

CSPC2021

COMPUTER SCIENCE POSTGRADUATE
COLLOQUIUM 2021

+

Towards Impactful Research

IN THE ONLINE NORM

22nd SEPTEMBER 2021



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Foreword From the Dean



First, I would like to extend my heartiest gratitude to the organizing committee for sustaining the Computer Science Postgraduate Colloquium throughout these years. Since the year 2004, the Computer Science Postgraduate Colloquium has been the annual meeting ground for our postgraduates to showcase their research findings and share research ideas as well as socialize with fellow students and lecturers. Following the global situation of the Covid-19 pandemic, this year's CSPC is continued to be held in a very special way where all of us meet via a virtual platform.

Following the global situation of the Covid-19 pandemic, this year's CSPC is continued to be held in a very special way where all of us meet via a virtual platform. We all know that the pandemic has posed a new challenge to all of us where we cannot meet face-to-face, and most of the social activities are now shifted to online mode. Hence, the theme for this year's CSPC is set as "Towards Impactful Research in The Online Norm", which focuses on staying productive and overcoming the challenges and changes faced by researchers during this pandemic.

In the setting of new normal, postgraduate studies have their unique challenges, ranging from supervision, lab work, meeting with peers and even viva. Nevertheless, with the advancement of technology like virtual meeting platforms, I can see that we adapt well to this new mode of study. Keep up the good work. Finally, I would like to thank all speakers, participants, judges, and attendees for your support and contribution in making this event successful.

Professor Dr. Bahari Belaton

Dean, School of Computer Sciences,
Universiti Sains Malaysia

Foreword From the Advisor



Good day everyone. I wish everyone well and safe. At this point of time, I believe every one of us are still facing the challenge of adjusting ourselves to the way of living in this new normal of pandemic. As a postgraduate, you are adjusting yourself to adapt to the virtual meeting with your supervisor; you are adjusting yourself to conduct research from your home workspace; you are training yourself to be self-disciplined, you are trying to focus on studies while dealing with the pandemic news updates. Some of us can easily

adapt ourselves into this new normal, some may take a little more time. My humble advice is, follow your own pace, your own instinct, reach out for help if needed and never give in easily.

Despite all these obstacles, we are proud to continue our tradition of CSPC again in online mode this year. Throughout the many years of CSPC, I am happy to see that each CSPC is uniquely organized for the best interests of our beloved postgraduates. This year, we will be having workshop series, forum speakers from different continents as well as motivational keynote speaker. At the same time, we are delighted to welcome the participations of our postgraduates who are joining this event from various continents as well.

Finally, I am glad that this year's colloquium is led by our research postgraduates, Haziqah Samsudin as Chair and Asma Sajid as Co-chair, together with their team members. The team has done a remarkable job in the organizing works despite the challenge they are facing in this new normal. I am also pleased to see great involvements of lecturers from our school serving as advisors and judges of competitions for this event. I hope all postgraduates can take the opportunities to get valuable feedback from our academics, especially for those who have participated in Poster and 3MT competitions.

To all attendees, do enjoy all the sessions. I sincerely hope you will gain meaningful insights from our invited speakers and your peers.

Happy learning & stay safe.

Dr. Gan Keng Hoon

Advisor, Computer Science Postgraduate Colloquium 2021

Foreword From the Chair



Hello everyone, heartiest welcome to all of you for joining our Computer Science Postgraduate Colloquium (CSPC 2021) with the theme “Towards Impactful Research: In the Online Norm”.

CSPC is organised by the School of Computer Sciences annually as a platform dedicated to all postgraduate students to share research ideas, progress, and outcomes within the CS community. This year is the second year of this virtual colloquium due to the COVID-19 pandemic. The committee tries to imitate the physical activities and make sure CSPC still serves platform to connect postgraduates with the other universities, and alumni. This colloquium particularly encourages the interaction of students and academicians to discuss new and current research.

Hence, we are glad to organise various programmes such as poster competition, 3-minutes thesis (3MT) competition, talk, forum, and workshop for postgraduate participation. This year, we are so grateful to have internationally known speakers from several countries to deliver Special Events at CSPC 2021. We are also excited to hold the workshop on various topics delivered by fellow alumni in hopes that it will benefit all of us in moving forward with our research.

On behalf of the organising committees, we welcome you to the CSPC 2021. We hope you will receive the utmost benefits from attending this colloquium. Let me wrap up by taking this opportunity to tell my fellow coursemates that it is a challenging time for us now to continue working in this online norm. But, we can go through this by continuing to be persistent and working hard.

“Challenges are what make life interesting. Overcoming them is what makes life meaningful.”- Joshua J. Marine

Haziqah Shamsudin

Chair,

Computer Science Postgraduate Colloquium 2021

About CSPC 2021

Computer Science Postgraduate Colloquium (CSPC) was introduced in the year 2004 where the first colloquium started as a mini conference where it was organised exclusively for the research students of the School of Computer Sciences, USM. Realising that this platform is a very good channel for the postgraduate students to meet and share their knowledge, it then becomes an annual event organised by the school.

CSPC then become a catalyst for Computer Science Postgraduate Students at the School of Computer Sciences, Universiti Sains Malaysia to gather with academics and industry to communicate ideas and to have constructive discussions for the advancement of knowledge and to move the nation forward as a whole. It also becoming the venue to communicate and to expand research possibilities for our research students.

Objective

01

To provide a platform for postgraduate students to share knowledge and experience

02

To open up channel for industry – community – university to communicate for a more sustainable relationship in research and innovation

03

To foster relationship and communication among postgraduate students and Computer Science staff

04

To explore new knowledge in the current state of the art for respective studies in Computer Sciences

Schedule Day 1

Time (GMT +8)	Agenda
8.30am - 8.45am	Registration
8.45am - 10.45am	<u>Workshop I</u> Gaming The System – Using Game Concept to Conduct Your Research Speaker: Dr. Mohd. Akmal Nor Khalid
10.45am - 11.00am	Break
11.00am - 1.00pm	<u>Workshop II</u> How to Write a Research Paper for a Refereed Journal Speaker: Dr. Laith Abualigah
1.00pm - 2.00pm	Break
2.30pm - 4.30pm	<u>Workshop III</u> How to Conduct Literature Review and Organization of The Literature Speaker: Dr. Toqir Ahmad Rana
4.30pm - 4.45pm	Closing

Schedule Day 2

Time (GMT +8)	Agenda	Hall
8.45am – 9.00am	Registration	Hall 1
9.00am – 9.15am	Opening <ul style="list-style-type: none"> Opening Speech from Deputy Dean Professor Dr Azman Samsudin Opening Video Rule Announcement Asma Sajid 	+ Hall 1
9.30am - 11.00am	Poster Competition (Parallel Session) <ul style="list-style-type: none"> Session 1 Session 2 Session 3 	Hall 1 Hall 2 Hall 3
11.15am - 1.00pm	<u>Forum</u> The new normal 2.0: Massive delay in my research work - an excuse or a reality? Panels : Ts. Dr. Mohd Heikal Husin, Dr Fernando Fernández-Martínez, Dr. Julian D. Echeverry-Correa, Mr Robert Yusuf Lyon	Hall 1
1.00pm – 1.45pm	Break	
2.00pm – 3.00pm	3MT Competition	Hall 2
3.15pm - 4.30pm	<u>Keynote Speech</u> Feel It To Heal It: The Only Way Out Is Through Speaker : Ms Patience Chen	Hall 1
4.45pm – 5.15pm	Closing Ceremony <ul style="list-style-type: none"> Winner Announcement Closing Speech by Advisor Dr Gan Keng Hoon Speech by Chair Haziqah Shamsuddin 	Hall 1

Workshop



Gaming The System – Using Game Concept to Conduct Your Research

Dr. Mohd. Akmal Nor Khalid
Assistant Professor,
Japan Advanced Institute of Science and Technology (JAIST)



How to write a research paper for a refereed journal

Dr. Laith Abualigah
Assistant Professor, Amman Arab University



How to conduct literature review and organization of the literature

Dr. Toqir Ahmad Rana
Assistant Professor, University of Lahore

Forum

The new normal 2.0: Massive delay in my research work - an excuse or a reality?



Ts. Dr. Mohd Heikal Husin

Senior Lecturer
Universiti Sains Maysia



**AP Dr Fernando
Fernández-Martínez**

Associate Professor
Universidad Politécnica de Madrid
(UPM)



**AP Dr. Julian D.
Echeverry-Correa**

Associate Professor
Universidad Tecnológica de Pereira

Mr Robert Yusuf Lyon

PhD candidate
Northcentral University



Forum Panel



Ts. Dr. Mohd Heikal Husin

Senior Lecturer, School of Computer Sciences, USM

An 'explorer' and educator in Information Systems who developed an interest in Software Engineering through his work at USM. Upon graduating with a PhD in IT from the University of South Australia, he has taught both undergraduate and postgraduate students specifically in Project Management, Software Testing and ERP Process related courses over the period of 7 years.

He has also published several papers specifically on understanding technology usage impacts within organizations and other technology domains. Now, he currently supervises more than 10 postgraduate students and has managed to graduate several postgraduate students over the years (2 PhD, 1 MSc and more). Now, he leads several research grants including the first MRUN grant project in USM where the work explores the influences of technology towards developing positive behaviour in zero waste within university campuses. During his time off, he enjoys hiking, eating good food and watching travel / tech videos. He sometimes can be found watching TikTok as well on the side (after resisting to do so for several years).

Forum Panel



AP Dr. Julian D. Echeverry-Correa

Associate Professor, Universidad Politécnica de Madrid (UPM)

F. Fernández-Martínez received the Telecommunication Engineering degree and the Ph.D. degree from the Universidad Politécnica de Madrid (UPM), Madrid, Spain, in 2002 and 2008, respectively. He has made several research stays as a visiting scientist and professor including: the University Lille 3 (Lille, France), IDIAP Research Institute (Martigny, Switzerland), Ulm University (Ulm, Germany), and more recently at the Department of Signal Theory and Communications of the Universidad Carlos III of Madrid, where he was also a member of the Multimedia Processing Group (GPM).

Since September 2015, he has been an Associate Professor in the Department of Electronic Engineering of the UPM and also a member of the Speech Technology Group, currently attached to the Information Processing and Telecommunications Center of the same university. His main research interests include: natural language processing, HCI Systems, speech technology, affective computing, social signal processing, multimedia information retrieval, image processing, scene understanding and aesthetics assessment. In terms of research, his experience highlights an important record of research projects and contracts in the fields mentioned. As a result of this involvement, he has authored or co-authored more than 90 articles in both international journal and conferences. He also holds one software patent.

His hobbies and interests include: everything involving food, photography, watching movies and TV shows, hiking, kayaking and any other aquatic activities. He is known as Fernando Happy face as he has a smile as huge as the moon.

Forum Panel



AP Dr. Julian D. Echeverry-Correa

Associate Professor, Universidad Tecnológica de Pereira

Julian David Echeverry Correa received his bachelor degree in Electronic Engineering (2004) from Universidad Nacional de Colombia, a master degree in Electrical Engineering (2006) from Universidad Tecnológica de Pereira and both master and PhD degrees (with highest distinction) in Electronic Systems from Universidad Politécnica de Madrid, Spain. He is director of the Research Group in Data Analysis and Computational Sociology - GIADSc and an active member of the Research Group in Automatics, both groups belonging to the Engineering Faculty of Universidad Tecnológica de Pereira .

Since 2007 he is professor at the Program of Electrical Engineering at Universidad Tecnológica de Pereira, currently as an Associate Professor. He has participated in several research projects funded by both the Universidad Tecnológica de Pereira and the Colombian Ministry of Science, serving as principal investigator and co-investigator. Julian has authored and co-authored several papers published in indexed journals and in different conferences covering a variety of topics ranging from signal processing to the development of natural language processing systems. His main research areas cover signal processing and machine learning applied to data analysis, pattern recognition, and natural language processing.

He enjoy traveling, getting to know new places and new cultures. He is an amateur photographer and he also have a guilty pleasure and that is the taste for antique calligraphy.

Forum Panel



Mr Robert Yusuf Lyon

PhD candidate, Northcentral University

Robert Lyon, is an accomplished educator currently working as a Mathematics Interventionist at KIPP Heartwood Academy in San Jose, California. Here is where he uses multiple skillsets to inspire and mentor students towards their academic goals. Graduating Middle Tennessee State University with degrees in Communications, Art, and Agriculture led him to the American Military University where he obtained his Masters in History. The academic journey continued to Northcentral University where he is currently defending a PhD in Education with specialties in Curriculum and Teaching.

His philosophy towards education revolves around common sense and the simplistic view that all students are capable of learning. Mr. Lyon believes that the key to success for any student is for the teacher to diligently discover how each student learns. Creating curriculum for every scenario that teachers and students alike may face on their academic journeys is a goal in which he does not take lightly. Developing fail-safe guided lessons for all teachers with varied experience levels is a challenge he readily accepts and with diligent work and believable accountability, he intends to make this happen in as many spaces as possible.

His personal life consists of being a father to his beloved daughter, tutoring adult students for postgraduate acceptance, archival research, writing, photography, and just about any activity that takes him outdoors.

Keynote Speech

Feel It To Heal It

Going through the grieving process is hard work, and it often feels like things need to get worse before it gets better. Worldwide, no life has been completely untouched and unaffected by Covid. Individuals, families and communities are going through mass grieving, whilst continuously coping with the uncertainties that lay before them. The masses are grieving, and experiencing crisis and trauma on a daily basis. The grieving process can be difficult and challenging, but it can be managed with the right support. As a community and society, we can learn to support one another in our grief, in order to find the path that leads to healing.

Keynote Speaker

Patience Chen
Licensed & Registered Counsellor



Patience is a passionate speaker and facilitator who believes in the potential of individuals to grow and make meaningful changes in their lives. She has 8 years of experience as a facilitator and trainer, speaking to thousands of individuals in various schools, campuses and organizations across the country, both as a staff and volunteer in the non-profit sector.

She obtained her Bachelor's Degree in Psychology at the University of South Australia (UniSA), a Masters in Counselling at Universiti Sains Malaysia (USM) and is now a licensed and registered counsellor in Malaysia.

She draws on her lived experience in counselling and employs a person-centered approach in therapy. She also taps on the wisdom of the body in understanding one's thoughts, feelings and behaviours in order to make conscious changes in one's life. She is familiar in working with clients who experience anxiety, depression, suicidal thoughts, low levels of motivation, self-esteem, self-confidence and self-compassion. She has journeyed with individuals experiencing grief and loss, family conflict, relationship issues, as well as those who are questioning their direction in life or need help identifying their career path.

She has journeyed with individuals experiencing grief and loss, family conflict, relationship issues, as well as those who are questioning their direction in life or need help identifying their career path. She is confident working in group or individual settings.

Poster Competition

JUDGES

Dr Fadratul Hafinaz Hassan

Ts Dr Chew XinYing

AP Dr Umi Kalsom Yusof

Dr Mohd Halim Mohd Nor

Ts Dr Pantea Keikhosrokiani

Dr Suzi Iryanti Fadilah

AP Dr Wong Li Pei

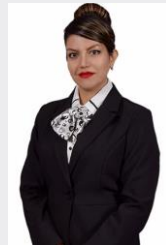
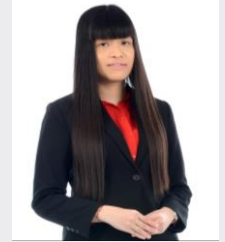
Dr Hazrina YH

Dr Nur Hana Samsudin

Ts Dr Sharifah Mashita Syed Mohamad

Mr G. C. Sodhy

Dr. Mohd. Adib Hj. Omar



Poster Schedule

Hall 1

Judge's Name	Time	Poster ID	Student's Name	Title
	9.30 AM - 9.34 AM		Bello Rotimi-Williams	Introduction & Competition Rules
Dr Fadratul Hafinaz Hassan Ts Dr Chew XinYing	9.35 AM - 9.45 AM	A01	Phang Yuen Chi	A multi-objective tasks scheduling for IoT applications in the edge-cloud computing
	9.50 AM - 10.00 AM	A02	Osamah Mohammed Fadhil Alabed Alhasan	Hybrid Filter-Wrapper Text feature Selection Technique for Text Classification
	10.05 AM - 10.15 AM	A03	Wan Nor Arifin Wan Mansor	Simulating Data to Evaluate Partial Verification Bias Correction Methods in Diagnostic Accuracy Studies
AP Dr Umi Kalsom Yusof Dr Mohd Halim Mohd Nor	10.20 AM - 10.30 AM	A04	Chunsheng Zhao	Visual Analysis on Job Shop Scheduling Problem Related Literatures Based on Mapping Knowledge
	10.40 AM - 10.50 AM	A05	Kelvin Lim Ching Wei	A Simulated Annealing-based Hyper-heuristic for Flexible Job Shop Scheduling Problem
	10.55 AM - 11.05 AM	A06	Sani Abdullahi	Improving Feature Weighting with Multi Domain Knowledge for Aspect Extraction in Review Text
	11.06 AM - 11.10 AM	Photo Session	Bello Rotimi-Williams	Group Photo, Wrap up & Thank you Note

Poster Schedule

Hall 2

Judge's Name	Time	Poster ID	Student's Name	Title
	9.30 AM - 9.34 AM		Addy Suyatno Hadisuwito	Introduction & Competition Rules
Ts Dr Pantea Keikhosrokiani Dr Suzi Iryanti Fadilah	9.35 AM - 9.45 AM	A07	Ahmad Mahdi Salih Alaubaydi	The acceptance and adoption framework of DevOps among IT and software development practitioners in Iraq
	9.50 AM - 10.00 AM	A08	Wada Mohammed Jinjiri	Optimizing Adaptive Neuro Fuzzy Inference System (ANFIS) for Predicting the Risk of Heart Disease
	10.05 AM - 10.15 AM	A09	Manal Ahmad Saleh Al-rawashedh	Nurse's awareness about IoT applications and nurse's perception regarding adopting IoT applications in nursing care : A pilot study in Jordan
AP Dr Wong Li Pei Dr Hazrina YH	10.20 AM - 10.30 AM	A10	Nur Izzati Ab Kader	Determining The Effects of Climate Change on Depressive Patients using Long Short-Term Memory Approach
	10.40 AM - 10.50 AM	A11	Norismiza Ismail	Predicting Malaysian Students' Interest in STEM Stream Selection by using Clustering & Hybrid Machine Learning
	10.55 AM - 11.05 AM	A12	Ali Fawzi Mohammed Ali Al-khafaji	Dominant Gray Level based Particle Swarm Optimization Clustering for Segmenting Brain Tumor Sub-regions from Multimodal Magnetic Resonance Images
	11.06 AM - 11.10 AM	Photo Session	Addy Suyatno Hadisuwito	Group Photo, Wrap up & Thank you Note

Poster Schedule

Hall 3

Judge's Name	Time	Poster ID	Student's Name	Title
	9.30 AM - 9.34 AM		Oyelami Julius Olusegun	Introduction & Competition Rules
Dr Nur Hana Samsudin Ts Dr Sharifah Mashita Syed Mohamad	9.35 AM - 9.45 AM	A13	Nik Nur Adlin Nik Qausbee	IMP X ASD: SIMPLE SOLUTION FOR COMPLEX CONNECTIONS
	9.50 AM - 10.00 AM	A14	Zhang Hao	Sentiment Knowledge Enhanced Pre-training for Sentiment Analysis
	10.05 AM - 10.15 AM	A15	Mohd Nathmee Bani Yaseen	An analysis of accessibility support demands in electronic learning systems for People with disabilities
Mr G. C. Sodhy Dr. Mohd. Adib Hj. Omar	10.20 AM - 10.30 AM	A16	Thulfiqar Jabar Abd	Situational Awareness Cybersecurity for Mitigating Mobile APT
	10.40 AM - 10.50 AM	A17	Duraidd Thamer Salim	Network Security Situation Awareness Model to Detect Mobile APT attacks
	10.55 AM - 11.05 AM	A18	Shamsuddeen Rabiou	Load balancing and Auto-scaling Optimization in Container Microservice Cloud-based System
	11.06 AM - 11.10 AM	Photo Session	Oyelami Julius Olusegun	Group Photo, Wrap up & Thank you Note

3MT Competition

JUDGES

Professor Dr. Rosni Abdullah



Mdm. Maziani Sabudin



Associate Professor Dr. Cheah Yu-N



3MT Schedule

Time (GMT +8)	Speaker ID	Full Name	Title of 3MT
2:00 pm -2:04 pm		Asma Sajid (Moderator)	Introduction & Remarks
2:05 pm -2:08 pm	Speaker 1	Amjed Ahmed Majid Al-Kadhimi	Advanced Persistent Threat (APT) Mobile Sensors Behaviour
2:09 pm -2:12 pm	Speaker 2	Samina Aman Ullah Khan	Usable Security Evaluation of Electronic Health Record System Among Healthcare Workers In Saudi Arabia
2:13 pm - 2:16 pm	Speaker 3	Nik Nur Adlin Binti Nik Qausbee	Research on Image Processing of Handwritten Datasets of Children With Autism Spectrum Disorder and Normal Children (Aged Around 6 to 9 Years Old)
2:17 pm - 2:20 pm	Speaker 4	Dua'a Mkhiehir Salamh Akhtom	Adversarial Machine Learning
2:21 pm - 2:24 pm	Speaker 5	Thevendran A/L Marimuthu	Quantum-aided Combinatorial Optimization
2:25 pm - 2:28 pm	Speaker 6	Usman Hamza	DevOps Concurrency All-Inclusive Stakeholder Model
2:29 pm - 2:32 pm	Speaker 7	Oyinloye Damilare Peter	Analysis and Design of Blockchain Consensus Protocols Based on Past Behaviour
2:33 pm - 2:36 pm	Speaker 8	Aminu Maigari	Breast Cancer Prognosis Prediction using Multimodal Deep Learning and Metaheuristic Optimization
2:37 pm - 2:40 pm	Speaker 9	Fung Chey	Learning to Solve Dynamic Vehicle Routing Problem
2:41 pm - 2:44 pm	Speaker 10	Zhang Yanbing	Memory of Lifelong Machine Learning
2:45 pm - 2:48 pm	Speaker 11	Auwal Shehu Ali	An Enhanced User Centered Privacy Policy Representations in Mobile Application
2:49 pm - 2:52 pm	Speaker 12	Asma Sajid	Formulation of Effective Features for Fake News Detection
2:53 pm - 2:58 pm	Reviews	Judges	Review & Wrapping up
2:59pm	Group Photo	Moderator	Screen Capture

Advanced Persistent Threat (APT) Mobile Sensors Behaviour

Amjed Ahmed Majid Al-Kadhimi
Supervisor: Dr. Manmeet Mahinderjit Singh



Advanced Persistent Threat (APT) is a targeted attack technique utilized by a sophisticated and expert adversary to preserve undetected access over an extended period to the exfiltration of important information. The APT attack has several attacks, such as social engineering techniques via spear phishing, SQL injection, malware, and watering hole. A smartphone contains many sensors and services, which are essential in supporting user activities that could comprise sensitive information. Therefore, a smartphone has become the primary goal of attackers to carry out Advanced Persistent Threat (APT) attacks. Many challenges occurred due to the vulnerability of smartphone sensors and services, security framework, and ineffectiveness of methods for detecting APT. Although there are many APT solutions designed and implemented, they fail to provide a comprehensive solution. The reason is due to the lack of APT attack profiles or fingerprinting. Fingerprinting of attacks follows a step by steps of TTP. As a result, this paper proposes a framework based on the correlation between MITRE Framework and the attack tree. This framework contributes in improving the security awareness that supports detecting an APT attack on smartphones.

Usable Security Evaluation of Electronic Health Record System Among Healthcare Workers In Saudi Arabia

Samina Aman Ullah Khan

Supervisor: Dr. Syaheerah Labai Lutfi



Electronic Health Records Systems (EHRs) are real-time, patient-centered records that make information instantly and securely available to authorized users. The nature of sensitive and private data stored in them makes EHRs a security system. Usability is a quintessential element of a security system - users can bypass or avoid it if the usability of the security application is weak. Therefore, usability and security are intertwined, and there is a need to find the right balance between the two. This has given rise to the concept of usable security. In Saudi Arabia, there has been a significant increase in the adoption of local EHRs, although there has been variation in the rate and level of EHR adoption across hospitals. Over the past few decades, the government has been driving the nationwide adoption of EHRs to improve health systems and provide more efficient health care to the population. However, there are still some challenges and issues to be addressed due to lack of computer literacy, technical limitations and training, ease of use, and security concerns among healthcare professionals. There is a high chance of users unintentionally losing or damaging patient data in such a situation. Evaluating EHRs is complex because healthcare settings are highly contextual. EHRs are at high risk of security breaches, and the reasons for these breaches are not always the security system itself or just the users. Therefore, there is a need for a systematic usable security evaluation for EHRs in the context of healthcare professionals to address this issue. This study aims to determine if the EHRs security by design hinders usability in the ""context"" of healthcare professionals. The context in evaluating the usability of EHRs relates to the ""who"" and ""why"" of the evaluation framework - the ""who"" being healthcare professionals with medical backgrounds and varying computer skills, and the ""why"" being the determination of whether the security of EHRs by design impedes their usability. Therefore, this study aims to design an evaluation framework that identifies factors that influence the usability of EHR security, in the context of healthcare professional users.

Research on Image Processing of Handwritten Datasets of Children With Autism Spectrum Disorder and Normal Children (Aged Around 6 to 9 Years Old)

Nik Nur Adlin Binti Nik Qausbee
Supervisor: Dr. Nur Intan Raihana



Handwriting is one of the ways to illustrate one's uniqueness, personality, and self-expression. Handwritten character analysis has always been one of the active areas in the field of image processing, even with the introduction of the concept of neural networks, this field of research is still in progress today. The concept of image processing refers to the processing of digital images. This study focuses on recognition of handwritten character datasets of children with autism spectrum disorder and normal children with the help of SVM. The initial phase is image acquisition, which involves acquiring the scanned image. Then, output image for this process is provided as input to the pre-processing phase followed by image segmentation as the method by which the visual image is partitioned into separate subgroups (of pixels) called image objects. When the data becomes too huge to handle, it is converted into a smaller representation set of features in feature extraction phase. Finally, each handwritten character is classified using SVM. This recognition system is planned to be implemented in MATLAB software.

Adversarial Machine Learning

Dua'a Mkhie mir Salamh Akhtom
Supervisor: Dr. Manmeet Mahinderjit Singh



The quick spread of COVID-19 has become a global concern and as of 23 August 2021, there have been 211,730 confirmed cases of COVID-19, including 4,430,697 deaths, reported to WHO. X-ray images are utilized for diagnosis. Therefore, automation screening of COVID19 using x-ray images became essential. NN-based models particularly, CNN architecture show the remarkable results of the diagnosis, however the generated adversarial examples, imperceptible perturbations are added to a real sample, make those models fail to predict correctly. One of the few defenses against adversarial attacks that withstands strong attacks called adversarial training (AT). AT relies on merging the adversarial examples generated using one of the chosen attack methods with training dataset to improve the robust accuracy, the achieved accuracy after training with perturbed inputs). However, the high cost of generating strong adversarial examples makes standard AT impractical on large-scale problems and sometimes hurts the standard accuracy. In our work, we propose a new approach, optimized adversarial training approach and we expect our proposed defence will be able to enhance the accuracy and the generalization to adapt DNN-model reliably in real life applications. As a test case, covid19 images will be as evaluation test to identify if the adversary modify it by adding imperceptible perturbations.

Quantum-aided Combinatorial Optimization

Thevendran A/L Marimuthu
Supervisor: Dr. Wong Li Pei



Combinatorial optimization problems are known for complexity; the problem complexity could expand easily in relative to the high-dimensional data spaces involved for computations. This indirectly imposes limitation in terms of computational power required to solve the problems. Following such situation, multiple approaches are being proposed, trying to present better computing alternatives to solve combinatorial optimization problems. Recent emergence of quantum computing has exposed more opportunities or possibilities for feasibly computing hard-to-solve problems. Considering the statements mentioned before, a usage model of solving combinatorial optimization problems via quantum computing is being presented.

DevOps Concurrency All-Inclusive Stakeholder Model

Usman Hamza

Supervisor: Dr. Sharifah Mashita Syed Mohamad +

Development and Operation methodologies and tools have become a must for organizations to stay competitive in the market in this decade. It is seen as a culture that emphasizes automation of the processes of building, testing, deploying and fast delivery of software, coined as DevOps with various definitions, such as “it’s an automated process for collaborations between software developers, operators and quality assurance”. Successful implementation of DevOps culture totally depends on the acceptance of its development methodologies by DevOps stakeholders. Due to a lack of standardization of process, definitions, and tools along with cultural barriers, organizations are facing huge problems in DevOps adoption. As a result, different organization needs leads to various definitions for DevOps. We argue that common guidelines for adaption, more collaborators and concurrency implementation to enhancing the process to achieve more success in DevOps. This research study reviews the literature and proposes the DevOps Concurrency All-inclusive-stakeholder model. This is to ensure the balanced interests of all relevant stakeholders and deliver services faster that deliver value to users and customers.

Analysis and Design of Blockchain Consensus Protocols Based on Past Behaviour

Oyinloye Damilare Peter
Supervisor: Dr. Teh Je Sen



Blockchain consensus protocols are the major architectural components of blockchain networks. Mainstream consensus protocols have been implemented over the years in various applications, but they are not without their drawbacks such as low throughput, enormous energy consumption and low scalability. Numerous enhancements of popular blockchain consensus protocols such as proof of work and proof of stake have led to the birth of alternative consensus protocols, some of which cater to specific areas such as medicine or transportation. However, these protocols remain relatively unknown despite having their own merits and lacks formal security analysis compared to the mainstream protocols. A reasonable amount of research has been done on these alternative protocols, one of which is a class of consensus protocols known as consensus protocols based on past behaviour (CPPB). However, these works do not include a security and performance analysis of this class of consensus protocols referred herein as CPPBs.

Breast Cancer Prognosis Prediction using Multimodal Deep Learning and Metaheuristic Optimization

Aminu Maigari

Supervisor: Dr. Zurinahni Zainol



Breast Cancer is a very aggressive type of cancer that is usually developed in breast cells. Despite significant advancements in the treatment of primary breast cancer over the last decade, an effective predictive model for breast cancer prediction is urgently needed. A successful predictive model can help to predict breast cancer correctly. This accurate prediction can have many advantages, such as early-stage cancer diagnosis, saving patients from unnecessary care, and associated medical expenses. Multimodal cancer data sets (gene expression, copy number alteration, and clinical) have become available in recent years. The latest advances in deep learning methods show that a model with multiple input data source modalities performs well compared to a model with a single input data source. This fact has been validated in some breast cancer prognosis and diagnosis research, which are based on multimodal data. However, these data on genomics and clinical outcomes from multiplatform and heterogeneous sources are used to make clinical decisions for cancer patients, where both multimodality and heterogeneity pose significant challenges to bioinformatics tools and algorithms. This study proposes Fireworks algorithms (FWA) to optimize Deep Neural Network (DNN) weights and biases to find the best global value to avoid backpropagation algorithm limitations (DNN-FWA). Subsequently, due to the high dimensionality of the data, the distribution of the class is highly skewed. In a deep learning case, the majority class ultimately controls the net gradient responsible for updating the weights of the model. The error of the majority group reduces very quickly during the early iteration, but also increases the error of the minority group and causes the network to be stuck in a slow convergence mode. In order to reduce the class imbalance and improve accuracy, cost-sensitive learning is proposed using the genetic algorithm (GA) to hybridize with DNN-FWA (DNN-FWA-GA). Furthermore, addressing the classification of heterogeneous data to find the final prediction is a challenge in a deep multimodal approach. Recently, one of the best works in the field apply score level fusion and manually process the coefficient to obtain the final prediction. Late fusion optimization is proposed using Fireworks Algorithms (FWA) to optimize scores obtained from multiple DNN classifiers to increase overall classification accuracy. The proposed methods will be evaluated on a Metabric dataset using various evaluation metrics. Finally, extensive comparisons will be conducted against well-known state-of-the-art methods.

Learning to Solve Dynamic Vehicle Routing Problem

Fung Chey
Supervisor: Dr. Wong Li Pei



Solving dynamic vehicle routing problem is important in real world application. Classical Operations Research (OR) techniques is fit to accomplish the task in smaller instance with some customization. Recently, machine learning techniques, such as deep reinforcement learning and graph neural network, obtained better result at specific condition compared to the OR techniques in static combinatorial optimization. This research is targeted to extend the work of these techniques into dynamic environment, with the expectation of these techniques will gain positive outcome compared OR techniques too. The experiment will start with in depth study of these techniques, followed by handling challenges during the adaption, and generalization across different variants. The proposed algorithm will be tested in both simulated dynamic environment as well as real world deployment in Automated Guided Vehicle (AGV).

Memory of Lifelong Machine Learning

Zhang Yanbing
Supervisor: Dr. Chan Huah Yong



The existing Machine learning or deep learning systems depend on huge volumes of data that has already been classified. So what are the AI disadvantage? The core differences in my view are all related. Consciousness, emotion, intent, continual learning and memory. Lifelong machine learning is our object. Consciousness, emotion, intention, logic thinking and memory are the components of lifelong learning. Machine memory is the foundation of lifelong machine learning. And that base stone of artificial intelligence in the future. All other advanced activities of artificial intelligence will be based on this memory system. This study adopts the integrated simulation method, including function, structure and behavior simulation method. According to logical simulation, it can well realize advanced artificial intelligence activities such as continuous learning and logical thinking and so on.

An Enhanced User Centered Privacy Policy Representations in Mobile Application

Auwal Shehu Ali

Supervisor: Dr. Zarul Fitri Zaaba



The rise in popularity of mobile apps especially during the pandemic (covid-19) has serious consequences for consumer privacy. Privacy policies of mobile apps are essentially function as an agreement between end users and mobile app service providers by default. Although, researchers have criticized privacy policies for being difficult to comprehend by end users and for not allowing any level of control over individual privacy. This is due to the fact that privacy policies are developed by service providers and are legalistic and technical in nature, guided by regulatory requirements instead of the ability of consumers to comprehend them. Although there has been research on the design of various alternative privacy policy representations, but user participation in the design of alternative privacy policy representations seems to have been minimal. This research is aim to enhance an efficient privacy policy representation by including the viewpoint of end users into the privacy policy design. An analysis of some apps privacy policy will be conducted and use the results to construct a reference model of privacy terms, which will then be used to investigate the privacy policy domain. Then, an early user study will be conducted in order to determine users' mental models, control needs, and representation preferences from the viewpoint of the end users. Then finally, the combination of these two outcomes will leads to the creation of an enhanced user-centered privacy policy representation, and the proposed privacy policy representation will be evaluated against the conventional privacy policy.

Formulation of Effective Features for Fake News Detection

Asma Sajid

Supervisor: Dr. Gan Keng Hoon



Information, when mishandled, intentionally or unintentionally, becomes misinformation and can sway the public away from the facts. This useful information can turn into a dangerous entity; become a cause of chaos, even a weapon to cloud the judgment of the masses, if it is not true or based on misleading data. These days, there is quite a deep penetration of fake news into our society. Much of the work has been done in fake news identification. For the last couple of years, this domain is facing novel challenges. Different kinds of data are being targeted to infuse fake content including news, social media posts, messaging applications, videos, and images. This research will focus on textual data. Each type of data comes with different challenges for the detection of fake information. To understand the connection between different types of datasets and the suitable techniques, this research aims to study various features that can be used to introduce more efficacy in forged or fake content detection.

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