings greater challenges. In order to overcome the above difficulties, we proposed new color restoration method to obtain accurate color information of PCBs utilizing customized PCB Dataset and PCB ColorChecker. The experimental results demonstrate that the new method improves both accuracy and efficiency.
One Day Visit

One Day Visit

August 18, 2019 (Sunday) 9:00~17:00

(Tip: Please arrive at Nanyang Executive Centre, Singapore before 9 a.m. The following places are for references, and the final schedule should be adjusted to the actual notice.)

1. **(9:00am) Assemble at Nanyang Executive Centre**
2. **(9:00-12:00pm) Morning Visit**

Visit Merlion Park

Merlion Park, is a Singapore landmark and major tourist attraction, located at One Fullerton, Singapore, near the Central Business District (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.The park was first designed by the Singapore Tourism Board (STB) in 1964 as an emblem of Singapore.

Visit St Andrew's Cathedral

In the mid-1980's, St. Andrew's Cathedral was restored and renovated to its present. Though there are many changes in the liturgical space, they made every effort to respect the Victorian period during which the Cathedral was designed. Restoration architects, Bawlf, Cooper & Associates completed the design work. The decorative panels are designed by Nicholas Bawlf and based on the Book of Kells. The Cathedral's altar is of particular significance. It was built by acclaimed West Coast native artist Charles Elliot. The top of the altar is yellow cedar, weighing about 400 pounds, which rests on two traditional native "bent boxes". Each box has a different picture carved on each of its four sides, representing different events in the life of Christ or stories from Scripture. These altar panels are rotated several times a year, to coincide with the events in the Church's liturgical year. The lectern was carved by native artist Roy Henry Vickers. It has a carving of Christ on the front, symbolizing both death and resurrection, the red side being the crucified Christ wearing the crown of thorns and the black side being the risen Christ. A new icon of the Holy Family was formally installed on September 8, 2007. The icon, which is 7 feet high by 5 feet wide, is the largest ever written by iconographer André Prevost of Manitoba.

Visit Chinatown, Singapore

Chinatown in Singapore is a sharp contrastto the rest of the city, with low rise buildings and culture bursting out onto the streets, from the fragrant smells of traditional cuisine to the bold red and gold tones that run through the neighbourhood. This is an area that's proud of its heritage, and has it very much on display. There are ornate Chinese, Buddhist and Hindu temples, museums galore and plenty of opportunities to soak up the bustling streets lined with old shophouses.

3. (12:00-14:00) Lunch time

4. (14:00-17:00) Afternoon visit

Visit Gardens by the Bay

Gardens by the Bay is an independent organization responsible for developing and managing one of Asia's foremost garden destinations.

The Gardens is led by a multidisciplinary team of professionals who have been involved in the greening of Singapore and had worked alongside international and local experts to develop the Gardens. It has an in-house team of skilled landscape designers, horticulturists, arborists, engineers, plant health, garden and turf management experts, as well as plant research and orchid breeding professionals, who leverage on the extensive global network of plant sources cultivated during the development days, to continuously curate and grow the Gardens.

Guided by its vision to be a world of gardens for all to own, enjoy and cherish, Gardens by the Bay has earned numerous awards and accolades including the World Building of the Year in 2012, the President's Design Award (Singapore) in 2013, the Outstanding Achievement Award by the Themed Entertainment Association in 2014, the Largest Glass Greenhouse (Flower Dome) in the Guinness World Records for 2015, and the TripAdvisor Certificate of Excellence in 2016. These achievements are testament to the ongoing excellence of the Gardens and spur the team towards attaining greater success.

Visit Little India

Little India is an ethnic district in Singapore. It is located east of the Singapore River—across from Chinatown, located west of the river—and north of Kampong Glam. Both areas are part of the urban planning area of Rochor. Little India is commonly known as Tekkain the Indian Singapore an community.

5. (17:00) Back to Nanyang Executive Centre

Note