



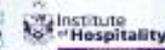
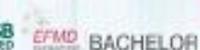
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9-10 March 2021

8th International Conference on Computing & Informatics

PROGRAMME & ABSTRACT BOOK

Digital Transformation and
Innovative Technologies
for Sustainable Cities & Communities



UUM
Universiti Utara Malaysia

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MESSAGE FROM THE DEPUTY VICE CHANCELLOR (RESEARCH AND INNOVATION)



Bismillahirrahmanirrahim
Assalamualaikum warahmatullahi wabarakatuh and Greetings

It gives me great pleasure to warmly welcome all the scholars and practitioners in the field, who have come from all over the world to lend their intellectual vigor to the 8th International Conference on Computing and Informatics (ICOCI 2021). Following on from the resounding successes of its previous editions, ICOCI has returned for the 8th time with a theme - “Digital Transformation and Innovative Technologies for Sustainable Cities & Communities”.

Digitalization, big data, Internet of Things (IoT) and Artificial Intelligence have changed the way we live, work, collaborate and communicate. This disruptive change interconnects with all information systems and processes that are important for providing services. The use of these digital and innovative technologies could contribute towards sustainable cities and communities. It was reported that a few cities such as Zurich, Stockholm, Geneva and Vienna have already started to benefit from big data analytics and IoT to address contingent challenges such as traffic congestion, air pollution, waste management, loss of biodiversity and natural habitat and energy generation, conservation and consumption. As digitalization become an integral part of our everyday life, I believe this conference could be a platform to share best practices in harnessing technological innovations for a sustainable city of the future.

The task of organizing an international virtual conference of this stature undoubtedly requires a high degree of dedication and commitment among the members of the organizing committee. In this respect, I would like to express my sincere gratitude and appreciation to the organizing committee, the staff of the School of Computing and SCIMPA, UUM, for their efforts and dedication in planning and hosting this event.

I would also like to extend my appreciation to the eminently distinguished scholars, industrial speakers, paper presenters, and participants, who have come together virtually from all parts of the world to share their invaluable insights and knowledge at ICOCI 2021. Finally, I am honoured to invite everyone present today in hopes to collaborate with us in future publications and researches.

I wish everyone a fruitful and rewarding conference.

PROF. DR. HAIM HILMAN ABDULLAH
DEPUTY VICE-CHANCELLOR (RESEARCH AND INNOVATION)
UNIVERSITI UTARA MALAYSIA

MESSAGE FROM THE ASSISTANT VICE CHANCELLOR OF COLLEGE OF ARTS AND SCIENCES



Bismillahirrahmanirrahim
Assalamualaikum warahmatullahi wabarakatuh

It is an honour for me to virtually welcome you to the 8th International Conference on Computing & Informatics (ICOCI 2021). ICOCI 2021 is organized by the School of Computing (SOC), UUM College of Arts and Sciences, Universiti Utara Malaysia. This conference provides a platform for local and international students, researchers, academia and industry players to share and promote research works that are related to the conference theme “Digital Transformation and Innovative Technologies for Sustainable Cities & Communities”.

ICOCI 2021 is one of the initiatives that brings together the researchers and industry players from many countries to further widen and strengthen the research in the field of computing and informatics. With the capability and talents of experienced participants in this conference, I strongly believe that we should be able to come up with creative ideas, suggestions and action plans that are suitable for the development of Computing and Informatics.

I would like to take this opportunity to express my sincere gratitude to the organizing committee, keynote speakers, industrial speakers, authors & all participants, sponsor (HDA Integrated Solution Sdn. Bhd.) and collaborators (Journal of Information and Communication Technology (JICT), Baghdad Science Journal, International Journal on Informatics Visualization (JOIV), International Journal on Advanced Science, Engineering and Information Technology (IJASEIT)) for their endless support in ensuring the success of this conference.

I hope that this conference will be able to provide valuable information as well as an unforgettable experience to all of you. I wish everyone an enjoyable time through the upcoming sessions and I look forward to seeing you in the future.

Thank you.

PROF. DR. HUDA HJ. IBRAHIM
ASSISTANT VICE CHANCELOR
UUM COLLEGE OF ARTS AND SCIENCES

MESSAGE FROM THE CONFERENCE CHAIR



Alhamdulillah, all praise is to GOD for HIS blessings. I am honoured and delighted to welcome all participants to this conference. This is our first virtual conference as COVID-19 has forced meeting planners and organizers to move from face-to-face mode. ICOCI 2021 brought forward a special theme on "Digital Transformation and Innovative Technologies for Sustainable Cities & Communities". We are interested to bring the world's attentions towards the role of computer technology in innovating sustainability of cities and communities.

The landscape of scholarly community changes where research output is published in journals rather than the conference proceedings. To cope with this change, I am glad to announce that for the second time, ICOCI publishes the articles in four journals namely Journal of Information Communication & Technology, International Journal on Advanced Science, Engineering and Information Technology, Baghdad Science Journal, and International Journal on Informatics Visualization. We appreciate contributions given by the international and local technical committee members who have reviewed the articles. We thank the support given by the conference participants especially to those who have been with us since the first ICOCI.

Finally, I would like to extend my greatest appreciation to all collaborators and sponsors in supporting the conference. To all participants, I hope you enjoy and get the benefits from the conference. I look forward to meeting you again in the next ICOCI.

Thank you.

PROF. DR. KU RUHANA KU MAHAMUD
CONFERENCE CHAIR

BIOGRAPHY OF KEYNOTE SPEAKER I

PROF. DR. MARCUS FOTH
Queensland University of Technology, AUSTRALIA

More-than-Human Futures: Connected Urbanism and Cohabitation in the Smart City



Prof. Dr. Marcus Foth is Professor of Urban Informatics in the QUT Design Lab, Creative Industries Faculty at Queensland University of Technology. He is also an Honorary Professor in the School of Communication and Culture at Aarhus University, Denmark, and was a 2019 Visiting Professor in the School of Design, Politecnico di Milano, Italy. Professor Foth’s research brings together people, place, and technology. His transdisciplinary work is at the international forefront of human-computer interaction research and development with a focus on smart cities, community engagement, media architecture, internet studies, ubiquitous computing, and sustainability. He founded the Urban Informatics Research Lab in 2006 and the QUT Design Lab in 2016. Ahead of their time and before the term “smart cities” became popular, he pioneered a new field of study and practice: Urban informatics that examines people creating, applying and using information and communication technology and data in cities and urban environments.

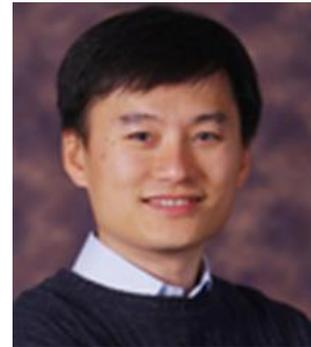
Professor Foth was a recipient of Queensland Young Tall Poppy Science Award 2013, and was inducted by the planning, design and development site Planetizen to the world’s top 25 leading thinkers and innovators in the field of urban planning and technology. In 2017, the Australian Computer Society (ACS) made Professor Foth a fellow for “a sustained and distinguished contribution to the field of computer science. He coined the term urban informatics – now adopted by universities and industry worldwide. Foth’s work makes clear how academic research can successfully respond to societal challenges.” Professor Foth has authored and co-authored over 200 publications in journals, edited books, and conference proceedings. He also chaired or co-chaired various Summer Doctoral Programme and conferences, became an ACM Distinguished Speaker and has been giving invited keynote talks at leading research institutions including Harvard University, MIT and University of Oxford.

BIOGRAPHY OF KEYNOTE SPEAKER II

PROF. DR. S.-H GARY CHAN

Hong Kong University of Science and Technology, HONG KONG

Boosting Healthcare with AI for the Young and Old: A Technology Transfer Journey



Prof. Dr. S.-H. Gary Chan is currently a Professor in the Department of Computer Science and Engineering, HKUST. His research interest includes smart sensing and IoT, cloud and fog/edge computing, indoor positioning and mobile computing, video/location/user/data analytics, and IT entrepreneurship. Professor Chan conduct applied system research on multimedia and wireless networking, addressing critical industry-driven and operational challenges to support cost-effective large-scale services. His team has been working closely with companies to study and develop novel, distributed and deployment-ready systems using rigorous algorithmic and optimization techniques. Professor Chan has been an Associate Editor of IEEE Transactions on Multimedia (2006-11), and a Vice-Chair of Peer-to-Peer Networking and Communications Technical Sub-Committee of IEEE Comsoc Emerging Technologies Committee. He is and has been Guest Editor of several well-known journals including Elsevier Computer Networks, ACM Transactions on Multimedia Computing, Communications and Applications and IEEE Transactions on Multimedia. He was the TPC chair of IEEE Consumer Communications and Networking Conference (IEEE CCNC) 2010, Multimedia symposium of IEEE Globecom (2007 and 2006), IEEE ICC (2007 and 2005), and Workshop on Advances in Peer-to-Peer Multimedia Streaming in ACM Multimedia Conference (2005).

Professor Chan is the recipient of several local and international awards including Google Mobile 2014 Award, Silver Award of Boeing Research and Technology, Charles Ira Young Memorial Tablet and Medal, and the POEM Newport Award of Excellence at Princeton. He was Undergraduate Programs Coordinator in Department of Computer Science and Engineering (2013-15), Director of Sino Software Research Institute (2012-15), Co-director of Risk Management and Business Intelligence program (2011-2013), and Director of Computer Engineering Program (2006-2008) at HKUST. He is a member of honor societies Tau Beta Pi, Sigma Xi and Phi Beta Kappa, and a Chartered Fellow of The Chartered Institute of Logistics and Transport (FCILT).

BIOGRAPHY OF KEYNOTE SPEAKER III

PROF. DR. SIMON X YANG
University of Guelph, CANADA

Bio-inspired Intelligence with Applications to Various
Engineering Systems



Prof. Simon X. Yang received the B.Sc. degree in engineering physics from Beijing University, China in 1987, the first of two M.Sc. degrees in biophysics from Chinese Academy of Sciences, Beijing, China in 1990, the second M.Sc. degree in electrical engineering from the University of Houston, USA in 1996, and the Ph.D. degree in electrical and computer engineering from the University of Alberta, Edmonton, Canada in 1999. Prof. Yang joined the School of Engineering at the University of Guelph, Canada in 1999. Currently he is a Professor and the Head of the Advanced Robotics & Intelligent Systems (ARIS) Laboratory at the University of Guelph in Canada.

Prof. Yang has diversified research expertise. His research interests include robotics, intelligent systems, sensors and multi-sensor fusion, wireless sensor networks, control systems, machine learning, fuzzy systems, and computational neuroscience. His significant research contributions can be reflected by his original and innovative work in biologically inspired intelligence with applications to real-time motion planning, tracking and control of various robotic systems, and various other engineering and biomedical systems. He has published about 450 referred papers, including over 250 journal papers. Prof. Yang he has been very active in various professional activities. Prof. Yang serves as the Editor-in-Chief of International Journal of Robotics and Automation, and an Associate Editor of IEEE Transactions on Cybernetics, IEEE Transactions of Artificial Intelligence, and several other journals. He has involved in the organization of many international conferences.

Prof. Simon X. Yang received the B.Sc. degree in engineering physics from Beijing University, China in 1987, the first of two M.Sc. degrees in biophysics from Chinese Academy of Sciences, Beijing, China in 1990, the second M.Sc. degree in electrical engineering from the University of Houston, USA in 1996, and the Ph.D. degree in electrical and computer engineering from the University of Alberta, Edmonton, Canada in 1999. Prof. Yang joined the School of Engineering at the University of Guelph, Canada in 1999. Currently he is a Professor and the Head of the Advanced Robotics & Intelligent Systems (ARIS) Laboratory at the University of Guelph in Canada.

Prof. Yang has diversified research expertise. His research interests include robotics, intelligent systems, sensors and multi-sensor fusion, wireless sensor networks, control systems, machine learning, fuzzy systems, and computational neuroscience. His significant research contributions can be reflected by his original and innovative work in biologically inspired intelligence with applications to real-time motion planning, tracking and control of various robotic systems, and various other engineering and biomedical systems. He has published about 450 referred papers, including over 250 journal papers. Prof. Yang he has been very active in various professional activities. Prof. Yang serves as the Editor-in-Chief of International Journal of Robotics and Automation, and an Associate Editor of IEEE Transactions on Cybernetics, IEEE Transactions of Artificial Intelligence, and several other journals. He has involved in the organization of many international conferences.

BIOGRAPHY OF KEYNOTE SPEAKER IV

PROF. DR. EL-SAYED M. EL-ALFY

King Fahd University of Petroleum and Minerals, UAE

Demystifying the Role of Machine and Deep Learning in
Cybersecurity



Professor Dr El-Sayed M. El-Alfy is a professor at College of Computer Sciences and Engineering King Fahd University of Petroleum and Minerals (KFUPM). He holds Ph.D. in Computer Engineering, M.Sc. in Computer Science, M.Sc. in Intelligent Systems, B.Sc. in Computer and Control Engineering (Excellent with Honor). He has been actively involved in several funded research projects and published widely in areas related to intelligent systems, pattern recognition and machine learning, data mining, computer networking and optimization, and multimedia information security. He has co-founded and coordinated the Intelligent Systems Research Group (ISRG) at KFUPM. He has been published numerously in his field of expertise with 160+ refereed journal and conference papers, patents, book chapters and book volumes. He also chaired the ABET/CAC Accreditation Committee in the Computer Science Department at KFUPM (2008-2012).

Prof. El-Alfy received several awards, certificates and recognitions among them King Abdullah Award for the Translation of Computer Networking textbook in 2012, Distinction Award for Excellence in Teaching from KFUPM in 2011, Outstanding Undergraduate Student (1986-1991), listed in Marquis Who's Who in Science and Engineering, listed in the 26th Edition of Marquis Who's Who in the World, 2009, listed in the 2000 Outstanding Intellectuals of the 21st Century, IBC, Cambridge, UK, 2009/2010.

BIOGRAPHY OF INDUSTRY SPEAKER I

HARYATI ANUAR
Telekom Malaysia Berhad

A Virtual-First Talent Strategy



Madam Haryati graduated from UUM, Bachelor Degree in IT majoring in Software Engineering in 2005 and Master in Business Administration in 2008. She worked as GIS Analyst from 2005 to 2008. Upon completed her Master degree, she was accepted as Telco Engineer at Telekom Malaysia Berhad until now. Her areas of expertise include IP Multimedia Subsystem (IMS) and Project Management and Finance and has been a Planner for High-Speed Broadband (UNIFI) for 10 years. Her current position is as Industry Strategist Education under Telekom Malaysia Berhad business arms and competent in Smart Campus Services, Cloud for Education, Social Media & Big Data Analytics, Security and Blockchain specializing in Education Environment.

BIOGRAPHY OF INDUSTRY SPEAKER II

DR. WAN MUHAMAD HASNI WAN SULAIMAN

LeadUS and Techna-X Berhad

Forecasting the End of Covid Pandemics: Smart Risk management
Applications for Government Agencies



Dr. Wan Muhamad Hasni graduated from the University of Iowa, United States of America. He obtained his BSc. Degree in Statistics in 1986, MSc. Degree in Actuarial Science in 1988 and PhD in Finance in 1993. Earlier working experience was in Islamic Finance and investments in the 1990s. Later, he joined in technology investments in the 2000s and finally into AI and Data Science from 2010 onwards. He was formerly affiliated with Virtue Fintech LLC (Dubai, UAE), a fintech company in AI and Blockchain. Currently, he is with Techna-X Berhad as Chief Data Scientists a and Senior Fellow for LeadUS Think-tank group.

BIOGRAPHY OF INDUSTRY SPEAKER III

DR. SYARIFAH BAHYAH RAHAYU SYED MANSOOR
Cybersecurity Centre, National Defense University of Malaysia

Society and Security Transformation in a Modern World



Dr. Syarifah graduated from Northern Arizona University (NAU), Arizona, USA in BSc. Computer Information System in 1999. She obtained her MSc. Information Technology degree from Queensland University of Technology (QUT), Australia in 2001 and PhD Information Science from Universiti Kebangsaan Malaysia (UKM) in 2014. She worked as a COBOL tutor at NAU from 1997 to 1999, later she joined Universiti Teknologi PETRONAS (UTP) as Academic Trainee from 1999 until 2000 and a Lecturer from 2001 until 2008. She worked as IT Consultant from 2008 until 2018 before joining UPNM as Fellow Researcher of Cyber Security Center and a Senior Lecturer of the Faculty of Defense Science and Technology. Her research interests are in the areas of Blockchain, Artificial Intelligence and Big Data.

CONFERENCE SCHEDULE

Times are according to Malaysia time zone (GMT +8:00)

DAY 1 - 9 MARCH 2021 - TUESDAY

0900 **Registration**

0930 **Welcoming speech**

Prof. Dr. Ku Ruhana Ku Mahamud
ICOI 2021 Chair

Opening Remarks

Prof. Dr. Haim Hilman Abdullah
Deputy Vice Chancellor (Research and Innovation), Universiti Utara Malaysia

1000 **Keynote Address I**

Prof. Dr. Marcus Foth
Queensland University of Technology
More-than-Human Futures: Connected Urbanism and Cohabitation in the Smart City

1100 **Keynote Address II**

Prof. Dr. S-H Gary Chan
Hong Kong University of Science and Technology
Boosting Healthcare with AI for the Young and Old: A Technology Transfer Journey

1200 **Session A1**

Session A2

Session A3

1300 **Break**

1500 **Session B1**

Session B2

Session B3

DAY 2 - 10 MARCH 2021 - WEDNESDAY

0900 **Keynote Address III**

Prof. Dr. Simon X Yang
University of Guelph, Canada
Bioinspired Intelligence with Applications to Various Engineering Systems

1000 **Industry Talk I**

Mrs. Haryati Anuar
Telekom Malaysia Berhad
A Virtual-First Talent Strategy

1100 **Industry Talk II**

Dr. Wan Muhamad Hasni Wan Sulaiman
Techna-X Berhad
Forecasting the End of Covid Pandemics: Smart Risk management Applications for Government Agencies

1200 **Industry Talk III**

Dr. Syarifah Bahiyah Rahayu Syed Mansoor
Cybersecurity Centre, Universiti Pertahanan Nasional Malaysia
Society and Security Transformation in A Modern World

1300 **Break**

1400 **Keynote Address IV**

Prof. Dr. El-Sayed M. El-Alfy
King Fahd University of Petroleum and Minerals, Saudi Arabia
Demystifying the Role of Machine and Deep Learning in Cybersecurity

1500 **Announcement of Best Paper Awards**

Closing Remarks

Prof. Dr. Huda Hj. Ibrahim
Assistant Vice Chancellor, UUM College of Arts and Sciences

PARALLEL SESSION SCHEDULE

Parallel Session A (1200 – 1300, Malaysia time zone GMT +8:00)

A1: Management & Engineering of IT-enabled Services/IoT/Smart Technology
Chair: Dr. Zahurin Mat Aji
Webex link: <http://bit.ly/icoci2021-sessionA1>
Event number: 158 344 8331 Password: icoci2021@my

Time	PID	Title
1200	33	Simulation and Modelling of Electricity Usage Control and Monitoring System Using ThingSpeak Nurhazwani Anang, Mohammad Safwan AB Hamid, Wan Mariam Wan Muda
1220	46	Community Perception on Smart Engagement: Case of Kubang Pasu Local Government Ku Ruhana Ku Mahamud, Noraziah Che Pa, Mohd Hasbullah Omar, Shamsuritawati Sharif, Farizan Salleh
1240	52	A Scoping Study on Lightweight Cryptography Reviews in IoT Ikenna Rene Chiadighikaobi, Norliza Katuk

A2: Software Engineering & Knowledge Engineering/Decision Support System
Chair: Mr. Wan Hussain Wan Ishak
Webex link: <http://bit.ly/icoci2021-sessionA2>
Event number: 158 002 0786 Password: icoci2021@my

Time	PID	Title
1200	3	Refactoring Techniques for Improving Software Quality: A Practitioners' Perspectives Abdullah Almogahed, Mazni Omar
1220	4	Ontological Methodologies for Counselling Intervention: Do'a and Zikr Al-Māthur Corpus Roslina Othman, Siti Fatimah Mohd Tawil
1240	6	Knowledge-Based Decision Support System for Emergency Management: The Pandemic Framework Bahaa Ahmad Masmah, Azlinah Mohamed

A3: Human-Computer Interaction/Multimedia Support & Application
Chair: Dr Asmidah Alwi
Webex link: <http://bit.ly/icoci2021-sessionA3>
Event number: 158 573 9075 Password: icoci2021@my

Time	PID	Title
1200	2	Identifying the Requirements of Visually Impaired Users for Accessible Mobile E-Book Applications Munya Saleh Ba Matraf, Nor Laily Hashim, Azham Hussain
1220	26	Preliminary Analysis of Web-Based Learning Interface Design Based on Experts' Verification for Higher Education Zuriana Abu Bakar, Fatin Sarah Salim, Nor Fatin Farzana Zainuddin, Noor Maizura Mohamad Noor, Rosmayati Mohamad
1240	43	A New Approach for Video Concept Detection Based on User Comments Maha Thabet, Mehdi Ellouze, Mourad Zaied

Parallel Session B (1500 – 1700, Malaysia time zone GMT +8:00)

B1: Optimization Algorithm/Intelligent Systems & Robotics

Chair: Dr. Mohamad Farhan Mohamad Mohsin

Webex link: <http://bit.ly/icoci2021-sessionB1>

Event number: 158 034 4490 Password: icoci2021@my

Time	PID	Title
1500	9	Artificial Intelligence in Automated Bookkeeping: A Value-Added Function for Small and Medium Enterprise Nurul Akmar Azman, Azlinah Mohamed, Amsyar Mohmad Jamil
1520	22	Hybrid K-Nearest Neighbour and Particle Swarm Optimization Technique for Divorce Classification Hayder Naser Khraibet Al-Behadili, Ku Ruhana Ku-Mahamud
1540	34	Arabic Speech Classification Method Based on Padding and Deep Learning Neural Network Asroni Asroni, Ku Ruhana Ku Mahamud, Cahya Damarjati, Hasan Basri Slammat
1600	41	Reinforcement Learning-Based Television White Space Database Armie Pakzad, Raine Mattheus Manuel, Jerrick Spencer Uy, Xavier Francis Asuncion, Joshua Vincent Ligayo, Lawrence Materum
1620	48	An Iterated Two-Steps Sinusoidal Pitch Contour Formulation for Expressive Speech Synthesis Izzad Ramli, Nursuriati Jamil, Noraini Seman
1640	51	An Improved Pheromone-Based Kohonen Self-Organizing Map in Clustering and Visualizing the Balanced and Imbalanced Datasets Azlin Ahmad, Rubiyah Yusof, Nor Saradatul Akmar Zulkifli, Mohd Najib Ismail

B2: Social Analytics/E-Commerce/Computer Systems & Networking

Chair: Dr Juhaida Abu Bakar

Webex link: <http://bit.ly/icoci2021-sessionB2>

Event number: 158 709 2132 Password: icoci2021@my

Time	PID	Title
1500	11	Data Mining Techniques for Pandemic Outbreak in Healthcare Nur Izyan Suraya Abdul Satar, Azlinah Mohamed, Azliza Mohd Ali
1520	36	A Word Cloud Model Based on Hate Speech in an Online Social Media Environment Valentina Ibrahim, Juhaida Abu Bakar, Nor Hazlyna Harun, Alaa Fareed Abdulateef
1540	37	A Conceptual Model on Internet Banking Acceptance in China with Social Network Influence Guo Yi, Norziha Megat Mohd Zainuddin, Nur Azaliah Abu Bakar
1600	49	A Comparative Survey of Coding, Multiplexing, and Equalization Techniques Used in Coherent Optical Fiber Communications John Martin Ladrado, Emmanuel Trinidad, James Agustin Molina, Lawrence Materum
1620	53	Wireless Propagation Multipaths using Spectral Clustering and Three-Constraint Affinity Matrix Spectral Clustering Jojo Blanza
1640	54	An Improved K-Power Means Technique using Minkowski Distance Metric and Dimension Weights for Clustering Wireless Multipaths in Indoor Channel Scenarios Antipas Teologo Jr., Lawrence Materum

B3: Cybersecurity/System & Network Security

Chair: Assoc. Prof. Dr Mohd Hasbullah Omar

Webex link: <http://bit.ly/icoci2021-sessionB3>

Event number: 158 013 3456 Password: icoci2021@my

Time	PID	Title
1500	21	The impact of Fear and Rational Appeal Scam Techniques on Individual Susceptibility Siti Nurdiana Abu Bakar, Nur Haryani Zakaria
1520	30	Performance Evaluation of Intrusion Detection System using Selected Features and Machine Learning Classifiers Raja Azlina Raja Mahmood, AmirHossein Abdi, Masnida Hussin
1540	32	A Modified Symmetric Key Fully Homomorphic Encryption Scheme Based on Reed-Muller Code RatnaKumari Challa, VijayaKumari Gunta
1600	38	Identification of Factors Contributing to the Online Game Addiction Among Adolescents Wan Mohd Yusoff Wan Yaacob, Nur Haryani Zakaria, Zahurin Mat Aji
1620	44	A Comprehensive Review on Medical Image Steganography Based on LSB Technique and Potential Challenges Bushra Abdullah Shtayt, Nur Haryani Zakaria, Nor Hazlyna Harun

ABSTRACTS

PID2

IDENTIFYING THE REQUIREMENTS OF VISUALLY IMPAIRED USERS FOR ACCESSIBLE MOBILE E-BOOK APPLICATIONS

Munya Saleh Ba Matraf^{1,4}, Nor Laily Hashim², and Azham Hussain³

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²Human-Centered Computing Research Lab, Universiti Utara Malaysia, laily@uum.edu.my

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Books are a medium for communicating information and of which in recent years have taken the electronic form known as e-books. This shift has opened new opportunities for the visually impaired in overcoming their struggles with books in the traditional paper format. Yet, the National Federation of the Blind (NFB) claimed that many e-books do not meet the needs of the visually impaired. As a result, equitable access to e-books for the visually impaired is still limited. There is now a necessity to design usable and accessible e-book interfaces for the visually impaired. To achieve this goal, it is important to identify the e-book needs of the visually impaired and introduce those needs into their e-book applications. Very few studies had looked into this subject matter, thus paving the way for this current study to address the above research gap. An online survey was conducted involving seven visually impaired students at a local Malaysian university. The target participants' age was between 21 and 27 years old. The outcomes of this study identified ten requirements for accessible e-book applications for the visually impaired. Among these requirements were features that enabled users to zoom, read aloud, and search for book contents. Besides, screen reader strategy and text-to-speech were also mandatory features. Other requirements included clear text and sound, ease of navigation, high contrast, and high brightness. These requirements would involve the field of Human-Computer Interaction design, which would be applied particularly in the development of usable and accessible mobile e-book applications for the visually impaired.

Keywords: Accessible, e-book, requirements, visually impaired, Human-Computer Interaction design

PID3

REFACTORING TECHNIQUES FOR IMPROVING SOFTWARE QUALITY: A PRACTITIONERS' PERSPECTIVES

Abdullah Almogahed^{1,2} and Mazni Omar²

¹Taiz University, Yemen, abdullah.almogahed@outlook.com

²Universiti Utara Malaysia, Malaysia, mazni@uum.edu.my

Refactoring is a critical task in software maintenance and is commonly applied to improve system design or to cope with design defects. There are 68 different types of refactoring techniques and each technique has a particular purpose and effect. However, most prior studies have selected refactoring techniques based on its common use in academic research without getting evidence from the software industry. This is a shortcoming which points to the existence of a clear gap between academic research and the corresponding industry practices. Therefore, to bridge this gap, this study identifies the most frequently used refactoring techniques, the commonly used programming language, and methods of applying refactoring techniques in the current practices of software refactoring among software practitioners in the industry, by using an online survey. The findings from the survey reveal the most used refactoring techniques, programming language, and the methods of applying the refactoring techniques. This study contributes to the improvement of software development practices by adding empirical evidence on software refactoring used by software developers. The findings would be beneficial for researchers to develop reference models and software tools to guide the practitioners in using these refactoring techniques based on their effect on software quality attributes to improve the quality of the software systems as a whole.

Keywords: exploratory study, software refactoring, refactoring techniques, survey, maintenance

PID4

ONTOLOGICAL METHODOLOGIES FOR COUNSELLING INTERVENTION: DO'A AND ZIKR AL-MĀ' THUR CORPUS

Roslina Othman¹ and Siti Fatimah Mohd Tawil²

¹International Islamic University Malaysia, Malaysia, roslina@iiu.edu.my

²Universiti Sains Islam Malaysia, Malaysia, sitifatimah.mt@usim.edu.my

Do'a and Zikr al-Mā'thur (authentic supplications and remembrance of ALLAH 'Azza wa Jalla) can be suggested to Muslims to help them deal with challenges or issues in life. Counselling cases affect a person's feelings. Do'a and Zikr al-Mā'thur are often applied as a counselling intervention. Unfortunately, the authentic Do'a and Zikr al-Mā'thur are dispersed in many resources not visible to users, and the fact that not all online resources offer access to accurate Do'a and Zikr al-Mā'thur to users and the dubious Do'a and Zikr al-Mā'thur frequently credited to the Prophet (pbuh). The goal of this research is to develop an ontology for the purpose of providing credible results to counselling cases in need of relevant Do'a and Zikr Al- Ma'thur. This research focused on presenting how an ontology could support to provide accurate information to cases supervised by high school counsellors. This research developed the ontology for Do'a and Zikr al-Mā'thur for counselling in Protégé. The methodology implemented in the ontology development included the models designed by Fernandez-Lopez et al., Thunkijjanukij, Gomez-Perez et al., and Kreider. The ontology was verified, validated, and evaluated by two subject domain experts. Most concepts were rated as 'Compliant' and some as 'Partially Compliant'. Queries in SPARQL produced answers to the competency questions. Feedbacks from the user assessment proved that the executed results from the Do'a and Zikr al-Mā'thur ontology for counselling succeeded in fulfilling the users' requirement. It is recommended that the sustainability of the ontology should be secured through constant submission of real cases by counsellors and people with similar roles for query analysis and results. Credible scholars should provide direction to trustworthy sources. Such essential input is valuable for content management and contributes towards very few domain ontologies that deliver support to professional works. It also provides the step-by-step procedures to ontology construction and assessment for Islamic collection for counselling intervention.

Keywords: Islamic knowledge, knowledge representation, ontology, ontology evaluation, ontology development, semantic technology.

PID6

KNOWLEDGE-BASED DECISION SUPPORT SYSTEM FOR EMERGENCY MANAGEMENT: THE PANDEMIC FRAMEWORK

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Emergency management systems (EMS) assist the emergency managers to resolve emergencies on hand, through analysing the emergency characteristics, consolidating data from different departments that are involved in resolving the emergency. Many countries adopted various forms of EMSs that are specialized in resolving one type of emergency, and studies show their effectiveness in producing better decisions. However, the COVID-19 pandemic showed the lack of a comprehensive framework that could deal with different emergencies. It also revealed, the inability of the current systems to communicate with each other's to retrieve the needed data. The aim of this study is to show the current state of the EMSs in the emergency departments, constructing framework for Knowledge-based decision support system for emergency management focusing on resolving pandemics. Qualitative approach is adopted in this research, where the authors reviewed emergency management in general and pandemics in specific. Existing emergency management systems have been investigated. Knowledge-based and decision support systems have been explored. Approaches for integration, communication, and collaboration have been studied. As a result of this study, a comprehensive framework: a knowledge-based decision support system for the emergency departments, focusing on resolving pandemics, has been introduced and been validated with domain experts who has given insights and many suggestions for future research. While the research primary focus is to assist emergency managers in resolving covid-19 pandemic, what makes the proposed framework unique is that it adopts different approaches and techniques that enable the system to deal with various emergencies not limited to the current pandemic.

Keywords: pandemic; emergency management; decision support systems; knowledge-based system.

PID9

ARTIFICIAL INTELLIGENCE IN AUTOMATED BOOKKEEPING: A VALUE-ADDED FUNCTION FOR SMALL AND MEDIUM ENTERPRISES

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Bookkeeping plays a vital role in dealing with records of day-to-day financial transactions from invoices until payment. Studies show that an evolution of bookkeeping management from manual record keeping to electronic record keeping had simplified most of the burden of the bookkeepers as well as made it more reliable and accurate. However, with the rise of artificial intelligence, automated bookkeeping system is common to large business tasks at real time and is hassle free. The system will function more than just journals management but also as a decision-making tool to any business. Despite the benefits of the system, many small and medium enterprises, especially in Malaysia, still hesitate to implement the system. Artificial intelligence will further improve automated bookkeeping, making it simpler and efficient for all levels of business. This paper presents an artificial intelligence perspective and the methods used in automated bookkeeping focus on invoice processes such as Optical Character Recognition (OCR), document recognition, machine learning and auto journal record entries. Besides that, its challenges to be implemented in small and medium enterprises are also presented. The result of this study highlights the benefits of the automated bookkeeping process to suit the Malaysian small and medium enterprises. Future work will look at the suggested intelligence features that can be implemented for more efficient automated bookkeeping for small and medium enterprises.

Keyword: automated bookkeeping, automated invoices recognition, artificial intelligence, Optical Character Recognition; Small and Medium Enterprise; Malaysian Small and Medium Enterprises

PID11

DATA MINING TECHNIQUES FOR PANDEMIC OUTBREAK IN HEALTHCARE

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Pandemic outbreaks such as SARS-CoV, MERS-CoV and Covid-19 have attracted worldwide attention since these viruses have affected many countries and become a global public health issue. In 2019, Covid-19 was announced as a pandemic disease and categorized as a public health emergency globally. It is ranked as the sixth most serious pandemic internationally. This pandemic tracking and analysis require an appropriate method that gives better performance in terms of accuracy, precision and recall that defines its pattern since it involves huge and complicated datasets from the pandemic. Pattern identification is currently applied in many instances due to the rapid growth of data besides having the potential to generate a knowledge-rich environment which can help to significantly improve the quality of clinical decisions and identify the relationships between data items. Therefore, there is a need to review the techniques in data mining on the pandemic outbreak that focuses on healthcare. The goal of this study was to analyze the algorithms from the data mining method that had been implemented for pandemic outbreaks in past research such as SARS-CoV, MERS-CoV and Covid-19. The result shows that 2 main algorithms, namely Naïve Bayes and Decision Tree, from the classification method, are appropriate algorithms and give more than 90% accuracy in both the pandemic and healthcare. This will be further considered and investigated for future analysis on large datasets of Covid-19 which can help researchers and healthcare practitioners in controlling the infection of the coronavirus using the data mining technique discussed.

Keywords: data mining techniques, pandemic outbreak, healthcare, classification, algorithms

PID21

THE IMPACT OF FEAR AND RATIONAL APPEAL SCAM TECHNIQUES ON INDIVIDUAL SUSCEPTIBILITY

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Scams remain among top cybercrime incidents happening around the world. Individuals with high susceptibility to persuasion are considered as risk-takers and prone to be scam victims. Unfortunately, limited number of research is done to investigate the relationship between appeal techniques and individuals' personality thus hindering a proper and effective campaigns that could help to raise awareness against scam. In this study, the impact of fear and rational appeal were examined as well as to identify suitable approach for individuals with high susceptibility to persuasion. To evaluate the approach, pretest and posttest surveys with 3 separate controlled laboratory experiments were conducted. This study found that rational appeal treatment has a significantly stronger impact than the fear appeal. This result is a starting point in suggesting that rational appeal is a promising means in persuading individuals with high susceptibility to persuasion.

Keywords: scam, fear appeal, rational appeal, susceptibility to persuasion, online fraud

PID22

HYBRID K-NEAREST NEIGHBOUR AND PARTICLE SWARM OPTIMIZATION TECHNIQUE FOR DIVORCE CLASSIFICATION

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Judgment is the ability to make a considered decision by an evolution of knowledge. With the increasing trend of applications of artificial intelligence in law, divorce prediction has become the centre of research. Divorce classification and divorce factors determination are two of the most important matters in societies. Developing an effective technique is essential to prevent communities from collapsing. The traditional techniques of artificial intelligence play a major role in classifying divorce cases. Feature selection is a powerful pre-processing method used for data classification problems. Most previous studies on divorce classification focused on heuristic feature selection methods to determine the main factors behind divorce. These heuristic methods are considered the greedy strategy which does not produce an optimal solution. In this research, a new hybrid swarm intelligence technique was proposed using particle swarm optimisation for feature selection and the K-nearest neighbour algorithm for classification. Specifically, the proposed hybrid classifier can be used in real divorce applications where judges in their investigations can identify the factors that lead to the applications. For the experiment, five classifiers were used for performance analysis. The proposed technique was successfully applied and showed that the performance is better than the existing classifiers, namely naive Bayes, support vector machine, artificial neural network, repeated incremental pruning to produce error reduction, and decision stump. Therefore, the proposed classification model is a more suitable technique for divorce classification than other artificial intelligence techniques.

Keywords: K-nearest neighbour, particle swarm optimization, data classification, machine learning, feature selection

PID26

PRELIMINARY ANALYSIS OF WEB-BASED LEARNING INTERFACE DESIGN BASED ON EXPERTS' VERIFICATION FOR HIGHER EDUCATION

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Recently, the Web-based learning (WBL) platform, particularly for higher education, has become more crucial due to the Covid-19 pandemic. Thus, due to the increased use of WBL in higher education, an effective WBL interface design for higher education is truly important in order to attract students to use WBL and to further keep them engaged during learning via the Web-based platform. Therefore, the aim of this study was to determine the aesthetics of web interfaces based on experts' opinions. This study adopted a quantitative research approach involving a data-gathering survey. Fifteen (15) WBL interfaces were designed based on nine (9) design principles which were balance, proportion, simplicity, alignment, movement, hierarchy, consistency, contrast, and proximity. The results of this study discovered that nine (9) WBL interfaces were determined by the experts as aesthetic interfaces, five (5) WBL interfaces as non-aesthetic and 1 (one) WBL interface was considered neither aesthetic nor non-aesthetic. This finding revealed that six (6) out of nine (9) interfaces had the balance design principle. However, balance was also in most non-aesthetic interfaces. A possible reason that balance was the most design principle in both the aesthetic and the non-aesthetic interfaces is that when designing WBL interfaces, there is a need to consider the combination of the design principles as a whole, and not count the design principles individually.

Keywords: human computer interaction, web design, aesthetics interface, web-based learning, higher education

PID30

PERFORMANCE EVALUATION OF INTRUSION DETECTION SYSTEM USING SELECTED FEATURES AND MACHINE LEARNING CLASSIFIERS

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Some of the main challenges in developing an effective network-based intrusion detection system (IDS) include analyzing large network traffic volumes and realizing the decision boundaries between normal and abnormal behaviors. Deploying feature selection together with efficient classifiers in the detection system can overcome these problems. Feature selection finds the most relevant features, thus reduces the dimensionality and complexity to analyze the network traffic. Moreover, using the most relevant features to build the predictive model, reduces the complexity of the developed model, thus reducing the building classifier model time and consequently improves the detection performance. In this study, two different sets of selected features have been adopted to train four machine-learning based classifiers. The two sets of selected features are based on Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) approach respectively. These evolutionary-based algorithms are known to be effective in solving optimization problems. The classifiers used in this study are Naïve Bayes, k-Nearest Neighbor, Decision Tree and Support Vector Machine that have been trained and tested using the NSL-KDD dataset. The performance of the abovementioned classifiers using different features values was evaluated. The experimental results indicate that the detection accuracy improves by approximately 1.55% when implemented using the PSO-based selected features than that of using GA-based selected features. The Decision Tree classifier that was trained with PSO-based selected features outperformed other classifiers with accuracy, precision, recall, and f-score result of 99.38%, 99.36%, 99.32%, and 99.34% respectively. The results show that using optimal features coupling with a good classifier in a detection system able to reduce the classifier model building time, reduce the computational burden to analyze data, and consequently attain high detection rate.

Keywords: intrusion detection system, selected features, machine learning classifiers, performance evaluation

PID32

A MODIFIED SYMMETRIC KEY FULLY HOMOMORPHIC ENCRYPTION SCHEME BASED ON READ-MULLER CODE

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Homomorphic encryption became popular and powerful cryptographic primitive for various cloud computing applications. In the recent decades several developments have been made. Few schemes based on coding theory have been proposed but none of them support unlimited operations with security. We propose a modified Reed-Muller Code based symmetric key fully homomorphic encryption to improve its security by using message expansion technique. Message expansion with prepended random fixed length string provides one-to-many mapping between message and codeword, thus one-to-many mapping between plaintext and ciphertext. The proposed scheme supports both (MOD 2) additive and multiplication operations unlimitedly. We make an effort to prove the security of the scheme under indistinguishability under chosen-plaintext attack (IND-CPA) through a game-based security proof. The security proof gives a mathematical analysis and its complexity of hardness. Also, it presents security analysis against all the known attacks with respect to the message expansion and homomorphic operations.

Keywords: chosen plaintext attack, homomorphic encryption, reed-muller code, sparse subset sum, random permutation

PID33

SIMULATION AND MODELLING OF ELECTRICITY USAGE CONTROL AND MONITORING SYSTEM USING THINGSPEAK

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Renewable energy technology is growing fast especially photovoltaic (PV) system to move the conventional electricity generation and distribution towards smart grid. However, similar to monthly electricity bill, the PV energy producers can only monitor their energy PV generation once a month. Any malfunction in PV system components may reduce the performance of the system without notice. Thus, developing a real-time monitoring system of PV production is very crucial for early detection. In addition, electricity consumption is also important to be monitored more frequently to increase energy savings awareness among consumers. Hardware based Internet-of-Thing (IoT) monitoring and control system is widely used. However, the implementation of the actual smart grid system is high in cost. Thus, simulation and modelling of the system is important to see the capability of the actual system before being employed. Since the smart grid and its components are usually modeled using MATLAB/Simulink, the communication between MATLAB/Simulink, IoT platform such as ThingSpeak and mobile application is crucial to be explored to gain a better understanding of the features of the smart grid. To achieve the objectives, there are five main steps which are simulation of grid-connected photovoltaic (PV)

system to generate data to be monitored and controlled using HOMER software, then, development of monitoring on ThingSpeak and mobile application using MIT App Inventor 2. Next, the control system is developed on mobile application and the communication on how data are transferred between all the software are set up. The results show that all the selected parameters can be monitored in real-time successfully. The developed mobile application can be used to control the MATLAB/Simulink in two modes. During automatic mode, ThingSpeak controls the MATLAB/Simulink by giving a zero signal (OFF) if load demand is less than the power generated by PV and a one signal (ON) if the load demand is greater than PV power. During manual mode, consumer can send ON or OFF signal to MATLAB/Simulink via the mobile application unconditionally. It is hoped that the proposed system will bring many benefits in modeling a complete smart grid system in MATLAB/Simulink.

Keywords: smart grid, MATLAB / Simulink, ThingSpeak, MIT App Inventor 2

PID34

ARABIC SPEECH CLASSIFICATION METHOD BASED ON PADDING AND DEEP LEARNING NEURAL NETWORK

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Deep learning convolution neural network has been widely used to recognize or classify voice. Various techniques have been used together with convolution neural network to prepare voice data before the training process in developing the classification model. However, not all model can produce good classification accuracy as there are many types of voice or speech. Classification of Arabic alphabet pronunciation is a one of the types of voice and accurate pronunciation is required in the learning of the Qur'an reading. Thus, the technique to process the pronunciation and training of the processed data requires specific approach. To overcome this issue, a method based on padding and deep learning convolution neural network is proposed to evaluate the pronunciation of the Arabic alphabet. Voice data from six school children are recorded and used to test the performance of the proposed method. The padding technique has been used to augment the voice data before feeding the data to the CNN structure to developed the classification model. In addition, three other feature extraction techniques have been introduced to enable the comparison of the proposed method which employs padding technique. The performance of the proposed method with padding technique is at par with the spectrogram but better than mel-spectrogram and mel-frequency cepstral coefficients. Results also show that the proposed method was able to distinguish the Arabic alphabets that are difficult to pronounce. The proposed method with padding technique may be extended to address other voice pronunciation ability other than the Arabic alphabets.

Keywords: Arabic alphabet, deep learning, speech classification, COVID-19, spectrogram

PID36

A WORD CLOUD MODEL BASED ON HATE SPEECH IN AN ONLINE SOCIAL MEDIA ENVIRONMENT

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Social media is known as detectors platform that are used to measure the activities of the users in the real world. However, the huge and unfiltered feed of messages posted on social media trigger social warnings, particularly when these messages contain hate speech towards specific individual or community. The negative effect of these messages on individuals or the society at large is of great concern to governments and non-governmental organizations. Word clouds provide a simple and efficient means of visually transferring the most common words from text documents. This research aims to develop a word cloud model based on hateful words on online social media environment such as Google News. Several steps are involved including data acquisition and pre-processing, feature extraction, model development, visualization and viewing of word cloud model result. The results present an image in a series of text describing the top words. This model can be considered as a simple way to exchange high-level information without overloading the user's details.

Keywords: hate crime, social network, word cloud, Python

PID37

A CONCEPTUAL MODEL ON INTERNET BANKING ACCEPTANCE IN CHINA WITH SOCIAL NETWORK INFLUENCE

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The Internet of Things and Industry 4.0 is changing the way we live including the use of Internet banking. Although, the government has been encouraging its usage in China, the acceptance of Internet banking is still not well received by Chinese customers. The reason is they are more concerned about the economic development on the banking industry, and less concerned about technology acceptance and its development. This lack of acceptance is also attributed to the current lack of social network influence to Internet banking which includes its weak compliance, lack of identification and lack of internalization. This paper aimed to identify the factors that may be influencing IB acceptance by proposing a model which can determine the customer's behavioural intention based on social network influence. The TAM, UTAUT and the Social Influence Theory (SIT) were simultaneously adopted for this study. This was done to use the TAM model's perceived ease of use and perceived usefulness, the UTAUT model's social influence, and the SIT's compliance, identification and internalization factor for the analysis. For this purpose, a preliminary study was first administered to identify customers' attitudes towards IB acceptance. Thirty respondents were recruited for a structured interview. The behavioural intention and the social network influence on Internet banking in China was then examined with the proposed model. It appears that the model can be used to forecast Chinese customers' acceptance of Internet banking. It will benefit the bank and the society to pay attention to the influence of the social network for Internet banking in China. Besides, it will add knowledge to the Social Influence Theory (SIT) to influence the acceptance of Internet banking.

Keywords: Internet banking, acceptance test, social network influence, TAM, UTAUT, Social Influence Theory (SIT), customer behavioural intention

PID38

IDENTIFICATION OF FACTORS CONTRIBUTING TO THE ONLINE GAME ADDICTION AMONG ADOLESCENTS

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Nowadays, there is growing views of potentially addictive behaviors such as digital addiction especially Online Game Addiction (OGA). This study argues that all type of addictions is related to common components such as Salience, Mood Modification, Tolerance, Withdrawal, Conflict, Relapse and Problems. Despite the plethora of online games consequences, there is no standards or benchmarks used to classify between addicted and non-addicted users. Hence, this study is organized to identify the factors that contribute to OGA and examine the level of OGA especially among adolescents by utilizing the Online Game Addiction Scale (OGAS). Using the same scale, the adolescents will be classified into addicted and non-addicted categories. Driven by previous studies of conventional game addiction, we adopt all the distinct common components to measure 7 underlying criteria which related to OGA. We analyze the dimensional structure of the scale based on the samples of adolescents among students of Higher Learning Institution (HLI) in Northern Malaysia. Data were collected from 389 participants who responded to an online survey. Based on the OGAS, 35% of the participants were found to be addicted to online games based on the OGAS. In addition, the findings demonstrate a good concurrent validity as shown by the coherent associations between the time spent in playing games and the category of the games. This study contributes to the identification of factors that influence the OGA among adolescents which are significant in preventing the occurrence of other behavioral issues such as insecure cyber and emotional behavior.

Keywords: addictive behavior, online game disorder, digital addiction, online game addiction scale and adolescent

PID41

REINFORCEMENT LEARNING-BASED TELEVISION WHITE SPACE DATABASE

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Television white spaces (TVWSs) refer to the unused part of the spectrum under the very high frequency (VHF) and ultra-high frequency (UHF) bands. TVWS are frequencies under licenced primary users (PUs) that are not being used and are available for secondary users (SUs). There are several ways of implementing TVWS in communications, one of which is the use of TVWS database (TVWSDB). The primary purpose of TVWSDB is to protect PUs from interference with SUs. There are several geolocation databases available for this purpose. However, it is unclear if those databases have the prediction feature that gives TVWSDB the capability of decreasing the number of inquiries from SUs. With this in mind, the authors present a reinforcement learning-based TVWSDB. Reinforcement learning (RL) is a machine learning technique that focuses on what has been done based on mapping situations to actions to obtain the highest reward. The learning process was conducted by trying out the actions to gain the reward instead of being told what to do. The actions may directly affect the rewards and future rewards. Based on the results, this algorithm effectively searched the most optimal channel for the SUs in query with the minimum search duration. This paper presents the advantage of using a machine learning approach in TVWSDB with an accurate and faster-searching capability for the available TVWS channels intended for SUs.

Keywords: radio propagation, radio spectrum management, reinforcement learning, television white space database

PID43

A NEW APPROACH FOR VIDEO CONCEPT DETECTION BASED ON USER COMMENTS

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Video concept detection means describing a video with semantic concepts that correspond to the content of the video. The concepts help to retrieve video quickly. These semantic concepts describe high-level elements that depict the key information present in the content. In the last years, many efforts have been done to automate this task because the manual solution is time-consuming. Nowadays, videos come with comments. Hence, in addition to the content of the videos, the comments should be analyzed because they contain valuable data that help to retrieve videos. In this paper, we focus especially on videos shared on social media. The specificity of these videos is the presence of massive comments. We try in this paper, to exploit comments by extracting concepts from them. We aim at exploiting the comments to support the research effort working only on the visual content. Natural language processing techniques are used to analyze comments and to filter words to retain only ones that could be considered as concepts. We tested our approach on YouTube videos. The results demonstrate that the proposed approach is able to extract from the comments accurate data and concepts that can be used to make the retrieval of videos easier. It supports the research effort working on the visual and audio content of the videos.

Keywords: Natural Language Processing, video concept detection, social media tagging, keywords-based video retrieval

PID44

A COMPREHENSIVE REVIEW ON MEDICAL IMAGE STEGANOGRAPHY BASED ON LSB TECHNIQUE AND POTENTIAL CHALLENGES

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The rapid development of telemedicine services and the requirements for exchanging medical information between physicians, consultants, and health institutions have made the protection of patients' information an important priority for any future e-health system. The protection of medical information, including the cover (i.e., medical image), has a specificity that slightly differs from the requirements for protecting other information. It is necessary to preserve the cover greatly due to its importance on the reception side as medical staff use this information to provide a diagnosis to save a patient's life. If the cover is tampered with, this leads to failure in achieving the goal of telemedicine. Therefore, this work provides an investigation of information security techniques in medical imaging, focusing on security goals. Encrypting a message before hiding them gives an extra layer of security, and thus, will provide an excellent solution to protect the sensitive information of patients during the sharing of medical information. Medical image steganography is a special case of image steganography, while Digital Imaging and Communications in Medicine (DICOM) is the backbone of all medical imaging divisions, whereby it is most broadly used to store and transmit medical images. The main objective of this study

is to provide a general idea of what Least Significant Bit-based (LSB) steganography techniques have achieved in medical images.

Keywords: Telemedicine, Medical Imaging, Information Security, image Steganography, Dicom, Least Significant Bit (LSB).

PID46

COMMUNITY PERCEPTION ON SMART ENGAGEMENT: CASE OF KUBANG PASU LOCAL GOVERNMENT

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Implementing smart community engagement should consider careful planning and collaboration with numerous stakeholders, including the community. The technology and program must be designed to frame its purpose and should link back to specific goals of implementing smart community engagement. Digital services do not guarantee a smart engagement between the community and the local government. This is the case for the Kubang Pasu local government where several online services have been provided in their attempt to implement the smart community concept. However, understanding on the preferences of features and requirements of existing web-based systems and the impact of these systems is lacking. Therefore, a perception study needs to be conducted to obtain information regarding smart community engagement implementation. This study aimed to discover the community's perceptions on smart community engagement, specifically for Kubang Pasu in terms of its local context. To achieve this, a combination of interview and online survey was employed involving stakeholders of several organizations and 309 respondents among the community in Kubang Pasu. Result of the interview and survey revealed moderate engagement between the community and organizations due to low awareness, moderate engagement between the community and local authorities, low exposure to online services, as well as the weaknesses of the current online systems. It can be concluded that the satisfaction level of the respondents with officers at the organizations was only moderate. The implementation of e-services could reduce face-to-face interactions, which could help to improve the satisfaction level. This could also help in moving toward the smart community engagement concept. Therefore, the smart communication method via social media, email, and website could be employed to increase the low rating of public engagement with the authorities. This move will foster the prompt implementation of smart community engagement.

Keywords: online system, community engagement, e-services, perception

PID48

AN ITERATED TWO-STEPS SINUSOIDAL PITCH CONTOUR FORMULATION FOR EXPRESSIVE SPEECH SYNTHESIS

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Intonation generation in expressive speech such as storytelling is essential to produce high quality Malay language expressive speech synthesizer. Intonation generation such as explicit control has shown a good performance in terms of intelligibility with reasonably natural speech; thus, it was selected in this research. This approach modifies the prosodic features such as pitch contour, intensity, and duration to generate the intonation. However, modification of pitch contour remains a problem because the desired pitch contour is not achieved. This paper formulates an improved pitch contour algorithm to develop a modified pitch contour resembling the natural pitch contour. In this work, the syllable pitch contours of nine storytellers were extracted from their storytelling speeches to create an expressive speech syllable dataset called STORY_DATA. All the shapes of pitch contours from STORY_DATA were analyzed and clustered into the standard six main pitch contour clusters for storytelling. The clustering was done using one minus the Pearson product moment correlation. Then, an improved iterative two-steps sinusoidal pitch contour formulation was introduced to modify the pitch contours of a neutral speech into expressive pitch contour of natural speeches. Overall, the improved pitch contour formulation was able to achieve 93% high correlated matches indicating the high resemblance compared to previous pitch contour formulation at 15%. Therefore, the improved formula can be used in TTS synthesizer to produce a more natural expressive speech. We also discovered unique expressive pitch contours in Malay language and need further investigations in the future.

Keywords: speech synthesis, pitch contour formulation, prosody modification, storytelling

PID49

A COMPARATIVE SURVEY OF CODING, MULTIPLEXING, AND EQUALIZATION TECHNIQUES USED IN COHERENT OPTICAL FIBER COMMUNICATIONS

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As the world advances into 5G networks, significant scientific research accomplishments are being conducted for a communication system that could further enhance the current limit of data transmission capacity. Currently, the communication systems with the highest data rate are optical fiber systems. Due to the recent advancement of coherent optical fiber communications by exploiting time, wavelength, phase, amplitude, polarization, and space, optical engineering has been able to break the petabit barrier data rate. Therefore, coherent optical fiber communications is a hot topic due to its very high data rate that could be applied or as a requirement in 5G and big data analytics. This paper focuses on a comparative survey of the current applied fundamental techniques in fiber communication channels. These fundamental techniques that could be further studied and exploited to increase the bandwidth performance, decrease the error rate and energy consumption are coding, multiplexing, and equalization. At the end of this paper, a comparative result was discussed to explain the difference among the current techniques in the literature for the optical engineering community to improve collective coding, multiplexing, and equalization in coherent fiber systems.

Keywords: coherent optical communications, coding, multiplexing, equalization

PID51

AN IMPROVED PHEROMONE-BASED KOHONEN SELF-ORGANIZING MAP IN CLUSTERING AND VISUALIZING THE BALANCED AND IMBALANCED DATASETS

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The data distribution issue remains an unsolved clustering problem in data mining, especially in dealing with the imbalanced dataset. The Kohonen Self-Organizing Map (KSOM) is one of the well-known clustering algorithms that can solve various problems without a pre-defined number of clusters. However, similar to other clustering algorithms, this algorithm requires sufficient data for its unsupervised learning process. The inadequate amount of class label data in a dataset significantly affects the clustering learning process, leading to inefficient and unreliable results. Many kinds of research have been done by hybridizing and optimizing the KSOM algorithm with various optimization techniques. Unfortunately, the problems are still unsolved, especially the separation boundary and overlapped clusters problems. Therefore, this research proposed an improved PKSOM (iPKSOM) algorithm to solve the mentioned problem. Six different datasets; Iris, Seed, Glass, Titanic, Wdbc and Tropical Wood datasets have been chosen to investigate the effectiveness of iPKSOM algorithm. All datasets are then being observed and compared with the original KSOM results. This modification significantly impacts the clustering process by improving and refining the scatteredness of clustering data and reducing the overlapped cluster. Thus, this proposed algorithm can be implemented in clustering other complex datasets, such as high dimensional and streaming data.

Keywords: imbalanced data, clustering, Kohonen self-organizing map, optimization, pheromone

PID52

A SCOPING STUDY ON LIGHTWEIGHT CRYPTOGRAPHY REVIEWS IN IOT

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The efforts in designing and developing lightweight cryptography (LWC) started a decade ago. Many scholarly studies in literature report the enhancement of conventional cryptographic algorithms and the development of new algorithms. This significant number of studies resulted in the rise of many review studies on LWC in IoT. Due to the vast number of review studies on LWC in IoT, it is not known what the studies cover and how extensive the review studies are. Therefore, this article aimed to bridge the gap in the review studies by conducting a systematic scoping study. It analysed the existing

review articles on LWC in IoT to discover the extensiveness of the reviews and the topics covered. The results of the study suggested that many review studies are classified as overview-types of review focusing on generic LWC. Further, the topics of the reviews mainly focused on symmetric block cryptography, while limited reviews were found on asymmetric-key and hash in LWC. The outcomes of this study revealed that the reviews in LWC in IoT are still in their premature stage and researchers are encouraged to explore by conducting review studies in the less-attended areas. An extensive review of studies that cover these two topics is deemed necessary to establish a balance of scholarly works in LWC for IoT and encourage more empirical research in the area.

Keywords: lightweight cryptography, Internet of Thing, sensors, encryption, review, scoping study

PID53

WIRELESS PROPAGATION MULTIPATHS USING SPECTRAL CLUSTERING AND THREE-CONSTRAINT AFFINITY MATRIX SPECTRAL CLUSTERING

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This study focused on spectral clustering (SC) and three-constraint affinity matrix spectral clustering (3CAM-SC) to determine the number of clusters and the membership of the clusters of the COST 2100 channel model (C2CM) multipath dataset simultaneously. Various multipath clustering approaches solve only the number of clusters without taking into consideration the membership of clusters. The problem of giving only the number of clusters is that there is no assurance that the membership of the multipath clusters is accurate even though the number of clusters is correct. SC and 3CAM-SC aimed to solve this problem by determining the membership of the clusters. The cluster and the cluster count were then computed through the cluster-wise Jaccard index of the membership of the multipaths to their clusters. The multipaths generated by C2CM were transformed using the directional cosine transform (DCT) and the whitening transform (WT). The transformed dataset were clustered using SC and 3CAM-SC. The clustering performance was validated using the Jaccard index by comparing the reference multipath dataset with the calculated multipath clusters. The results show that the effectiveness of SC is similar to the state-of-the-art clustering approaches. However, 3CAM-SC outperforms SC in all channel scenarios. SC can be used in indoor scenarios based on accuracy, while 3CAM-SC is applicable in indoor and semi-urban scenarios. Thus, the clustering approaches can be applied as alternative clustering techniques in the field of channel modeling.

Keywords: channel models, cluster computing, clustering methods, data processing, validity index

PID54

AN IMPROVED K-POWER MEANS TECHNIQUE USING MINKOWSKI DISTANCE METRIC AND DIMENSION WEIGHTS FOR CLUSTERING WIRELESS MULTIPATHS IN INDOOR CHANNEL SCENARIOS

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Wireless multipath clustering is an important area in channel modeling, and an accurate channel model can lead to a reliable wireless environment. Finding the best technique in clustering wireless multipaths is still a challenge due to the radio channels' time-variant characteristics. Several clustering techniques have been developed which offer an improved performance but considering only one or two parameters of the multipath components. This study improves the K-PowerMeans technique by incorporating weights or loads based on the principal component analysis and utilizing the Minkowski distance metric to replace the Euclidean distance. K-PowerMeans is one of the several methods in clustering wireless propagation multipaths and has been widely studied. This improved clustering technique is applied to the indoor datasets generated from the COST2100 channel model and considers the multipath components' angular domains and their delay. The Jaccard index is used to determine the new method's accuracy performance, and results show a significant improvement in the clustering of the developed algorithm than the standard K-PowerMeans.

Keywords: channel model, principal component analysis, Minkowski distance, radio wave propagation, multipath clustering

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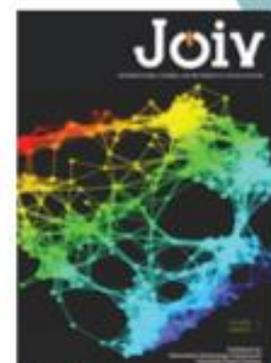
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