Time Zone: GMT+8

SEAI 2023 | 2023 3rd IEEE International Conference on Software Engineering and Artificial Intelligence

IWPR 2023 | 2023 8th International Workshop on Pattern Recognition

Xiamen, China | June 16-18, 2023

Co-sponsored by

华侨大学 HUAQIAO UNIVERSITY

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Venue: 华侨大学陈延奎大楼

Address: 福建省厦门市集美区集美大道 806 号

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WELCOME MESSAGE

Dear all, we are delighted to welcome you to these conferences 2023 3rd IEEE International Conference on Software Engineering and Artificial Intelligence (SEAI 2023), along with 2023 8th International Workshop on Pattern Recognition (IWPR 2023) to be held in Xiamen, China during June 16-18, 2023, which is co-sponsored by IEEE and Huaqiao University, hosted by College of Computer Science and Technology, Huaqiao University, co-hosted by Minnan Normal University and Longyan University, supported by Faculty of Sciences and Technology, University of Coimbra, Colorado Technical University and Valdosta State University.

The objective of the conference is to provide a premium platform to bring together researchers, scientists, engineers, academics and graduate students to share up-to-date research results. We are confident that during this time you will get the theoretical grounding, practical knowledge, and personal contacts that will help you build a long term, profitable and sustainable communication among researchers and practitioners in the related scientific areas.

This year's program is composed of the keynote speeches delivered respectively by Prof. Mauro Barni (Fellow of IEEE, University of Siena, Italy), Prof. Grigoris Antoniou (Fellow of IEEE, University of Huddersfield, UK), Prof. Wei Xiang (La Trobe University, Australia), Prof. Bo Mao (Member of IEEE/ACM, Senior Member of the Chinese Computer Society (CCF), Xiamen University, China), Prof. Jianting Ning (Fujian Normal University, China), 5 technical parallel sessions including 1 on-site session and 4 online sessions. We would like to express our gratitude to all the speakers in these conferences. Special thanks to all of our committee members, all the reviewers, the attendees for your active participation and also thanks goes to our social partners The Academic.net and Iconf.org. We hope the conferences will be proved to be intellectually stimulating to us all. Finally, we wish you very successful conferences!

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GENERAL INFORMATION

A Conference Venue

华侨大学陈延奎大楼

福建省厦门市集美区集美大道 806 号

B On-site Registration

Registration desk→ Inform the staff of your paper ID→ Sign-in→ Claim your conference kit.

C Devices Provided by the Organizer

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

D Materials Provided by the Presenter

Oral Session: Slides (pptx or pdf version). Format 16:9 is preferred.

Presentation Language: English only.

E Duration of Each Presentation

Keynote Speech: 40min, including 5 min Q&A.

Oral Session: 15min, including 3 min Q&A.

F Notice

※ Please wear your delegate badge (name tag) for all the conference activities. Lending your badge to others is not allowed.

※ Please take good care of your valuables at any time during the conference. The conference organizer does not assume any responsibility for the loss of personal belongings of the participants during conference day.

G Zoom Meeting ID

	Room	Meeting ID	Link
zoom ✓ Zoom Download ✓ Zoom Background	A	891 7068 2704	https://us02web.zoom.us/j/89170682704
	B	838 7073 8826	https://us02web.zoom.us/j/83870738826

Note:

1. We recommend to install the Zoom platform beforehand. New users can login the Zoom meeting **without registration**.
   (Zoom 新用户可直接输入会议号参会，无需注册账号。)
2. Please set your display name before joining the online meeting. For instance,
   Author/Presenter: Paper ID_Name < PR001_Li Lei >
   Listener: Listener_Name < Listener_Li Lei >

AGENDA OVERVIEW

FRIDAY, JUNE 16, 2023	
13:30~17:00	On-site Registration (华侨大学陈延奎大楼 <1F> Lobby)
13:30~17:00	Zoom Test Session (Room A: 891 7068 2704, Link: https://us02web.zoom.us/j/89170682704)

Timetable of Zoom Test Session			
13:30~14:00	14:00~14:30	14:30~15:00	15:00~15:30
PR721	PR925	PR733	PR644
PR305	PR710	PR531	PR648
PR739	PR720	PR722	PR919
PR765	PR769	PR709	PR642
PR901	PR736	PR641	PR715
PR972	PR766	PR723	PR712
PR647	PR757	PR760	PR652
PR307	PR768	PR734	PR705
PR767	PR902	PR640	PR719
PR770	PR654	PR763	--------
PR655	--------	--------	--------
15:30~17:00	For other online participants, includes but not limited to keynote speakers, session chairs, committee members, listeners, etc.		

Presenters are required to join the rehearsal in Zoom on Friday, June 16. Duration: 2~3min apiece. Feel free to leave after you finish the test.

线上报告的参会人员需参加 6 月 16 号的 Zoom 测试以确保会议当天报告有序进行。每人大约需要 2~3 分钟，完成即可离线。

AGENDA OVERVIEW

SATURDAY, JUNE 17, 2023

华侨大学陈延奎大楼 <2F>

08:30~08:50 On-site Registration *For offline participant who is not able to sign in on the first day.*

Room 202 <2F> | Zoom A: 891 7068 2704

Chairperson:
Prof. Hui Tian (Local Organizing Chair & Associate Dean of College of Computer Science and Technology, Huaqiao University, China)

09:00~09:10 Opening Speech
Prof. Jin Gou (Conference General Chair & Dean of College of Computer Science and Technology, Huaqiao University, China)

09:10~09:50 Keynote Speech I
"Using Ai in the Diagnosis of Mental Health Conditions"
Prof. Grigoris Antoniou (Fellow of IEEE, University of Huddersfield, UK)

09:50~10:30 Keynote Speech II
"Research on Software-Hardware Co-Designed Storage in the AI Era"
Prof. Bo Mao (Member of IEEE/ACM, Senior Member of the Chinese Computer Society (CCF), Xiamen University, China)

10:30~10:50 Group Photo / Coffee Break (Open Space at 2F)

10:50~11:30 Keynote Speech III
"Hybrid Trust Multi-party Computation with Trusted Execution Environment"
Prof. Jianting Ning (Fujian Normal University, China)

11:30~12:10 Keynote Speech IV
"When Artificial Intelligence Meets the Internet of Things: Motivations, Challenges, and Applications"
Prof. Wei Xiang (La Trobe University, Australia)

12:10~13:30 Lunch Time (Room 208-209 <2F>)

13:30~14:10 Keynote Speech V
"DNN Watermarking: Opportunities, Challenges, Dos and Don'ts"
Prof. Mauro Barni (Fellow of IEEE, University of Siena, Italy)

Room 202 <2F>

14:10~15:40 **On-site Session (Part A):** Application of Artificial Intelligence Theory in Information System and Image Processing
PR918 PR302 PR650 PR704 PR729 PR974

15:40~16:00 Coffee Break (Open Space at 2F)

16:00~17:45 **On-site Session (Part B):** Application of Artificial Intelligence Theory in Information System and Image Processing
PR912 PR724 PR737 PR759 PR915 PR910 PR306-A

18:00~19:30 Dinner Time (Room 203 <2F>)

AGENDA OVERVIEW

Room A: 891 7068 2704 || Link: https://us02web.zoom.us/j/89170682704

14:10~16:55	**Online Session 1**: Digital Image Intelligent Analysis and Application PR721 PR305 PR739 PR765 PR901 PR972 PR647 PR307 PR767 PR770 PR655
17:00~19:30	**Online Session 3**: Machine Learning Theory and Algorithm PR733 PR531 PR722 PR709 PR641 PR723 PR760 PR734 PR640 PR763

Room B: 838 7073 8826 || Link: https://us02web.zoom.us/j/83870738826

14:10~16:40	**Online Session 2**: AI -based Intelligent Information System and Control Technology PR925 PR710 PR720 PR769 PR736 PR766 PR757 PR768 PR902 PR654
17:00~19:15	**Online Session 4**: Software Development and Programming PR644 PR648 PR919 PR642 PR715 PR712 PR652 PR705 PR719

Note: We will capture a group photo at the end of each session.

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Grigoris Antoniou, Fellow of IEEE

University of Huddersfield, UK

Using Ai in the Diagnosis of Mental Health Conditions

Abstract: This talk will cover work on using AI as a clinical decision support tool for mental health conditions, with a focus on adult ADHD and suicide risk assessment. This work was done collaboratively with a clinical unit of the UK's National Health Service (NHS), and has resulted in developing new technological solutions. From an AI perspective, the research is interesting because it had to address various requirements (in terms of accuracy and explainability) and because we are using a hybrid AI approach: a combination of a machine learning and a knowledge-based model. We will also touch upon the development of a disease-specific knowledge graph and its potential use in clinical decision making.

Grigoris Antoniou is Research Professor of AI at the University of Huddersfield, UK, and Vistting Professor at the L3S Research Centre in Germany. His research interests lie in semantic technologies, particularly knowledge representation and reasoning and semantics for big data, and its application to e-health and smart cities / IoT. He has published over 200 technical papers in scientific journals and conferences. He is author of three books with international publishers (MIT Press, Addison-Wesley); his book "A Semantic Web Primer" is internationally the standard textbook in the area, and has been translated to Japanese, Chinese, Korean, Spanish and Greek. His research has attracted over 12.000 citations. He is member of editorial boards of journals including Artificial Intelligence Journal, and has organised a number of conferences and workshops (including being PC Co-Chair of ESWC 2010 and General Chair of ESWC 2011). He is Fellow of IEEE, Fellow of the European Association for Artificial Intelligence and Fellow of the Asia-Pacific AI Association.

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Bo Mao, Member of IEEE/ACM, Senior Member of the Chinese Computer Society (CCF)

Xiamen University, China

Research on Software-Hardware Co-Designed Storage in the AI Era

Abstract: In the era of Artificial Intelligence (AI), there is an increasing demand for storage systems to deliver higher performance and efficiency. To address these requirements, research on software-hardware co-designed storage systems has become essential. This study aims to enhance the efficiency of storage systems through effective software-hardware co-design. At the software level, we investigate intelligent data deduplication techniques, and other approaches to reduce storage space utilization and improve storage efficiency. At the hardware level, our focus lies in innovations in intelligent storage devices. By integrating machine learning and AI technologies, storage devices and systems can dynamically optimize storage resource management based on workload characteristics. This optimization improves the efficiency of storage systems, enabling them to meet the growing demands of data processing and drive the development and AI applications.

Bo Mao is a professor in the School of Informatics at Xiamen University. He is a member of IEEE/ACM and a senior member of the Chinese Computer Society (CCF). His primary research focus lies in computer storage systems, including non-volatile memory, flash memory storage, data deduplication, key-value stores, and intelligent storage systems. Prof. Mao has published over 60 papers in the international conferences and journals such as FAST, HPCA, ICS, ICDCS, MSST, ICCD, IPDPS, and IEEE/ACM Transaction Journals. His research results were selected for DATE 2019 Best Paper Nomination. He currently serves as a member of the Technical Review Board and Reproducible Review Board for the IEEE Transactions on Parallel and Distributed Systems, and an associate editor of the International Journal of High Performance Computing and Network. He has served as the program co-chair of the 23rd ChinaSys conference, and participated in the organization and review of many international conferences and journals.

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Jianting Ning

Fujian Normal University, China

Hybrid Trust Multi-party Computation with Trusted Execution Environment

Abstract: Trusted execution environment (TEE) such as Intel SGX relies on hardware protection and can perform secure multi-party computation (MPC) much more efficiently than pure software solutions. However, multiple side-channel attacks have been discovered in current implementations, leading to various levels of trust among different parties. In an MPC scenario consisting of parties with different levels of trust, one could fall back to pure software solutions. In this talk, we study the above-mentioned scenario by proposing HYBRTC, a generic framework for evaluating a function in the hybrid trust manner. We give a security formalization in universal composability (UC) and introduce a new cryptographic model for the TEEs-like hardware, named multifaceted trusted hardware FTH, that captures various levels of trust perceived by different parties. To demonstrate the relevance of the hybrid setting, we give a distributed database scenario where a user completely or partially trusts different TEEs in protecting her distributed query, whereas multiple servers refuse to use TEE in protecting their sensitive databases. We further propose a maliciously secure protocol for a typical select-and-join query in the multiparty setting.

Jianting Ning received the Ph.D. degree from the Department of Computer Science and Engineering, Shanghai Jiao Tong University, in 2016. He is currently a Professor with the College of Computer and Cyber Security, Fujian Normal University, China. Previously, he was a Research Scientist at the School of Computing and Information Systems, Singapore Management University, and a Research Fellow at the Department of Computer Science, National University of Singapore. He has published papers in major conferences/journals, such as ACM CCS, NDSS, ESORICS, ACSAC, IEEE Transactions on Information Forensics and Security, and IEEE Transactions on Dependable and Secure Computing, and received the Best Paper Award from ESORCS 2020. His research interests include applied cryptography and information security. He has served as the program committee member in a number of international conferences, such as IEEE S&P 2021 Shadow PC, ESORICS 2020-2022 PC.

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Wei Xiang

La Trobe University, Australia

When Artificial Intelligence Meets the Internet of Things: Motivations, Challenges, and Applications

Abstract: Artificial Intelligence of Things (AIoT) is a newly emerging technology that combines IoT and AI technologies to enable decision making and analytics at IoT devices. IoT enables networks of physical objects that are equipped with sensors, software, and other technologies to exchange data with other devices and systems over the internet, while AI enables data analytics and automated decision making. This talk will start with the motivations of combining AI and IoT technologies as well as the associated challenges. Then Prof. Wei Xiang will talk about his experience in setting up Australia's first accredited IoT Engineering program at James Cook University, as well as establishing Australia's only industry-sponsored research centre that specialises in synergizing between AI and IoT technologies at La Trobe University. Before concluding the talk, Prof. Wei Xiang will talk about a wide range of applications and use cases his AIoT Centre has been working on in Australia.

Wei Xiang (S'00–M'04–SM'10) Professor Wei Xiang is Cisco Research Chair of AI and IoT and Director of the Cisco-La Trobe Centre for AI and IoT at La Trobe University. Previously, he was Foundation Chair and Head of Discipline of IoT Engineering at James Cook University, Cairns, Australia. Due to his instrumental leadership in establishing Australia's first accredited Internet of Things Engineering degree program, he was inducted into Pearcy Foundation's Hall of Fame in October 2018. He is an elected Fellow of the IET in UK and Engineers Australia. He received the TNQ Innovation Award in 2016, and Pearcey Entrepreneurship Award in 2017, and Engineers Australia Cairns Engineer of the Year in 2017. He was a co-recipient of four Best Paper Awards at WiSATS'2019, WCSP'2015, IEEE WCNC'2011, and ICWMC'2009. He has been awarded several prestigious fellowship titles. He was named a Queensland International Fellow (2010-2011) by the Queensland Government of Australia, an Endeavour Research Fellow (2012-2013) by the Commonwealth Government of Australia, a Smart Futures Fellow (2012-2015) by the Queensland Government of Australia, and a JSPS Invitational Fellow jointly by the Australian Academy of Science and Japanese Society for Promotion of Science (2014-2015). He was the Vice Chair of the IEEE Northern Australia Section from 2016-2020. He was an Editor for IEEE Communications Letters (2015-2017), and is currently an Associate Editor for IEEE Communications Surveys & Tutorials, IEEE Internet of Things Journal, IEEE Access, and Nature journal of Scientific Reports. He has published over 250 peer-reviewed papers including 3 books and 200 journal articles. He has severed in a large number of international conferences in the capacity of General Co-Chair, TPC Co-Chair, Symposium Chair, etc. His research interest includes the Internet of Things, wireless communications, machine learning for IoT data analytics, and computer vision.

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Mauro Barni, Fellow of IEEE

University of Siena, Italy

DNN Watermarking: Opportunities, Challenges, Dos and Don’ts

Abstract: Deep Neural Networks (DNNs) are the basis for the astonishing progress of Artificial Intelligence (AI). Such progresses, however, are hindered by a number of problems inherently linked to DNNs. Watermarking can provide a unified, solution to three of the most compelling problems of and raised by AI technology, namely: i) protection of the Intellectual Property Rights of DNN models, iii) authentication of DNNs for dependable AI, and iii) distinction between natural and AIgenerated content. Even if media watermarking is a well-established field with a solid theory and several practical solutions have developed over the past decades, its direct application to DNNs is not possible for the simple reason that DNNs are not static objects but functions defined by the way they map the input samples into the output space. This basic observation raises several challenges and opens a range of new opportunities that are going to fill the agenda of researchers for the next years. In this talk I will discuss the main similarities and dissimilarities between media and DNN watermarking, and present the main challenges ahead of DNN watermarking researchers, highlighting some possible solutions I have been working on in the last years. I will also point out some bad practices that negatively affected research in media watermarking and that should not be repeated in the case of DNNs.

Mauro Barni graduated in electronic engineering at the University of Florence in 1991. He received the PhD in Informatics and Telecommunications in October 1995. He has carried out his research activity for more than 20 years, first at the Department of Electronics and Telecommunication of the University of Florence, then at the Department of Information Engineering and Mathematics of the University of Siena where he works as full Professor. His activity focuses on digital image processing and information security, with particular reference to the application of image processing techniques to copyright protection (digital watermarking) and authentication of multimedia (multimedia forensics). He has been studying the possibility of processing signals that has been previously encrypted without decrypting them (signal processing in the encrypted domain – s.p.e.d.). Lately he has been working on theoretical and practical aspects of adversarial signal processing, adversarial machine learning and protection of IPR in AI by means of neural network watermarking.

From 2010 to 2011, Prof. Barni has been the chairman of the IEEE Information Forensic and Security Technical Committee (IFS-TC) of the IEEE Signal Processing Society. He has been a member of the IEEE Multimedia Signal Processing technical committee and of the conference board of the IEEE Signal Processing Society. Mauro Barni is a fellow member of the IEEE, fellow member of AAIA (Asia-Pacific Artificial Intelligence Association) and senior member of EURASIP. He was appointed distinguished lecturer by the IEEE Signal Processing Society for the years 2013-2014. He has been the chairman of the Italian chapter of the IEEE Signal Processing Society from 2018 to 2021.

ON-SITE SESSION

SATURDAY, June 17, 2023
On-site Session: Application of Artificial Intelligence Theory in Information System and Image Processing
Chairperson: Asst. Prof. Liyuan Liu, Saint Joseph's University, USA

Room 202 <2F>
会议室 202

Part-A	
14:10-14:25 PR918	A Novel Binary Classification Algorithm for Carpal Tunnel Syndrome Detection Using LSTM Feng Gu, College of Staten Island, City Universtiy of New York, USA Abstract-Carpal tunnel syndrome (CTS) is one of the common neurological disorders caused by prolonged compression of the median nerve. Thus, CTS patients' daily tasks are significantly affected. Traditional diagnostic methods are invasive or subjective, causing pain or inaccuracy. Therefore, a more accurate machine/deep learning classifier is needed to provide an accessible assessment approach that can help screen out early-stage patients to prevent further deterioration. Behavioral biomechanics has shown great potential to be used for CTS and its severity classification. The biomechanical parameters are collected when identified patients and healthy individuals perform daily life activities, such as grasping and lifting in a controlled manner. Facing the challenges of time series biomechanical data with small sample sizes and high dimensions, we propose a novel classification algorithm to create an ensemble model for CTS detection using Long Short-Term Memory (LSTM). The proposed algorithm achieves 93% accuracy on average for CTS detection using biomechanical data of daily life activities.
14:25~14:40 PR302	Quantitative Assessment of Head Impulse Test using Stewart Platform Jinyang Li, Xiamen University Tan Kah Kee College, China Abstract-The head impulse test (HIT) has been widely used in the assessment of patients with vestibular deficits. However, the objectively quantified head impulse device has not been used in HIT yet. This study evaluates the Stewart platform through two test impulse commands that satisfied the angular velocity criteria of horizontal head impulse motion and measure the angular velocity response of platform by using IMU. The results showed the proposed Stewart platform satisfies the minimum peak velocity criteria (50 ° /s) of manual head impulse motion. The evaluations prove that the 6-DOF Stewart platform has the potential to be an objective head impulse device in HIT.
14:40~14:55 PR650	MVPD: A Multimodal Video Physiology Database for rPPG Jiahe Peng, Hebei University of Technology, China Abstract-During the era of rapid development in the field of computer vision, camera sensors have been applied to a variety of scenarios, able to capture states and movement changes of objects, and even observe nuances in the real world that are invisible to human eyes. Remote photoplethysmography (rPPG) is a camera-based non-contact sensor method for monitoring physiological signs. In recent years, there are few datasets for rPPG and most of them are only for a few physiological parameters, such as photoplethysmography (PPG), heart rate (HR) and Peripheral oxygen saturation (SpO2). For studying more vital signs and learnable parameters, we propose the Multimodal Video Physiology Database (MVPD) containing 13 videos and physiological information from 13 volunteers. We use cameras to collect videos of faces, palms, wrists and fingertip, and physiological sign parameters, such as electrocardiogram (ECG), Respiratory rate (RR), skin temperature (ST), PPG, pulse rate (PR), blood pressure (BP), and SpO2. This database is mainly used for studying rPPG.
14:55~15:10 PR704	WeatherPon: A Weather and Machine Learning-based Coupon Recommendation Mechanism in Digital Marketing Liyuan Liu, Saint Joseph's University, USA Abstract-Machine learning has become an innovative technology tool to improve coupon recommendation systems in digital marketing. Users' information, coupon content, and

	customers' shopping history are the main factors to predict revenues, resolve promotions, and adjust distribution in past coupon recommendation models. However, weather is a critical factor that can affect human activities in daily life but has barely been awarded in previous studies. Many studies observed that weather change could impact human mood, behavior, and economics. Therefore, we proposed a weather and machine learning-based coupon recommendation mechanism named " WeatherPon. " We employ real-time weather data to optimize coupon recommendation systems. Considering the non-linear relationship and multiple uncertainties, we utilize the deep neural networks and use Shapley Value to interpret the black-box model. The WeatherPon is a coupon recommendation mechanism not only improves accuracy but also helps enterprises achieve automated marketing solutions in real-time.
15:10~15:25 PR729	Research on License Plate Recognition Algorithm Based on YOLOv5 and LPRNet Xianjing Xiao, Xiamen University of Technology, China Abstract-The traditional license plate recognition (LPR) algorithm is susceptible to the photo-taking conditions such as the weather, illumination and angle. Thus, the deep learning method is introduced to solve this problem. Using YOLOv5 to locate license plates can reduce environmental interference and improve location accuracy. The obtained license plate area is corrected through perspective transformation and then as an input of LPRNet. LPRNet can be used to identify characters without character segmentation, so the disruption of the border is avoided. In this method, we use Multi-Scale Retinex with Color Restore (MSRCR) to enhance pictures. Finally, end-to-end license plate recognition is realized by connecting YOLOv5 and LPRNet models in series. The experimental results show that the accurate localization rate reaches 99.5% with the Intersection over Union (IoU) of 0.5 after image enhancement. The recognition accuracy of characters is 96%. Compared to traditional LPR methods, our method improves the accuracy of license plate location and can directly recognize characters without segmentation.
15:25~15:40 PR974	A kind of Paradigm-based Software Cost Estimation Method using LSTM-CRF Xiaolu Zhu, North China Institute of Computing Technology, China Abstract-Software cost estimate is important not only to project plan but also to software budgeting. Although more and more modules and methods are presented, it seems that Artificial Intelligence is the only way to form relative precise solution. In this paper , we focus on Nesma, a kind of popular Function Point Measurement, and present 5 main paradigms to define heuristic rules, to split software into two layers, which are Pricing Objects and Measuring Objects, for precise mapping for ILF, EIF, EI, EQ, EO. Moreover, after large scale information projects are set as training sets, we use paradigms to improve performance of original LSTM-CRF. It is illustrated that paradigms-based LSTM-CRF has achieved significant results in terms of controlling the increase in accurate and precision rate while improving performance, however, it is obvious that recall rate remain high. Compared with experts manual auditing results, quantity and quality of the training samples and manually labeled texts are still need to be improved.

Part-B	
16:00~16:15 PR912	Promption Pre-service Teachers' AI-supported Application Self-efficacy Chun-Mei Chou, National Yunlin University of Science and Technology, Taiwan Abstract-This study explores pre-service teachers' AI-supported application of self-efficacy. Sixty-eight pre-service teachers (experimental group N=34; control group N=34) have completed the teacher training program and are in the educational practice program. This study develops an AI-supported application of self-efficacy scale that included four factors of technology acceptance, innovation expectations, AI usability, and AI usefulness. The study results indicate that the AI-supported application of self-efficacy programs significantly affect pre-service teachers' technology acceptance, innovation expectations, AI usability, and AI usefulness.

16:15~16:30 PR724	Similarity-based Shield Adaptation under Dynamic Environment Prasanth Senthilvelan, Waseda University, Japan Abstract-In this paper, we present an efficient design of a shield called Parameterized Shield which allows for easy modification of its requirement parameters in response to the changes in the environment instead of manually making many shields during the development time and changing the whole shield during runtime. We propose to generate one proper shield that has many requirement parameters where even when there is any complex situation, there is not any need for extra effort from engineers to develop additional requirements and prepare the shield but only the parameters need to be changed when there is a change in the environment which avoids choosing a whole new shield every time an environment change occurs during runtime. And similarity-based adaptation will be used to choose the right parameters for the shield according to the environment with the help of the MAPE-K loop framework and reinforcement learning and to give the appropriate policy for the agent to act according to that environment. We will demonstrate using a cleaning robot as an example.
16:30~16:45 PR737	Meta-heuristics for Solving Curve Fitting Problems in Optical-Diffraction Based Image Depth Reconstruction Qianyao Zhu, Macau University of Science and Technology, Macau, China Abstract-This paper investigates use meta-heuristic to solve curve fitting problems in Optical-Diffraction Based Image Depth Reconstruction. We aim to accurately establish a relationship curve between object distance and diffraction blur kernel through discrete data points. A mathematical model is first developed to formulate the concerned problems. Then, four meta-heuristic algorithms, particle swarm optimization, artificial bee colony, genetic algorithm and differential evolution, are employed and improved according to the problem’s feature. Finally, experiments are executed on a data set. A comparison of the similarity of the least squares method verifies the feasibility of meta-heuristics for solving curve fitting problems. Among the four meta-heuristics, differential evolution algorithm has the best competitiveness.
16:45~17:00 PR759	Sea-Surface Target Detection Based on Neural Network Prediction Jingtao Zeng, Nanjing Research Institute of Electronics Technology, China Abstract-In this paper, we use the theory of phase space reconstruction to calculates the parameters required for phase space reconstruction, and employ the powerful nonlinear fitting ability of neural network to approximate the nonlinear dynamical equation of reconstructed chaotic systems, achieving nonlinear prediction of sea clutter. We introduce the genetic optimization algorithm to initialize the network weights of BP and WNN network, and utilize multiple sets of IPIX radar data sets to experimentally verify the network model. Comparing prediction errors and target unit detection of the two, the results show that sea clutter prediction model based on neural network method can effectively detect sea surface targets in different sea conditions, with good prediction ability and generalizability. Meanwhile, the improved WNN network improves the detection performance by at least 6% compared to the BP network.
17:00~17:15 PR915	A Methodology of Face Validation with Domain Experts for Agent-Based Crime Risk Prediction Feng Gu, The Graduate Center, The City University of New York, USA Abstract-In modeling and simulation, face validation with domain experts is a recommended validation technique applied after implementing the conceptual model. Experts can offer early feedback on the prediction results. Experts’ empirical experiences can identify mistakes in the conceptual model and help estimate initial values of key parameters to save time for later calibrations. This work proposes a three-phase method to conduct face validation with police investigators and crime analysts to validate an agent-based crime risk prediction model. The three phases focus on verifying the prediction results, the behavioral design of target individuals, and the risk estimation process respectively. We present each phase’s goals, details, and types of validity addressed to provide clear guidance on adopting the method. Quantitative results of the feedback have shown that our face validation improves the correctness of the conceptual model and boosts intended users’ confidence in the model results. Our work also provides additional empirical experiences in urban crime prediction. The experimental results show the potential of the proposed

	method for validating other software systems with domain experts' knowledge.
17:15~17:30 PR910	Confrontation Game in Complex Networks Based on Intuitionistic Fuzzy Set Jiaqi Ren, National University of Defense Technology, China Abstract-Critical infrastructures are essential to modern society, but they are often vulnerable to attacks. Numerous game models have been proposed to analyze the confrontation between attacker and defender of critical infrastructures. However, few of them consider the ambiguity and uncertainty that exist in reality. In this paper, we employ two-persons and zero-sum matrix game with intuitionistic fuzzy set and provide a method for generating intuitionistic fuzzy payoff matrix using hyperbolic membership/non-membership functions. Subsequently, an efficient algorithm is adopted to obtain the Nash equilibrium solution in the case of intuitionistic fuzzy conditions. The efficacy of the game model based on the intuitionistic fuzzy set is authenticated.
17:30~17:45 PR306-A	The Right and Wrong Image Classification Evaluation for ML Model's Reproducibility Guofan Shao, Purdue University, USA Abstract-Machine learning (ML) is a widely used technique for image classification and segmentation, but ensuring the reproducibility of ML results is a significant concern. While many factors contribute to the reproducibility of ML models, the importance of classification evaluation is often overlooked. In particular, the variability in ML performance, as measured by evaluation metrics, reflects the reproducibility of image classification. However, most routine validation and testing metrics are highly sensitive to class imbalance, which can compromise the reproducibility of ML models. To strengthen the reproducibility of ML models for image classification, it is essential to use class imbalance-resistant evaluation metrics such as the area under the precision-recall curve, balanced accuracy, and image classification efficacy. By adopting these evaluation metrics, issues related to rare class handling during ML model training can be minimized. This approach can be applied in various fields, including medical imaging and earth observation, to ensure dependable ML applications in real-world image classifications.

ONLINE SESSION 1

SATURDAY, JUNE 17, 2023 Room A: 891 7068 2704

Online Session 1: Digital Image Intelligent Analysis and Application

Chairperson: Dr. Long H. Ngo, SMILE France, France

14:10~14:25 PR721	Learning Method to Detect Anomalies in Sewer Pipe Images Using Object Detection Tomomi Ogawa, Tokyo Denki University, Japan Abstract-Object detection has have been used in a wide range of fields, e.g., manufacturing, construction, and medicine. In this study, we investigated the possibility of applying an object detection method to the sewer pipe inspection task. Currently, many sewer pipes are aging, and there is a shortage of personnel and funding for maintenance work. To address this problem, a system is required to automatically detect sewer pipe anomalies. In a previous study, we classified 15 types of sewer pipe anomalies from a total of 58 types, and we trained using the YOLOv5 object detection method, resulting in an overall accuracy rate of 60%. However, higher accuracy is required for practical application. Thus, in this study, we optimized the YOLOv5 learning process by dividing the sewer pipe images into direct-view and side-view images and by the types of pipes, and we achieved an overall accuracy rate of 70.2% on images categorized according to the types of pipes.
14:25~14:40 PR305	Research on Acquisition and Processing Method for Extravehicular Panoramic Images of Manned Spacecraft Yue Yu, Beijing Institute of Spacecraft Environment Engineering, Beijing, China Abstract-Compared to the discrete image recording method during the assembly process of manned spacecraft, panoramic imaging technology has the advantages of high resolution and wide viewing angle. However, the application of traditional panoramic image acquisition and processing methods in the image recording during the assembly process of manned spacecraft can lead to issues such as low coverage of extravehicular panoramic images and insufficient image registration accuracy. According to the structural characteristics of manned spacecraft, this paper proposes a method for acquiring and processing extravehicular panoramic images of manned spacecraft, designs a layout scheme of extravehicular panoramic images, develops a control-by-wire panoramic pan-tilt-zoom(PTZ) system, and proposes an image registration algorithm based on perceptual hash matching point purification. The perceptual hash matching point purification method proposed in this paper calculates the similarity of small area images around two matching points based on hash fingerprints, and removes matching point pairs that are less than the set threshold.The method proposed in this paper meets the remote acquisition requirements of extravehicular manned spacecraft above 15 meters, ensuring complete coverage of extravehicular panoramic images, and improving the quality of panoramic images.
14:40~14:55 PR739	A New Convolutional Neural Network Architecture for Mars Landmarks Classification based on MobileNetV2 Runpeng Xia, The University of Tokyo, Japan Abstract-Convolutional neural networks have achieved outstanding state-of-the-art performance in many mainstream application scenarios. However, its application in niche but critical fields such as planetary science requires more exploration. Among those specific application scenarios, the Mars landmark classification is one of the ongoing tasks. While, due to issues with some in-use neural network architectures such as inadequate accuracy and excessively large size, this task has yet to be effectively fulfilled. To address these challenges, we proposed a new network architecture based on MobileNetV2 by introducing non-local operations and DropBlock. Also, with the help of label smoothing and transfer learning, the accuracy of our new proposed network architecture can achieve 93.64%, which outperforms several in-use models including VGG-16, original MobileNetV2, ResNet-34 and HiRISENet.

14:55~15:10 PR765	Metasurface Holographic Imaging Based on Three-nanopore Cuiping Zhang, Changchun University of Science and Technology, China Abstract-Holographic imaging is a technique to record the amplitude and phase information of the reflected and transmitted light waves of an object by using the diffraction principle, to further reproduce the real three-dimensional image of an object. Because of its outstanding performance in information storage, it has attracted wide attention. Due to its excellent design flexibility, metasurface can flexibly control electromagnetic waves' phase, amplitude, wavelength, and polarization by designing its geometric parameters or arrangement. The research directions of holographic metasurface mainly include improving the image quality, energy utilization efficiency, and light fractional wave condition. In this paper, the imaging principle of the holographic metasurface is first introduced. A composite metasurface composed of three elliptic nanomoles is designed, wavelength multiplexing metasurface is simulated by an electromagnetic field, and holographic reproduction is realized. Finally, the quality of the imaging results was evaluated and optimized.
15:10~15:25 PR901	Moving Object Detection Based on Improved Gaussian Mixture Model and Three-frame Difference Xiaowei Lv, Shenyang Jianzhu University, China Abstract-The proposed algorithm is based on an improved Gaussian Mixture Model (GMM) and a combination of three-frame difference for addressing the issue of low detection accuracy in complex backgrounds such as abnormal closure of doors, suspended objects, and unauthorized personnel intrusion. Firstly, the improved three-frame difference method can rapidly distinguish between background and targets in the video, and it can also address illumination changes. Furthermore, the algorithm incorporates adaptive selection and background updating strategies into the Gaussian Mixture Model (GMM), which significantly improves modeling efficiency and accelerates the elimination of "ghosting" artifacts. Lastly, morphological operations are applied to the results to obtain moving objects, and the performance of the algorithm is validated through comparative experiments with simulations. The experimental results demonstrate that the proposed algorithm can effectively detect moving objects in complex environments with high accuracy.
15:25~15:40 PR972	Semi-Automated Image Annotation for Cannabis Seed Gender Detection Model Prachya Boonsri, Chulalongkorn University, Thailand Abstract-Many areas such as industrial, academic and medical have turned attention to the value and market opportunities that use cannabis as the new mixture. Due to the potential of its compounds, cannabis has become an economically viable plant. Many growers in Thailand are turning to cannabis as one of the yield crops and probably an alternative economically crop. The growers generally buy regular seeds for planting outdoor, resulting in the mix of growing up to male and female plants. The fact that only female cannabis plants are preferred as they provide valuable cannabinoid-rich flowers to harvest. Therefore, automated screening the gender of cannabis seeds upfront prior to plant could help lower waste and increase profitability. Agri-technology such as computer vision has played an important role in agriculture. Object detection models would facilitate sorting out female from male seeds. However, dataset annotation is resource consumption. This paper thus presents an approach of semi-automated image annotation as part of the YOLOv5 object detection model for gender screening of cannabis seeds. The preliminary result is promising. Compared to the model using manual annotation, the model using the proposed semi-automated annotation achieved comparable performance, and reduced half of the time spent on dataset annotation.

15:40~15:55 PR647	DenseNet-SALD: A Lightweight Diseases And Pests Spatial Attention Classification Model Longqiu Chen, Tianjin Agricultural University, China Abstract-Leaf diseases and pests significantly impact crop yields, making it crucial to rapidly and accurately identify plant foliar diseases and implement appropriate control measures. We present a novel DenseNet-SALD-based model for identifying maize diseases and pests to improve classification performance. The proposed model was trained on a balanced dataset, incorporating an attention mechanism, Leaky ReLU activation function, and Dropout regularization to enhance its classification accuracy. The experimental results demonstrate that the proposed model outperforms conventional convolutional neural network models, such as DenseNet and AlexNet, achieving an accuracy of 85.96% and 99.06% for diseases and pests testing, respectively, meeting the primary pests recognition needs. This research provides valuable insights into the application of attention mechanisms in deep learning models for image recognition tasks, which could have potential implications for advancing the classification of corn leaf diseases and pests images.
15:55~16:10 PR307	A YOLOX-CBAF Algorithm for Traffic Sign Detection Zhanxin Sun, Nanchang Institute of Technology, China Abstract-Traffic sign detection plays a crucial role in autonomous driving tasks. However, in practical applications, the accuracy and real-time performance of general object detection algorithms are often compromised by factors such as scene variations, distance changes, and lighting conditions. To address these challenges, this paper proposes a YOLOX-CBAF algorithm. To improve the detection performance of small traffic sign targets, we propose the CBAM-PIM module, which enhances the channel attention part of the CBAM module. Instead of the original adaptive average pooling layer with forced dimension reduction, different direction pooling layer modules are used to effectively establish the correlation of channel attention modules with features in different directions, thus strengthening the channel representation ability. To address the issue of poor detection performance in complex backgrounds, we propose the ASFF-Dconv module, which replaces the nearest-neighbor interpolation operator in the sampling part of ASFF with a depth-wise separable transpose convolution module. We use a learnable sampling structure to enhance the network's ability to extract edge information, and use a large convolution kernel's depth-wise separable structure to reduce the computational complexity of transpose convolution and avoid the aliasing effect. This effectively solves the impact of complex backgrounds on traffic sign detection accuracy. Experimental results show that the proposed algorithm effectively addresses the challenges of detecting small targets and complex backgrounds, and improves the mean average precision (mAP0.5) by 4.33% compared to the YOLOX-tiny algorithm.
16:10~16:25 PR767	Quantitative Analysis of Facial Paralysis Based on TCM Acupuncture Point Identification Keding Huang, Sichuan University, China Abstract-Traditional methods for recognizing facial palsy suffer from factors such as reliance on professional doctors and high subjectivity. Existing intelligent methods for detecting facial palsy mainly extract facial features and base their judgments on face asymmetry, but they cannot perform quantitative analysis of the degree of facial palsy. To address these limitations, we propose a novel approach to diagnose and quantitatively analyze facial palsy based on facial acupuncture point recognition.Our method involves identifying three sets of acupuncture points related to facial palsy by accessing an improved Resnet model after detecting, cropping, and pre-processing the input image. We then measure the intersection angle of the line connecting these points and the vertical line of the middle symmetry line of the face to achieve quantitative analysis and grading of the degree of facial nerve damage.The aim of our proposed model is to quantify and grade the degree of facial nerve damage. We compared our model with VGG and MobileNet frameworks, and the experimental results demonstrate that our proposed model is effective in acupoint recognition and has the lowest error in quantitative analysis, and the average angle error can be reduced to 4.5 degrees. By using facial acupuncture point recognition to diagnose and grade facial palsy, our method provides a more objective and accurate approach to assessing this condition.

16:25~16:40 PR770	Towards Accurate Stress Classification: Combining Advanced Feature Selection and Deep Learning Lovish Arya, Delhi Technological University, India Abstract-Stress is a significant health issue that affect both physical and mental health. The application of deep learning and machine learning techniques for physiological signal processing has become popular in detecting and classifying stress. In this research, we developed a fresh approach to classify stress on multiple levels using advanced machine and deep learning models. The PhysioNet SRA database was used to collect physiological signals which were pre-processed using a pipeline of filters and normalisation techniques to remove noise and artefacts. These signals were subjected to various feature extraction algorithms to determine the most pertinent characteristics for categorisation. On the acquired features, dimensionality reduction techniques were applied in order to further improve classification performance. The evaluation the Random Forest model outscored all the other classic ML models, achieving an accuracy of 93.77% and 82.42% in classifying stress on two levels and three levels respectively. Among the DL models, the LSTM model is most effective., achieving an accuracy of 95.67% and 88.70% in classifying stress on two levels and three levels respectively. The proposed approach provides a more comprehensive analysis of stress levels, which can help individuals manage stress more effectively.
16:40~16:55 PR655	Relative Positioning of Multiple Robots Based on Panoramic Vision Fangmin Zhu, Anhui University of Technology, China Abstract-This paper focuses on the problem of multi-robot localization based on vision systems. Between two localization methods, relative and absolute localization, the relative localization method is chosen to obtain robot position information. The paper uses a panoramic vision system to capture the color ring image information on the robot, and carries out feature point categorization based on an improved K-means clustering algorithm. As the pixel point values are not the actual target body distance values, it is necessary to obtain robot coordinate information by converting between the color ring pixel values and the real distance values. The paper concludes with a pilot-follower formation experiment to verify the effectiveness and the paper concludes with a pilot-follower formation experiment to verify the effectiveness and feasibility of this paper's positioning method.

ONLINE SESSION 2

SATURDAY, JUNE 17, 2023 Room B: 838 7073 8826

Online Session 2: AI -based Intelligent Information System and Control Technology

Chairperson:Dr. Muhammad Imran Babar, National University of Computer and Emerging Sciences, Pakistan

14:10~14:25 PR925	Inverse Kinematics Analysis of 5-DOF Cooperative Robot Based on Long Short-term Memory Network Songtao Wang, Nanchang Institute of Technology, China Abstract-To solve the problems of lengthy computation times and slow path searches for the 5-DOF cooperative robot, an algorithm based on the long short-term memory network (LSTM) is proposed in this paper. Firstly, the forward and inverse analytical kinematics models of the 5-DOF cooperative robot are established based on the physical structure. Secondly, the forward and inverse kinematic models are verified by the Matlab robot toolbox. Then, a large amount data of the joints and the corresponding pose data are obtained by the analysis of the kinematics robot. Finally, the algorithm based on the LSTM network is established by training the data of the joints and poses. Compared with the traditional analytical method, the algorithm based on the LSTM network is more efficient and satisfies the demands of real-time computing.
14:25~14:40 PR710	A Node Importance Assessment Method for Complex Networks Based on the Neighborhood Influence Yuhao Liu, North China Electric Power University, China Abstract-Accurately assessing the contribution of neighbor nodes is of utmost importance for the evaluation of node importance. To further quantify the contribution of neighbor nodes to node importance, a node importance evaluation method based on the contribution refinement of multi-order neighbor node importance is constructed. This method comprehensively considers the independence and difference between same order neighbor nodes and utilizes the propagation mechanism of neighbor nodes' contributions. Then five real networks with different categories and structures are selected for propagation simulation experiments. The results show that the proposed algorithm has a higher ability to describe the node importance and identify the critical nodes in the network compared with the traditional metrics such as degree centrality, betweenness centrality, closeness centrality, and PageRank.
14:40~14:55 PR720	Highlight Generation Method for Game Commentary using Acoustic Features Taiki Yoshida, Tokyo Denki University, Japan Abstract-Viewers can easily grasp the main points of numerous videos in a short time using a video summary. Considerable research has been conducted on different video contents such as sports, news, and dramas based on genre-specific acoustic and image features. This paper proposes a method that focuses on the acoustic features of game videos intending to generate video summaries, particularly for game commentary videos. The first step of the proposed method is to define the scene to be extracted. Because the video data handled in this paper involve a game commentary video, the target scene to be extracted is the occurrence of an important event in the game. Next, an acoustic analysis of the video recording of the game commentary is conducted. After extracting the sound pressure from the video, the sound pressure level transition is determined to detect particularly exciting scenes. The summary results verify that the obtained scenes are at the target event occurrence and show the efficiency of the proposed method.
14:55~15:10 PR769	Underwater Wall-climbing Inspection ROV Scheme Design and Flow Resistance Simulation Based on BlueROV2 Modification Zhe Zeng, Navy Submarine Academy, China Abstract-The condition monitoring of underwater components of ships is an important means to

	ensure the safe navigation of ships. To address the problems of the current portable small underwater ROVs (Remotely Operated Vehicle) such as weak resistance to flow and difficult operation, based on the BlueROV2 HEAVY, an underwater ROV, this paper adds a tracked wall-climbing and barrier-crossing chassis to give it the ability to crawl on the underwater parts of the hull of ship. Simulation of the flow resistance of the modified wall-climbing ROV by ANSYS CFD software showed that: The modified underwater wall-climbing ROV not only has all the motion characteristics of the original BlueROV2 HEAVY, but also has good resistance to flow and can crawl steadily on the surface of the ship's submerged hull to achieve rapid underwater inspection of the submerged parts of the hull of ship.
15:10~15:25 PR736	A Low Latency Routing for Telematics Combined with Image Semantic Communication Zhiming Xu, Guangzhou Xinhua University, China Abstract-Vehicle networking enables real-time, efficient and stable transmission of massive data for various intelligent transportation applications, such as autonomous driving, intelligent intersection management, emergency message broadcasting, etc. However, vehicle networking faces severe challenges in network performance and reliability due to factors such as high-speed mobility of vehicles, dynamic changes of network topology structure, etc. This paper proposes a low-latency routing method for vehicle networking based on image semantic communication, aiming to solve the high latency problem of image data transmission in vehicle networking. For routing planning, this method considers factors such as distance measurement between vehicle nodes, packet loss probability of candidate nodes, residual energy measurement of candidate nodes, current load measurement of candidate nodes, etc. to comprehensively select routing nodes, thereby reducing transmission latency. This method also adopts semantic communication method to transform image data into semantic data and compresses semantic data, thereby further reducing the data volume to be sent by the source vehicle and achieving the purpose of shortening the total data transmission time.
15:25~15:40 PR766	Comparative Study of Seq2Seq and Transformer Model for Chat Bot Abhishek Kumar Singh, Delhi Technological University, India Abstract-Today, every company relies on technology for the effective delivery of services and the optimal use of technical resources. With the increasing adoption of AI based technologies in company operations worldwide, including India, the global Chatbot market will grow rapidly in the coming years. Chatbot technology has gained widespread acceptance in recent years, especially in the food delivery, finance, and e-commerce industries. Chatbots are computer programs that can answer questions posed by humans, and they are accessible anytime, providing quick and efficient communication with thousands of people simultaneously. Chatbots are becoming increasingly popular in human-machine interactions due to their ability to provide information without requiring time-consuming searches. In this paper, we will compare the methodologies, underlying algorithms, accuracy, and constraints of the various models for chat bots. Models compared in this study are Seq2seq Model with Attention Mechanism and Transformer. The result shows that the transformer model requires less number of iterations (epochs) to train than seq2seq model. Compared to LSTM networks, training transformer networks is easier due to the smaller number of parameters involved and Transformer network is faster than RNN based models.

15:40~15:55 PR757	Wordle Results Distribution Prediction Model and Difficulty Classification Model Using Word Linguistic Properties Zhuo Yang, Northeastern University, China Abstract-Wordle is a word guessing game offered daily by the New York Times. The aim of our study is to use selected word linguistic properties to predict the percentage of successfully guessing a word in one to six tries or failing and classify words by difficulty. A prediction model was established based on stepwise linear regression and normal distribution probability density function (PDF). The percentages of a word were predicted using stepwise linear regression. The Jarque Bera test using MATLAB function indicated that 97.5% of word attempt distributions followed a corresponding normal distribution. Thus, these seven percentages were used as independent variables to predict the mean and variance of the corresponding normal distribution. The PDF was then obtained to correct percentages. Additionally, a word classification model was also established based on K-Means and support vector machines (SVM) to classify words by difficulty. The elbow method was used to divide words into two categories. The classification model was trained based on SVM. The prediction results showed that the sum of predicted percentages for each word fell between 99 and 101, which was superior to performing a single stepwise linear regression. The average root mean square error per word was 3.22. The classification model results showed that, based on 5-fold cross validation, area under curve, accuracy, recall and precision were 0.83, 77.1%, 75.16% and 73.72%, respectively, indicating the reliability of our method.
15:55~16:10 PR768	Research in Blockchain-based Manufacturing Supply Chain Alex Kibet Langat, Nanjing University of Aeronautics and Astronautics, China Abstract-This paper proposes an innovative approach for enhancing the efficiency and security of manufacturing supply chains by integrating the Internet of Things, blockchain technology, and genetic algorithm-based consensus mechanism. The IoT devices are employed to monitor and collect real-time data from various stages of the supply chain, ensuring transparency and traceability. The blockchain technology is utilized to store and secure the collected data, enabling immutable and decentralized data management. To achieve consensus in the Blockchain network, a GA-based consensus algorithm is introduced, which optimizes the routing and allocation of resources in the supply chain. The GA considers factors such as distance, capacity, and demand to minimize transportation costs and maximize resource utilization. Experimental results demonstrate that the proposed approach significantly improves the efficiency and reliability of the manufacturing supply chain, reducing operational costs and enhancing customer satisfaction. This research contributes to the development of intelligent and trustworthy supply chain systems by leveraging the synergies among IoT, blockchain, and GA-based consensus mechanisms.
16:10~16:25 PR902	Script2Graph: Auto-construct Screenplay Text World by Mining Contextual Information Depei Wang, Guangdong University of Technology, China Abstract-With the rapid development of artificial intelligence and the continuous emergence of innovative technologies, its application in movie scenes has gained attention. Meanwhile, the application of natural language processing techniques in movie scripts has gradually attracted the attention of researchers, making text information extraction more intelligent and convenient. However, most of the previous works for unstructured script processing ignore the theoretical guidance of computational language and lack the framework of knowledge schema. Therefore, we propose Script2Graph method based on text world theory to solve unstructured text information extraction and knowledge organization, and realize the automatic construction of script text world. Our experiments demonstrate that the method is effective in extracting text world elements and using high-quality information in downstream applications.
16:25~16:40 PR654	Simulation Study of Vector Control of Permanent Magnet Synchronous Motor with Fuzzy PI Controller Yunfeng Zou, Jingchu University of Technology, China Abstract-There are several drawbacks to the traditional proportional-integral (PI) control of permanent magnet synchronous motors (PMSM), including its poor flexibility and heightened

	sensitivity to outside disturbances. To solve these problems, this paper uses a fuzzy PI controllers to augment the PMSM vector control model. Firstly, based on the mathematical model, the corresponding PI controller is established; on this basis, the fuzzy rules are used to adjust the parameters of the PI controller in real time for the defect that the parameters of the PI controller cannot be automatically adjusted in real time operation of the motor, which leads to poor dynamic characteristics. When compared to regular PI controllers, these fuzzy PI controllers improve the system's anti-disturbance performance and control precision.

ONLINE SESSION 3

SATURDAY, JUNE 17, 2023 Room A: 891 7068 2704

Online Session 3: Machine Learning Theory and Algorithm

Chairperson: Dr. Mohd Aliff Afira Bin Hj. Sani, Universiti Kuala Lumpur, Malaysia

17:00~17:15 PR733	Prediction of Seismic Performance Level of Reinforced Concrete Building Based on Structural and Seismic Parameters Combination Using Artificial Neural Network Warren Keith Jimenez Nietes, Mapúa University, Philippines Abstract-This study presents an analytical strategy based on Artificial Neural Networks (ANN) for analyzing the seismic performance (SP) of low-to-mid-rise reinforced concrete (RC) buildings. The performance analysis was conducted using eleven (11) three-to-twelve story RC buildings subjected to a non-linear pushover analysis (PA) based on the buildings' existing materials, loadings, and geometrical characteristics. The chosen parameters included fourteen (14) properties, eight (8) of which were geometrical and structural, and six (6) of which were seismic. The performance analysis was conducted under the guidance of the Federal Emergency Management Agency (FEMA 356) and the National Structural Code of the Philippines (NSCP 2015). The selected parameters were based on their potential influence on the performance of RC buildings during a seismic event. As the training algorithm (TA), the ANN-based Levenberg-Marquardt algorithm was used, and the hyperbolic tangent sigmoid (HTS) function was employed as the activation function (AF). The assessment demonstrated that the model attained R values of 0.9959 and 0.9887 for seismic performance at points X and Y, respectively. The aforementioned findings demonstrate the feasibility of the proposed ANN-based technique for predicting the SP of RC structures.
17:15~17:30 PR531	Study on Landslide Susceptibility Evaluation Based on Improved Multivariable Weighted Model: A Case Study of Lushan County, China Li Zhao, Wuhan Institute of Technology, China Abstract-The evaluation of regional geological hazard susceptibility is of great significance to the prevention and control of geological hazard. In this paper, the "4-20" Lushan earthquake disaster area as the research area, combined with GIS and characteristics of the research area, through correlation analysis, selected 9 influencing factors as the evaluation factors. The study was conducted using a weighted information volume-logistic regression model (WI-LR). The results were classified into five sensitivity levels: very low, low, medium, high and very high. The results show that the landslide prone areas in Lushan County are concentrated in the area below the middle of the county seat, mostly near rivers, faults and areas with peak acceleration greater than 0.4. Among them, WI-LR model (AUC=0.918) > deterministic factor model (CF =0.908) > weighted information quantity model (WI) (AUC=0.896) > information quantity model I (AUC=0.853) > information quantity logistic regression model I-LR (AUC=0.799). It indicates that WI-LR model has high evaluation accuracy.
17:30~17:45 PR722	Background Music Removal Using Deep Learning Shun Ozawa, Tokyo Denki University, Japan Abstract-Due to the increasing popularity of video-sharing websites and social networking services, videos are frequently posted to the Internet. However, users must be careful when posting copyright materials, e.g., music. Thus, the purpose of this paper is to investigate a method to remove music from audio data that include a mixture of various sounds, e.g., driving noises, human conversation, and music. Although speech enhancement techniques can be utilized to remove music, such methods also remove noise other than music, which reduces the realism of the content. Sound source separation can also be utilized for music removal, however, it has to select non-music sounds after separation, which increases the process. Thus, we conducted a preliminary experiment using a deep learning method in order to remove only music from audio data that include a mixture of speech and music sounds in a monaural audio signal, maintaining original noises and without sound source separation. We used Conv-TasNet for the network structure and the parameters were updated such that the RMSE value between the output of the model and the original speech sound was small. The results showed that accuracy tended to improve with longer sample lengths in the range of 50 –

	1,000 ms. The music removal results demonstrated that music components were reduced overall.
17:45~18:00 PR709	Impact of Deep Feature Synthesis on Deep Learning in Electronic Transaction Fraud Detection Mohammed Najim Uddin, CQUniversity, Australia Abstract-Electronic transactional fraud has been a severe threat in recent years, causing substantial financial losses and devaluing the reputation of financial institutions. Various machine learning and deep learning models have been cited in the literature to detect electronic transactional fraud effectively. Feature selection is crucial in enhancing the performance of a machine learning model. Automatic feature engineering techniques outweigh the manual feature selection process regarding the time spent and adapting to the changing nature of the dataset. However, to the best of our knowledge, the impact of state-of-the-art feature selection techniques, such as Deep Feature Synthesis (DFS), on the performance of deep learning-based electronic transactional fraud detection has not been thoroughly studied. Our study uses the DFS algorithm to generate features automatically from the labelled credit card transaction dataset collected from open-source sites. The data is fed into a baseline deep learning model, i.e., Convolutional Neural Networks (CNN), in two separate cases- with DFS and without DFS. A comparison of results from both cases shows that CNN with DFS outperforms the standalone CNN significantly in terms of accuracy, precision, recall, and F1 scores.
18:00~18:15 PR641	Hybrid Particle Swarm Optimization - Artificial Neural Network: Strength Prediction of Bambusa blumeana Fiber and Recycled Coarse Aggregate for Multi-Generation Recycled Aggregate Concrete Marko Lyxen G. Bajaro, Mapúa University, Philippines Abstract-Several studies on recycled aggregate concrete (RAC) have revealed percentage reductions in compressive strength (CS) and split tensile strength (STS). The possibility for enhancing the mechanical qualities of RAC by using bamboo fiber (BF), specifically Bambusa blumeana, is the focus of this study. 175 concrete mixtures that produced 1050 specimens from the zeroth to third recycling generations of concrete. These specimens underwent CS and STS tests, and the findings were used to develop a hybrid Artificial Neural Networks and Particle Swarm Optimization (ANN-PSO) model. The results showed that the R values for the developed models for CS and STS were approaching 1 and the MSE were approaching 0 which were the ideal values. The findings suggest that the ANN-PSO model outperformed the multiple linear regression model as evident to the higher R value and lower MAPE of the ANN-PSO models for CS and STS prediction. Moreover, using Garson’s algorithm (GA), the relative importance (RI) of the predictors used in the CS and STS models were calculated. The results showed that slump is the most influential parameter to the CS while that for the STS is the bamboo fiber % (BF%). This paper elucidates the potential of utilizing BF in RAC and the effectiveness of the ANN-PSO model in predicting CS and STS.
18:15~18:30 PR723	Attention Based Graph Neural Networks MD Ibrahim Khalil, Nanjing University of Science and Technology, China Abstract-The performance of graph neural networks (GNNs) in a variety of graph-related tasks, such as node categorization, has been remarkably good. Existing GNN models, especially when working with big and sparse graphs, are constrained in how well they can capture complicated graph topologies. In order to overcome this issue, we incorporate an attention mechanism into the GNN design in this study. During the message-passing phase, our proposed model, Attention-Based Graph Neural Networks (AB-GNN), uses a learned attention mechanism to differentially weight the significance of surrounding nodes. Using numerous benchmark datasets for node classification, we test the performance of the AB-GNN and demonstrate that it outperforms current state-of-the-art GNN models. Our tests specifically show that AB-GNN improves accuracy by up to 1% in comparison to the top baseline model. According to our findings, the attention mechanism enhances the model's capacity to detect critical aspects in the graph, resulting in more precise node classification on Cora and CiteSeer datasets in our case. Comprehensively, our work demonstrates the potential of attention mechanisms to enhance the functionality of GNN models and offers directions for further study in this field.

18:30~18:45 PR760	Maneuvering Target Tracking based on LSTM for Radar Application Shixiang Cai, Nanjing Research Institute of Electronics Technology, China Abstract-Aiming at the problem of model mismatch in tra-ditional model-based target tracking methods when the target undergoes maneuvers, an adaptive tracking method based on Long Short-Term Memory (LSTM) is proposed. The algorithm replaces traditional filtering algorithms with LSTM and intro-duces the error between the measurement and the predicted value during training. This enables the network to simultaneously ac-quire information about the target position and measurement error, and during prediction, use the measurement error to directly modify the network's prediction results to obtain the final tracking results. Simulation results demonstrate that this method effectively solves the problem of describing the motion state of maneuvering targets, and has higher tracking accuracy and stronger adaptability compared to traditional filtering algorithms.
18:45~19:00 PR734	Neural Network – based Prediction of the Performance Budget for Road Defects and Highway Maintenance Melchor S. Cabrera, Mapúa University, Philippines Abstract-The goal of this study is to create a model that can forecast the allocation for maintenance of roads and bridges in DPWH in Region XII. The study comes up with a new way to improve road maintenance, which is important for a country's social and economic growth. In this research, artificial neural networks (ANN) were employed to make a prediction model that could accurately predict how much it would cost to maintain roads and bridges in the future. At eight (8) District Engineering Offices in the DPWH Region XII between 2019 and 2022, the researcher used the maintenance section's prior allocation. In this study, final allocation served as the output variable, and the manipulated factors utilized to run the model were road length, road equivalent maintenance kilometer (EMK), bridge length, bridge EMK, and road condition. Levenberg-Marquardt (LM) based on ANN was utilized as the training algorithm (TA), while the Hyperbolic Tangent Sigmoid (HTS) function was used as the transfer function (TF). The outcomes of the analysis demonstrate that the model attained R values of 0.99197, which are approaching the optimal value of 1.00. It shows that neural network models perform 118 times better than multiple linear regression (MLR) models regarding prediction accuracy. This study provides a model for government agencies to use in predicting allocation costs for road and bridge maintenance more precisely.
19:00~19:15 PR640	MOEA/D with Adaptive Weights for Multi-objective Optimization Problems Xiangyu He, Jiangsu Normal University, China Abstract-Multiobjective optimization is always one of the most popular problems in evolutionary computation due to its wide existence in various practical applications. This paper proposes a new improved version of multiobjective evolutionary algorithms based on decomposition (MOEA/D) for solving multiobjective optimization problems, which is named MOEA/D-ADW including three significant strategies. Specifically, firstly, weight vector initialization mechanism is designed to generate high quality weights, which includes UR and WS-transformation strategies. Secondly, an external population is designed for storing the obtained individuals based on the neighborhoods of the weight vector and the search population. Finally, population agents stored in external set are reused for updating the weight adaptively during the evolutionary process. To evaluate the performance of the proposed algorithm, experimental results carried on a set of benchmark functions with various characteristics, demonstrate that the MOEA/D-ADW is competitive with respect to some existing multiobjective optimization algorithms.
19:15~19:30 PR763	Based on the Improved LSTM Model Aircraft Long Track Prediction Research Tingting Bi, Nanjing Research Institute of Electronics Technology, China Abstract-The plane long track forecast for half an hour or more forecast for a long period of time, is a military action to intentions and cracking down on the key technology of auxiliary decision, also it can be used in the field of civil aviation traffic control, strengthen the management of the aircraft. This article adopts data mining methods to improve the LSTM network structure. It proposes an LSTM network that combines convolutional neural networks and attention mechanisms and uses radar-measured aircraft trajectory data for long-term prediction. The predicted results show that the

	improved LSTM network structure has certain performance improvements in prediction. Based on this, the article analyzes the impact of prediction steps on the algorithm and presents the analysis results.

ONLINE SESSION 4

SATURDAY, JUNE 17, 2023 Room B: 838 7073 8826

Online Session 4: Software Development and Programming

Chairperson:Prof. Dr. Yew Kee WONG, Hong Kong Chu Hai College, Hong Kong, China

17:00~17:15 PR644	A Software Credibility Framework with a Decision Making Component for Patient Portals Marcus Aalon Rawlins, Beijng University of Technology, China Abstract-In today's digital era, when software applications are omnipresent across multiple areas, software credibility is critical. Based on Yu et al.'s model, this paper extends this model and proposes a software credibility framework with accumulation and decision-making components for patient portals. A basic patient portal prototype was used to test the framework, and three test cases were generated to demonstrate the various phases of the decision-making component. The results show that the framework effectively monitored malicious user activity and can be further integrated into real-time applications such as banking apps. The suggested framework has the potential to significantly increase software credibility and dependability, and more work can be done to extend the framework by employing Artificial Intelligence and Machine Learning to automatically learn and assign user behavioral states over time.
17:15~17:30 PR648	The Design and Practice of the openKylin Build and Management System Long Peng, National University of Defense Technology, China Abstract-The Linux-based desktop operating systems now dominate China ' s Market of Information Technology Application Innovation, as well as the kernel drivers and application companions. All of them can be arranged as software packages, such as Linux kernels, system configurations, core dynamic libraries. Building such a sophisticated and dynamic ecosystem urges for a clear and pipelined architecture of the build system. In this paper we elaborate our design and practice of the openKylin build and management system, including a property-extended modular package management system, an incremental upgrading and updating scheme, a remote maintenance system, and an enhanced modular code management system. The deployment results show that the openKylin build system has coherent procedure.
17:30~17:45 PR919	Line Quality Evaluation and Service Scheduling Scheme Based on SD-WAN Network Yang Gao, China Telecom Research Institute, China Abstract-SD-WAN is a flexible enterprise wide area network access technology. The key technology in SD-WAN is the creation of multiple high-performance connections across WAN links, such as the Internet or MSTP, where enterprises can dynamically select reliable paths for different traffic flows. In response to the degradation of network quality for Internet link connections over SD-WAN networks, this paper proposes a transmission line quality evaluation scheme and traffic scheduling scheme based on service priority evaluation under SD-WAN network. It is a kind of line quality evaluation based on network delay, packet loss, jitter and other parameters. In the case of line quality decline, the service scheduling scheme or strategic resending is proposed to ensure that the service is carried out without difference, which can save the network cost for users.
17:45~18:00 PR642	Automated Tobacco Leaf Grading System Based on Deep Learning Qi Li, China Tobacco Zhejiang Industrial Co Ltd, Hangzhou, China Abstract-To ensure the quality of tobacco products, tobacco leaves need to be graded to prevent mixing different quality tobacco leaves. The considerable intra-class variation and slight inter-class variation of different tobacco leaves may cause grading problems. Traditional methods of tobacco leaf grading rely on manual labor, which is inefficient and subjective. This work proposes an automated tobacco grading system based on deep learning. The reflectance image reflects information such as the texture, color, and shape of the tobacco leaf, and the transmittance image reflects the thickness of the tobacco leaf. Therefore, we capture both reflection and transmittance images of tobacco leaves and apply convolutional neural networks (CNNs) for automatic grading.

	During the acquisition process, the transmittance images of different areas are quickly stitched together to build a complete transmittance image of the tobacco leaf. Then the reflectance and transmittance images are aligned to improve the feature extraction of the CNN. After comparing the state-of-the-art models, we used DenseNet121 to grade the tobacco leaves and analyzed the effect of transmittance images on tobacco leaf grading.
18:00~18:15 PR715	A Chinese Knowledge Graph Q&A System Based on Dense Relationship Retrieval Kaifeng Guo, Fuzhou University, China Abstract-Currently, most knowledge graph question answering (KGQA) systems need to retrieve all entities when dealing with complex problems involving multiple entities and relationships, which results in high time complexity and resource consumption. The response time of KGQA systems is an important indicator for evaluating their performance. To address this issue, this paper proposes a Chinese KGQA system based on dense relationship retrieval. The system uses the Faiss index mechanism for vector similarity retrieval, quickly extracts the top K relationships from the pre-built vector relationship library, and constructs paths to reduce a large number of irrelevant semantic paths in most KGQA tasks, thereby improving the time cost and computational resource overhead caused by the exponential growth of path numbers in second-order and higher-order questions. By using this method, the response time of the QA system can be shortened to within 1 second with minimal loss of accuracy. This paper combines pre-training models to complete tasks such as text semantic similarity and entity mention recognition, and achieves an average F1 value of 71.3% on the CCKS2019-CKBQA test set. Comparing with other systems demonstrates the superiority of our method in terms of accuracy and efficiency.
18:15~18:30 PR712	Fitness Function Using Postconditions for Automated Program Repair Yusaku Ito, Waseda University, Japan Abstract-Genetic algorithm-based automated program repair has the challenge that execution time tends to be extremely long. One of the causes is the low adequacy of the fitness, which represents the evaluation of program variants. To improve the efficiency of automated repair, we propose a new fitness function that uses the state of internal variables of the program in addition to the results of test runs. First, candidate specifications are randomly generated using variables in the program. Next, the correct specification is automatically estimated from the candidates, thus making the granularity of the fitness function more fine-grained. Experimental results with small programs show that the proposed method extracts the postcondition of the program appropriately in most cases. On the other hand, experiments with the Defects4J Math dataset suggest that the proposed method does not necessarily improve the efficiency of automated repair and may reduce the diversity of generated variants.
18:30~18:45 PR652	Exploring code2vec and ASTminer for Python Code Embeddings Long H. Ngo, SMILE France, France Abstract-Automated understanding of code meaning and use has become an intrinsic part of software development recently. Neural models are being used in various natural language processing tasks, as they can represent natural language using vectors that carry semantic meanings. Although code is not natural language, we believe neural models to be capable of learning semantics and syntactic properties available in code snippets. To achieve such goal, we represent a code snippet using its abstract syntax tree (AST) syntactic paths to capture regularities that reflect common code patterns. This representation lowers significantly learning effort while being scalable to multiple problems and large code bases. In our work, we adopt ASTminer with code2vec, to represent code snippets as continuously distributed code vectors called “code embeddings”, used to predict the semantic properties of the snippets. This approach decomposes code into a collection of AST paths and learns each path's atomic representation while learning how to aggregate them. Code2vec is then paired with other neural models, which represent query, to create a hybrid model for the task of code search. While code2vec was originally developed for Java only, we present in this article our efforts to extend the method to Python language.
18:45~19:00 PR705	Neural Machine Translation for Recovering ASTs from Binaries Dharma Raj KC, University of Arizona, USA

	Abstract-Recovering higher-level abstractions of source code from binaries is an important task underlying malware identification, program verification, debugging, program comparison, vulnerability detection, and helping subject matter experts understand compiled code. Existing approaches to extracting higherlevel structures from lower-level binary code rely on hand-crafted rules and generally require great time and effort of domain experts to design and implement. We present Binary2AST, a framework for generating a structured representation of binary code in the form of an abstract syntax tree (AST) using neural machine translation (NMT). We use the Ghidra binary analysis tool to extract assembly instructions from binaries. A tokenized version of these instructions are then translated by our NMT system into a sequence of symbols that represent an AST. The NMT framework uses deep neural network models that can require a lot of training examples. To address this, we have developed a C source code generator for a restricted subset of the C language, from which we can sample an arbitrary number of syntactically correct C source code files that in turn can be used to create a parallel data set suitable for NMT training. We evaluate several variant NMT models on their ability to recover AST representations of the original source code from compiled binaries, where the best-performing attention-based model achieves a BLEU score of 0.99 on our corpus.
19:00~19:15 PR719	A Lightweight Code Cloning Technique Using Different Static Features Yasir Glani, Tsinghua University, China Abstract-In recent decades, malicious code reuse has surged in numbers and sophistication, it is common practice among adversaries to reuse malicious code, which significantly threatens user privacy and security. Several signature-based code clone detection techniques have been proposed to detect malicious clones in Android applications that use the MD5 hash function to generate signatures. Meanwhile, these techniques only retrieve signatures from Java files. Due to the 128-bit signature size of the MD5 hash function, these techniques take longer to generate signatures. In this article, we propose the AYATDROID technique, which efficiently identifies malicious chunks by retrieving signatures from Java and manifest files . AYATDROID technique is tested on reliable CiCMalDroid 2020 dataset.We have evaluated the AYATDROID technique with other cutting-edge code clone detection techniques. Our experimental results demonstrated that AYATDROID outperformed regarding detection time and accuracy. AYATDROID is not only lightweight but also efficient, allowing it to be implemented on the large scale.

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