WCSE International Workshop on Computer Science and Engineering

2021 The 11th International Workshop on Computer Science and Engineering (WCSE 2021)

With workshops of

2021 The 9th International Conference on Information Technology and Science
(ICITS 2021)

2021 The 7th International Conference on Data Processing and Applications
(ICDPA 2021)

June 19-21
Virtual Conference

Welcome Address

Welcome you all to 2021 the 11th International Workshop on Computer Science and Engineering (WCSE 2021), with workshops of 2021 The 9th International Conference on Information Technology and Science (ICITS 2021) and 2021 The 7th International Conference on Data Processing and Applications (ICDPA 2021), which will be held online during June 19-21, 2021 due to COVID-19.

After several rounds of review procedure, the program committee accepted those papers to be published by WCSE in WCSE 2021 conference proceedings. We wish to express our sincere appreciation to all the individuals who have contributed to WCSE 2021, ICITS 2021, ICDPA 2021 conferences in various ways. Special thanks are extended to our colleagues in the program committee for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee and the volunteers who had delicated their time and efforts in planning, promoting, organizing and helping the conference.

This conference program is highlighted by three Keynote Speakers: Prof. Ryuji Kohno (IEEE Fellow) , Yokohama National University, Japan; Prof. John C.S. Lui(ACM, IEEE and HKAES Fellow), The Chinese University of Hong Kong, China; Prof. Koichi Asatani, Shanghai University, China (IEEE Fellow and IEICE Fellow), They will deliver their speeches and share the latest research with the participants

One best presentation will be selected from each session, evaluated from: originality; applicability; technical Merit; qualities of PPT; English. The best one will be announced at the end of each Session, and we will e-mail you after conference.

Hope all of you can keep safe and sound and take care of yourself, we wish to see every one of you face to face in the next year

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- Stable WIFI or Wired network.
- Equipment be with enough battery or connected with chargers.
- If your network is not good, please send us presentation videos within 10 Minutes as a back-up.

Time Zone

- The conference is arranged based on Beijing Time (UTC+8).
- Please carefully check your presentation time, and join the conference 15 minutes in advance.

Presentation

- Stay online during Keynote & Invited speeches and your own sessions.
- English only during the conference.
- Certificates & receipts will be emailed to you after the conference

ZOOM Usage

- Download the APP ZOOM on zoom.us or www.zoom.com.cn (China only). Turn on your Audio and start your Video.
- Use headsets/Earphones to enhance the audio effect and avoid the speaker echo or howling. Stay in a quiet place without noise.
- Authors please rename like Session Number+Paper ID+Name as you join the room. E.g.: S1+W1001+Ashily.
- For KN or SC, please rename like KN/SC+ Name
- Join TEST DAY on June 19

TEST DAY SCHEDULE

June 19th 2021 | Saturday

Time	Event	Zoom Arrangement
10:30-11:30	Keynote Speaker Test Prof. Hong Lin(10:30-10:40) Prof. John C.S. Lui (10:40-10:50) Prof. Koichi Asatani (10:50-11:00) Prof. Ryuji Kohno(11:00-11:10)	Room A 951 7520 9496 https://zoom.com.cn/j/95175209496
11:30-14:00	Break	
14:00-15:00	Session 1+2 Test W13005, W1026, W1042, W1044, W2001, W2006, W1006, W2012, W1010, W1012, W1016, W1032, W1049, W3009, W3010, W2010	

Time	Event	Zoom Arrangement
10:30-11:30	Session 3+4 Test W1041, W1030, W1031, W1047, W1056, W3003, W2013, W1017, W1025, W13007, W1009, W1045, W1050, W1052, W1053, W2011	Room B 947 7484 9084 https://zoom.com.cn/j/94774849084
11:30-14:00	Break	
14:00-15:00	Session 5+6+7 Test W1004, W1005, W1015, W1034, W1058, W1057, W1023, W1029, W1008, W1013, W1002, W1014, W1011, W3007, W1022, W1024, W2007, W2301, W3005, W2014, W2015, W2016, W2005	

Test Tips

1. Please join the test session on time
2. First find your session and join the test room without sign in
3. Please send the message to conference secretary if you really have something emergency, we will arrange your test at other time

CONFERENCE AGENDA

June 20th 2021 | Sunday

Time	Room A: 951 7520 9496 https://zoom.com.cn/j/95175209496	Room B: 947 7484 9084 https://zoom.com.cn/j/94774849084
09:00-09:05	Opening Remarks By Prof. Hong Lin, University of Houston-Downtown, USA	
09:05-09:55	Keynote Speaker I Prof. Ryuji Kohno , Yokohama National University, Japan (IEEE and IEICE Fellow) Title: Beyond 5G Universal Platform with Enhanced Dependability Based on ICT and Data Science for Medical and Automotive Industries	
09:55-10:10	Break	
10:10-11:00	Keynote Speaker II Prof. John C.S. Lui, The Chinese University of Hong Kong, China (ACM, IEEE and HKAES Fellow) Title: Optimizing Mixture Importance Sampling and Online Learning for Network Simulations	
11:00-11:50	Keynote Speaker III Prof. Koichi Asatani, Shanghai University, China (IEEE Fellow and IEICE Fellow) Title: Trends and Future Perspective for 5G and 6G Networking	
11:50-13:30	Lunch Time	
13:30-15:30	Session 1 Software and Information Security	Session 2 Image Analysis and Processing
	W13005, W1026, W1042, W1044, W2001, W2006, W1006, W2012	W1010, W1012, W1016, W1032, W1049, W3009, W3010, W2010
15:30-16:00	Break	
16:00-18:00	Session 3 Information Science and Engineering	Session 4 Virtual Technology and Multimedia
	W1041, W1030, W1031, W1047, W1056, W3003, W2013, W1017	W1025, W13007, W1009, W1045, W1050, W1052, W1053, W2011

CONFERENCE AGENDA

June 21st 2021 | Monday

Time	Room A: 951 7520 9496 https://zoom.com.cn/j/95175209496	Room B: 947 7484 9084 https://zoom.com.cn/j/94774849084
10:00-12:00	Session 5 Intelligent Algorithm and Mathematical Calculation	Session 6 Communication and Signal System
	W1004, W1005, W1015, W1034, W1058, W1057, W1023, W1029	W1008, W1013, W1002, W1014, W1011, W2014, W2005, W2016
12:00-14:00	Break	
14:00-15:45	Session 7 Power Engineering and Intelligent Control Technology	
	W3007, W1022, W1024, W2007, W2301, W3005, W2015	

Formal Session Tips

1. Please join the keynote speeches on time, we will have a group photos together
2. First find your session and join the room without sign in
3. If you present on live, please prepare your PPT well and join directly
4. If you prepare a video, please play it by yourself and join your own session all the time
5. The language should be ENGLISH ONLY

KEYNOTE SPEAKER I

"Beyond 5G Universal Platform with Enhanced Dependability Based on ICT and Data Science for Medical and Automotive Industries"

Prof. Ryuji Kohno

Yokohama National University, Japan

IEEE and IEICE Fellow

Abstract:

Biography: Ryuji Kohno received the Ph.D. degree from the University of Tokyo in 1984. Since 1998, he is a Professor while a PI of MEXT 21st century and Global COE programs in Yokohama National University. He was a visiting Scientist in Univ. of Toronto, Canada, and a Distinguished Professor with the Univ. of Oulu, Finland in academia. In industry, he was also a Director in Sony CSL/ATL, and in the UWB and the Medical ICT Institutes of NICT, and the CEO of CWC-Nippon Co. Since 2006, he has also been an Associate Member of the Science Council of Japan. He is IEICE and IEEE Fellows. He was elected a BoG Member of the IEEE Information Theory Society in 2000-2006. He received NTT DoCoMo Mobile Science Award in 2002.

KEYNOTE SPEAKER II

"Optimizing Mixture Importance Sampling and Online Learning for Network Simulations"

Prof. John C.S. Lui

The Chinese University of Hong Kong, China

ACM, IEEE and HKAES Fellow

Abstract: Importance sampling (IS) is widely used in rare event simulation, but it is costly to deal when there are many simultaneous rare events For example, a rare event can be the failure to provide the quality-of-service guarantee for a critical network flow. Since network providers often need to deal with many critical flows (i.e., rare events) simultaneously, if using IS alone, providers have to simulate each rare event with its customized importance distribution individually. To reduce such cost, we propose an efficient mixture im- portance distribution for multiple rare events, and formulate the mixture importance sampling optimization problem (MISOP) to select the optimal mixture. We first show that the "search direction" of mixture is computationally expensive to evaluate, making it challenging to locate the optimal mixture. We then formulate a "zero learning cost" online learning framework to estimate the "search direction", and learn the optimal mixture from simulation samples of events. We develop two multi-armed bandit (MAB) online learning algorithms to: (1) Minimize the sum of estimation variances with a regret of (lnT)2/T; (2) Minimize the simulation cost with a regret of ln(T)/T , where T denotes the number of simulation samples. We demonstrate our method on a realistic network and show that it can reduce the cost measures (i.e., sum of estima tion variances and simulation cost) by as high as 61.6% compared with the uniform mixture IS.

Biography: John C.S. Lui is currently the Choh-Ming Li Chair Professor in the Department of Computer Science & Engineering (CSE) at The Chinese University of Hong Kong (CUHK). He received his Ph.D. in Computer Science from UCLA. His current research interests are in online learning algorithms and applications (e.g., multi-armed bandits, reinforcement learning), machine learning on network sciences and networking systems, large scale data analytics, network/system security, network economics, large scale storage systems and performance evaluation theory. John is currently the senior editor in the IEEE/ACM Transactions on Networking, and has been serving in the editorial board of ACM Transactions on Modeling and Performance Evaluation of Computing Systems , IEEE Transactions on Network Science & Engineering, IEEE Transactions on Mobile Computing, IEEE Transactions on Computers, IEEE Transactions on Parallel and Distributed Systems, Journal of Performance Evaluation, Journal of Network Science and International Journal of Network Security. John is an elected member of the IFIP WG 7.3, Fellow of ACM, Fellow of IEEE, Senior Research Fellow of the Croucher Foundation, Fellow of the Hong Kong Academy of Engineering Sciences (HKAES), and was the past chair of the ACM SIGMETRICS (2011-2015). His personal interests include films and general reading.

KEYNOTE SPEAKER III

"Trends and Future Perspective for 5G and 6G Networking"

Prof. Koichi Asatani

Shanghai University, China

IEEE Fellow and IEICE Fellow

Abstract: 5G is now being deployed in many countries. The new connected end points of communication networks will play key roles in 5G era, such as autonomous vehicles, various smart sensors and IoT, as well as the enhanced Internet and any other existing communications devices. Various research initiatives have started in academia, industry, and standard bodies toward 6G mobile wireless networks. This talk reviews trends in Global ICT and describes 5G architecture and use cases, and then addresses possible technical pillars of 6G, which are enhanced 5G technologies and/or new technologies possibly to be adopted in 6G. It also discusses the issues and challenges in realization and in deployment as an infrastructure.

Biography: Dr. Koichi Asatani: received his B.E.E.E., M.E.E.E. and Ph. D. degrees from Kyoto University in 1969, 1971 and 1974, respectively. From 1974 to 1997, Dr. Asatani was with NTT and engaged in R&D on optical fiber communication systems, hi-definition video transmission systems, FTTH, ISDN, B-ISDN, ATM networks, IP Networks and their strategic planning. From 1997 to 2014, he served as Professor at Kogakuin University. From 1999 to 2012, he joined Graduate School of Global Information and Telecommunication, Waseda University as Visiting Professor. He is Adjunct Professor, Shanghai University from 2019. He was Chair Professor, Nankai University, Tianjin, China for 2014 through2018. He is also Professor Emeritus, Kogakuin University. He is Life Fellow of IEEE and Life Fellow of IEICE. He was appointed as Distinguished Lecturer of IEEE Communications Society for 2006-2009, 2011-2012, and 2013-2014.

He is the founder of Communications QoS, Reliability and Performance Modeling Symposium at IEEE ICCs and IEEE Globecoms. He served as co-chair for this symposium at ICCs and Globecoms for 2002-2004. He is Ex-Chair and Advisory Board Member of IEEE Technical Committee on Communication Quality and Reliability (CQR-TC), Feature Editor on Standards (1993-1999), Senior Technical Editor (1999-2005) of IEEE Communications Magazine. He also served as Executive Chair, ICC2011 in Kyoto. From 1988 through 2000, he served as Vice-Chairman of ITU-T SG 13 (formerly CCITT SG XVIII), responsible for digital networks including GII, IP networks, NGN and Future Networks. He served as Chair for National Committee on Next Generation Networks in Japan. He also served as Chair, R&D and Standardizations Working Group, Next Generation IP Network Promotion Forum. He served as IEEE Communications Society Director, Membership Programs Development for 2014-2015 term. He is currently Chair, IEEE Com Soc GIMS Committee and Fellow Evaluation Committee member. He has been serving as a Board member, IEICE, and Chair, IEICE Standards Activities since 2014.

He has published more than fifty papers, authored/co-authored nineteen books, and gave more than 120 talks including keynotes and invited talks at the prestigious international conferences such as IEEE ICC and Globecom.

His current interests include Information Networks including Broadband networking, Internet Interworking, IP telephony, NGN, Future Networks, IoT, 5G Networking and their QoS aspects.

Session 1 Software and Information Security June 20th 13:30-15:30 | Online Zoom ID: 951 7520 9496		
		Chair:
13:30-13:45	W13005	**Research on IoT Malware Based on the ATT&CK Model** Presenter: **Mr. Bo Hao** State Key Laboratory of Mathematical Engineering and Advanced Computing, China The security of the IoT has become a hot research area in cyberspace security, among which the malware is a major threat. Based on the ATT&CK model, this paper studies the composition and behavior of IoT malware, constructs a malicious behavior model of IoT malware, and analyzes the technical implementation of each tactic in the malicious behavior model of IoT malware from three aspects: operating system related, target environment related and specific tools related. Based on this, we finally propose the evolution direction of IoT malware, which will be conducive to a more comprehensive grasp of the characteristics of IoT malware, and be supportive for maintaining the security of IoT.
13:45-14:00	W1026	**Static Detection of Vulnerabilities via Graph Attention hierarchically** Presenter: **Ms. Yuhan Zhang** Peking University, China With the rapid growth of the software industry, the risks of vulnerabilities are inevitably increasing. Deep learning based methods have been widely used in vulnerability detection in recent years. Since the inherent graph structure of source code contains rich semantics, many deep learning works have exploited graph neural networks to enhance code representation. Despite their novel design, learning the structural information in the graph hierarchically and focusing on important nodes are still problems to better capture vulnerability semantics. To tackle this bottleneck, we propose a novel neural model for vulnerability detection. A SAGPool module is designed to automatically chooses important nodes to retain hierarchically in each graph convolution layer. Our model is trained and tested over the REVEAL dataset built on two popular and well-maintained open-source projects. The experimental results demonstrate that our model outperforms the state-of-the-art methods.
14:00-14:15	W1042	**B2GPAPI: an Efficient Framework providing C/C++ Runtime in Web-based OS** Presenter: **Mr. Hao Xu**

		National University of Defense Technology, China In the Internet era, mobile devices have become more and more popular because of their portability. Web-based operating system (OS) is a mobile operating system based on web technologies and has great potential for growth. However, mobile applications are mainly developed for Android and iOS, and cannot run in a Web-based OS due to the incompatibility between different platforms. Aiming to expand the application ecosystem of the Web-based OS and based on the fact that many mature applications' low-level code is written in C/C++, we propose B2GPAPI, a framework that provides a runtime for C/C++ applications in the Web-based OS. B2GPAPI makes it possible that existing mature mobile applications can directly run in a Web-based OS. To implement the framework, on the one hand, we employ the <object> html tag in web applications as a connection with the dynamic link library of the C/C++ application; on the other hand, in Web engine of the Web-based OS, we provide an event interface to deliver the event information from web application to the C/C++ application and a graphic rendering interface to display the interface of the C/C++ applications. In order to verify the efficiency of the framework, we compare B2GPAPI's graphics rendering interface with the WebGL interface. Experimental results show that B2GPAPI has good practicability and outperforms than WebGL.
14:15-14:30	W1044	**EcoAction Mobile App: A Game Practice for Eco-activist** Presenter: **Asst. Prof. Ma. Corazon G. Fernando** FEU Institute of Technology, Philippines Environmental awareness enables us to take measures in protecting and maintaining the environment. Moreover, video games are available everywhere as a means to not only entertain, but also to develop one's skills. They may be used as a teaching tool while still being fun to play to instill healthy habits, especially when it comes to the environment. This paper presents the development of EcoAction – a tap and drag 2D Android game that promotes environmentalism. We describe the game design of EcoAction and provide a validated questionnaire for assessing the aesthetics and gameplay. Results demonstrate that the received positive responses for its well-designed gameplay and appealing visuals. Therefore, videogames like EcoAction can be used as an awareness platform to encourage players to adopt environmental practices.
14:30-14:45	W2001	**Vulnerability Model and Attack Path Prediction of the UEFI Firmware Platform Based on Risk Propagation** Presenter: **Mr. Weihua Jiao,** State Key Laboratory of Mathematical Engineering and Advanced Computing, China

		Targeted at the situation of rampant attack on UEFI Platform Firmware, this paper systematically analyzes the Security mechanisms of UEFI platform firmware. Then the vulnerability factors of UEFI firmware are described by modeling language, and a vulnerability model of UEFI firmware platform based on risk propagation (VMURP) is proposed. This paper introduces an improved PageRank algorithm to this model to reduce the influence of subjective factors which influences the accuracy of model. Based on VMURP model, an innovative method is proposed which using security configuration vector and attack vector to evaluate attack paths. Then, we use this method and VMURP to predict the most possible attack path of specific UEFI firmware platform. Finally, verify the rationality of the model and the validity of the prediction by experimental analysis. This study is helpful to quickly evaluate the vulnerability of UEFI firmware platform and predict possible attacks, gives platform managers more targeted guidance and suggestions to strengthen the security mechanisms.
14:45-15:00	W2006	**Adaptive Privacy-preserving and Shuffling Aggregation in Federated-learning** Presenter: **Ms. He Huixian** East China Normal University, China Deep learning models are usually trained on data sets containing sensitive information, such as personal shopping transactions, personal contacts, and medical records. Therefore, more and more important work attempts to train neural networks subject to privacy constraints, which are specified by differential privacy or divergence-based relaxation. However, these privacy definitions have weaknesses in handling certain important primitives (synthesis and sub-sampling), which makes the privacy analysis of training neural networks loose or complex. Federated learning is a popular privacy protection method, which collects local gradient information instead of real data. One way to achieve strict privacy guarantee is to apply differential privacy to federated learning. However, previous work did not give a practical solution. This paper proposes a new type of adaptive privacy-preserving and shuffling aggregation in federated-learning mechanism design. It can make the data more different from its original value and introduce lower variance. In addition, the proposed mechanism is updated through the split and shuffle model, avoiding the curse of dimensionality. A series of empirical evaluations conducted on the three commonly used data sets of MNIST, Fashi-MNIST and CIFAR-10 show that our solution can not only achieve excellent deep learning performance, but also provide strong privacy protection.
15:00-15:15	W1006	**Research and Progress on Data Security Based on Medical Information System** Presenter: **Ms. Luqi Wang**

		Zhengzhou University of Light Industry, China The data security of today's medical information system is one of the important fields of national security encryption technology application, and it is widely used in the development of network information security technology. Based on the introduction of the basic structure and analysis of network hospital data information security technology, it comprehensively analyzes network data control sharing, data encryption, data security service targets and other related medical information system data technologies. This article introduces the application of network information security encryption technology, and studies the development trend of future medical data information security technology system design.
15:15-15:30	W2012	**Research on Integration of Information System in Customs Supervision Warehouse Based on Business Process Improvement** Presenter: **Assoc. Prof. Dr. Han Chengguo** Guangdong University of Science and Technology, China With the rapid development of China's import and export trade, customs supervision warehouse is facing the pressure of order surge, fragmentation and complex commodity SKU, which affects the operation effi-ciency and error rate.,This paper comprehensively investigates and analyzes the three core processes of customer appointment, goods in and out of warehouse and customs declaration. Taking YanTian warehouse in Shenzhen of X supply chain company as an example, based on commodity master data management and unified management of appointment form, customs declaration form and goods information of in and out of warehouse, to simplify the operation process and reduces duplicate data entry.Through the establishment of an integrated and unified warehouse information system, the integration of customer appointment, WMS and customs declaration system, to ensure the accuracy of the data and information of goods in and out of the warehouse and the efficient operation of the whole process, and promote the intelligent and digital up-grading of the information operation of Customs warehouse management.

FORMAL SESSION 2

Session 2 Image Analysis and Processing June 20th 13:30-15:30 | Online Zoom ID: 947 7484 9084		
	Chair:	
13:30-13:45	W1010	**Integrating Segmentation and Association Relationship for Image Recognition** Presenter: **Dr. Xin Xu** Science and Technology on Information System Engineering Laboratory, China Image segmentation generally refers to partitioning of an image into a set of regions that cover it. It has been believed that these regions may represent meaningful areas of the image, such as buildings, roads, forests, crops, animals and so on. The regions are usually composed of sets of pixels with similar colors. For interesting targets in the foreground, the regions may even take the forms of particular shapes, such as circles, eclipse or rectangles. Inspired from the concept of image segmentation above, it's interesting to further explore the relationship of segments for the targets of interest according to some association rules, i.e., the spatial association. In this way, we could detect objects from the images satisfying the criterion of both the segment and association relationships. For instance, people may probably prefer to query a scenery image complying with a certain style instead of containing a certain object. In this work, we propose an efficient object detection method integrating information of both segmentation and association relationship. Experimental results indicate that our method has more semantic flexibility for image recognition.
13:45-14:00	W1012	**The Application of High-speed Videogrammetric Technique in Underwater 3D Displacement Measurement Scenario Based on Image Sequence Processing** Presenter: **Mr. Jiajun Zhao** Tongji University, China With the rapid development of underwater engineering, acquiring accurate three-dimension (3D) measurement of underwater objects has become a very concerned topic. High-speed videogrammetry, which has advantages of non-contact measurement, flexibility and high precision, provides a feasible method to extract transient 3D displacement of objects. This paper presents the application of high-speed videogrammetric technique in underwater 3D displacement measurement scenario, which includes the following four main components: (1) An underwater high-speed videogrammetry network is established to capture and record the 3D displacement of underwater objects; (2) The underwater camera calibration is performed to obtain the interior

		orientation parameters and eliminate lens distortion; (3) Accurate target recognition and tracking algorithms are introduced to calculate the image coordinates of the target points in the high-speed image sequence; (4) 3D displacement is calculated based on 3D reconstruction of target points on objects via videogrammetric analysis algorithms. The underwater simulation experiment indicates that the proposed technique has a fairly good application performance in underwater measurement scenario with submillimeter accuracy.
14:00-14:15	W1016	**GraftNet: An Efficient and Flexible Multi-label Image Classification and its application** Presenter: **Dr. Chunhua Jia** Shanghai Elevator Media Information Co., Ltd, China A multi-label network with an adaptive hierarchical structure is presented in this paper. The proposed network is efficient and flexible; we call it GraftNet in abbreviation. The network is in a tree-like fashion which has a trunk and several branches. The trunk is pre-trained with a dynamic graph for generic feature extraction and branches separately trained on sub-datasets with single label to improve accuracy and efficiency. We employ efficient neural architecture search (ENAS) for the branches part which outperforms manually designed architectures on image classification. The proposed network could avoid the inherent problem of "catastrophic forgetting" problem in deep neural networks and the addition of new image classes to a network could be easier than retraining the whole network again with all the classes. The employment of ENAS helps our network to achieve high performance. The proposed hierarchical network is also suitable for imbalanced dataset. Compared against fine-tuning a deep network, the proposed network achieves significant reduction of training and testing effort. Experimental results show that it has good performance on our human attributes recognition task.
14:15-14:30	W1032	**LSDNet: Boosting change detection of high-resolution remote sensing images by Combining Convolution-Involution and Ensemble Coordinate Attention** Presenter: **Mr. Yifan Liu** Shanghai Jiao Tong University, China Change detection has always been a crucial task in remote sensing fields, and there have already been great efforts made on it for decades. However, as high resolution (HR) remote sensing images generally contain abundant ground details, it still faces a huge challenge for their change detection, especially from the aspects of change detection accuracy and speed. Concerning this issue, a novel lightweight Siamese deep network (LSDNet) is proposed, and it combines Convolution-Involution Module (CIM) and

		Ensemble Coordinate Attention Module (ECAM) for boosting the change detection of HR remote sensing images. CIM summarizes the context of ground objects and reweights the importance of different positions, while ECAM aggregates multiple levels of semantic features and pays different attention to different spatial information. The experiments on CNZ data set have shown that the proposed LSDNet performs better than state-of-the-art (SOTA) change detection methods, especially it improves the accuracy by 1.92% and reduces the amount of model parameters by 32.89% compared to SNUNet-CD which has the best performance currently.
14:30-14:45	W1049	**An Automated Candling System For Duck Egg Fertility Detection, Sorting, And Counting Via Digital Image Processing** Presenter: **Mr. Den Whilrex Garcia,** Mapua University, Philippines Duck farming is considered one of the lucrative livelihoods in the Philippines because of its many advantages with minimal cost and high-profit returns. This is the second-largest poultry industry in the country, yet this industry is still immature and underdeveloped. There were many attempts done to improve the egg production sector of the poultry industry, particularly in the candling method. However, they mainly focused on chicken eggs. Hence, automating the candling system for the incubated duck eggs would be beneficial. The main objective of this study was to create an automated candling system for duck egg fertility detection, sorting, and counting via digital image processing. The hardware of the proposed system was made from locally available components, materials, and equipment. The most suitable light source was assessed, and it was found out that a 9W White LED would give the optimum results among the tested light bulbs. The camera was also calibrated and was placed three inches away from the incubated duck egg and was mounted ninety degrees from the horizontal. The fastest allocated processing time that would give a high fertility detection accuracy was assessed and was determined to be 2.5 seconds. The classification model was created in TensorFlow and was evaluated using a confusion matrix. The results showed that the classification accuracy was 0.86, f-measure was 0.875 and the MCC was 0.7417. The functionality was also assessed and was 100% functional. The accuracy of the machine to detect the fertility of 5-, 6-, 7-, 8-, 9- and 10-day old, incubated duck eggs were also tested and were found out to be 50%, 60%, 90%, 100%, 80%, and 80% accurate, respectively. The counting of total inputted duck eggs and total sorted “balut” and ”penoy” was also 100% accurate. Lastly, the efficiency of the system was evaluated by calculating the overall equipment effectiveness and was found out to be 83.99% efficient
14:45-15:00	W3009	**A 3D-Spatial-Spectral Feature Network for Hyperspectral Remote Sensing Image Classification** Presenter: **Mr. Douglas Omwenga Nyabuga**

		Donghua University, China Hyperspectral images (HSIs) are commonly applied in environmental monitoring, urban mapping, crop study, and mineral identification. These applications recurrently call for the distinguishing of the class of each pixel. Although several convolutional neural network (CNN) models have been proposed by recent researchers, none of them have been established as promising in terms of classification accuracy because of the wealth of information involved in these sorts of images for the classification of hyperspectral remote sensing images. Also, the high-dimensionality of the information, the problem of inseparability, and the limited availability of training samples are still an open challenge. This research proposes a novel convolutional neural network 3D spatial-spectral network (Model3DSN) model for the classification of hyperspectral remote sensing data, i.e., Indian Pines, Salinas Scene, and PaviaU. First, we deployed the principal component analysis (PCA) technique for low-dimensionality reduction of pixels and then 2-D and 3-D convolutions for discriminative spectral-spatial feature learning. We compared Model3DSN's efficiency against the existing spatial-spectral state-of-the-art (SOTA) models. The high accuracy achieved with the Model3DSN demonstrates its efficiency as a SOTA method for HSI remote sensing image classification, thus providing an in-depth interpretation of HSI images.
15:00-15:15	W3010	**CT image classification of invasive depth of gastric cancer based on 3D-DPN structure** Presenter: **Mr. Wenzhi Bao** East China Normal University, China With the role of accurate preoperative staging in improving the prognosis of gastric cancer patients is clear, how to effectively improve the preoperative depth of invasion has become one of the hot and difficult issues in the medical community. In recent years, using deep learning to classify computed tomography (CT) medical images effectively improves the accuracy and efficiency of classification. The traditional deep learning method processes the 3-dimension (3D) CT data into 2-dimension (2D) data, which is able to lose the spatial information of the data itself. We propose a 3D convolutional network to classify the depth of invasion of gastric cancer, which is effective to extract 3D volume feature of CT data. We also use self-supervised learning to overcome the shortage of medical image data. Combined with our contributions, we are able to achieve most 0.975 areas under the receiver operating characteristic curve (AUC). The overall results show better AUC performance than the state-of-the-art.
15:15-15:30	W2010	**Classification of Gastric Cancer based on Teacher-attention Distillation and Improved Dual-path Network**

Presenter: **Mr. Chenchao Huang**
East China Normal University, China

Early discovery of gastric cancer plays an important role in the clinical prognosis of gastric cancer. In recent years, using deep learning to classify CT medical images effectively improves the accuracy and efficiency of classification. But traditional deep learning models lack the ability to learn rich contextual information from CT data. This paper aims to explore the way that use weakly label area image to improve the accuracy of classification of gastric CT (Computer Tomography, CT) image differentiation. We propose a new model structure that combines improved dual-path network (DPN) to reuse and mine new image features, and uses teacher attention distillation to encode rich contextual information. Combining our contributions, we are able to achieve most 0.8135 AUC. The overall results show better AUC performance than the state-of-the-art.

Session 3
Information Science and Engineering
June 20th 16:00-18:00 | Online Zoom ID: 951 7520 9496

Chair:

16:00-16:15	W1041	**An Application to train eye movement control among Thai Juniors** Presenter: **Asst. Prof. Inthraporn Aranyanak** King Mongkut's Institute of Technology Ladkrabang, Thailand Reading is an important skill for acquiring knowledge throughout life. Without the ability to read fluently, opportunities for personal fulfilment and career achievements will be decreased. This study developed an application exploiting the concept of a word's optimal viewing position (OVP) with a gaming design to encourage students to read and practice their eye movement control to recognise a word quickly. A pilot study was conducted by training grade 3 students with the application with the OVP to guide their eye fixation for 7 days to explore if their reading performance improved. Before and after training sessions were conducted without using the OVP. The result shows that those students have increased their reading performance approximately 55% after the training sessions on the OVP game. The optimal viewing position game helps the readers recognise words faster. Quantitative data were collected using Net Promoter Score (NPS). The finding shows the application has an NPS score of 33 indicating that the application is doing good and has more happy users than unhappy ones. Qualitative data was also collected by interview and found that the children were satisfied with the interface design, the application is easy to use, but they were not familiar with some words causing them to be mispronounced.
16:15-16:30	W1030	**Blockchain-based Electronic Data Storage and Certificate System of Housing Provident fund** Presenter: **Ms. Yue Gu** Hangzhou Echaincity Technology Co., Ltd., China At present, China is gradually improving the housing provident fund related businesses, however, the existing centralized system still cannot meet the needs of online business management, personal privacy protection, electronic evidence effectiveness and so on. To solve these problems, this paper proposes a blockchain-based electronic storage and certificate system of housing provident fund. With the establishment of blockchain-based data sharing platform, it supports Chongqing Housing Provident Fund Management Center to form evidence consensus mechanism. Through the construction of the "hands-on" witness facility system of the judicial institutions, data collection, trusted storage and management of the

		co-investigation data of provident fund business and key business processes are carried out, so as to ensure the validity, authenticity and legal effect of the certification materials.
16:30-16:45	W1031	**Metro Passenger Flow Forecasting Using 2A-LSTM with Multi-source Data** Presenter: **Mr. Shun Yu** Shanghai University, China Short-term passenger flow forecasting has great significance for the safety and efficiency of urban rail transit system. The existing forecasting methods mostly focus on traffic data and consider little other external factors from multi-source data such as meteorological data and point of interest data, which may exert a strong influence on the passenger flow. This paper proposes a new type of LSTM with two attention mechanisms, named as 2A-LSTM, with dataset of multivariate time series to improve the forecasting accuracy. The multivariate time series are constructed from the multi-source data by means of data fusion. These time series have characteristics of strong self-correlation, periodicity and predictability, which are the key to ensure the prediction accuracy of 2A-LSTM. The 2A-LSTM uses temporal pattern attention and soft attention mechanism to perceive the correlation of each external factor on previous time steps. Based on Shanghai Metro traffic card data, we perform experiments to measure and compare the effect of external features on the accuracy of passenger flow by using different features combination. We input time series data of single station to our model and forecast the inbound passenger flow on weekdays. The experiment results show that the accuracy is improved by using external features, and our model has good performance on multivariate time series forecasting.
16:45-17:00	W1047	**Monipay: Food Consumption and Money Outlay Monitoring System** Presenter: **Assoc. Prof. John Benedict C. Legaspi** FEU Institute of Technology, Philippines Supervision regarding the wellness and security of the students of NBCA International School is insufficient. As for short break times and only one concessionaire, negligence in the school's canteen is prominent. To administer and enrich the wellbeing of each student, MoniPay intends to monitor the consumption and expenditures of food purchased using NFC or Near-Field Communication cards where parents are notified of the student's procuring activities. Reports of student's daily and weekly expenditures are accessible in the parent application. This study emphasizes the need for the system to fulfill what is lacking in administering the wellness of the students in the school. This study is quantitative research wherein data is collected by way of surveys answered by respondents chosen through a purposive sampling technique to improve the system. The results and objectives have been met in

		line with the gathered information from research, interview, and surveys.
17:00-17:15	W3003	**Link Selection with Collaborative Low-rank and Sparse Factorization for Community Detection in Multiplex Networks** Presenter: **Assoc. Prof. Dengdi Sun** Anhui University, China With the advent of multiple types of proximities between nodes, multiplex networks have emerged widely in the real world and been attracting increasing attention recently. The existing researches on community detection in multiplex networks usually assume that all layers come from a same latent consistent topology structure, and learn compatible and complementary information from different layers together, so as to dig out a shared community structure. However, this assumption is not satisfied in many real-world networks due to the existence of noisy/irrelevant links. To address this problem, in this paper we propose a multiplex network structure optimization algorithm based on collaborative low-rank and sparse factorization, which promotes the collaboration of different layers and lets them decompose as the robust consistent representations. In addition, an effective iterative algorithm is designed to optimize and solve the model. The experimental results in multiple ground-truth datasets show that this method can significantly improve the community detection performance of multiplex complex networks.
17:15-17:30	W1056	**Senyales : FSL Translator For Day-To-Day Emergencies** Presenter: **Prof. Anthony D. Aquino** FEU Institute of Technology, Philippines In the Philippines, there is still a barrier language between the deaf and hard of hearing and abled communities. This could be attributed to how time and resource-consuming it is to learn FSL. This study aims to develop an FSL emergency sign detection in hopes to diminish the prejudice against dhh and the barrier that prevent them from being entirely accepted by non-dhh. To test the hypothesis of how fast hand detection works in emergencies using mobile, YOLO v4 tiny was used as the main algorithm for FSL detection for selected phrases often used in emergencies backed by an online survey for its usefulness. The results yielded an average accuracy of 85% in detecting the hand signs in different background environments with ample lightning and that using the mobile application to detect emergency hand signs is fast and accurate enough when in different backgrounds.
17:30-17:45	W2013	**A Novel Adaptive Resource Allocation Framework for Sounding Networks** Presenter: **Ms. Halei Hu**

		Beijing HY Orient Detection Technology Co., Ltd, China For a long time, the detection of meteorological data is very important for weather prediction. However, in the process of data detection, manual input is often tedious and data duplication is easy to be lost, which is not conducive to the acquisition of meteorological data. To solve this problem, this paper presents a novel framework for the adaptive allocation of sounding network resources and uses a genetic algorithm and simulated annealing algorithm method to optimize the processing of meteorological data. Experimental results based on real data sets show that the method proposed in this paper improves the efficiency of data processing, simplifies the manual operation, and improves the accuracy of data, which provides a new idea for the processing of meteorological data.
17:45-18:00	W1017	**Compressed Sensing Network based on Wavelet Transform** Presenter: **Dr. Zhu Yin** University of Science and Technology of China, China The traditional compressed sensing algorithm realizes the optimization of image reconstruction through multiple iterative calculation from limited measurements, which cost high computational complexity and long reconstruction time. As the development of deep learning, it is proposed to combine the technology with compressed sensing(CS) which shows great advantages in accurate and fast CS reconstruction. In this paper, we propose a novel algorithm synthesize the advantages of the two technology as well as add another sparse prior technique based sym8 wavelet, which dubbed WCS-Net, is focus on two parts: sampling network based on sparse representation and deep reconstruction elastic network. Experimental results show the WCS-Net has the advanced performance at measurement rates 0.01, 0.04, 0.1, and 0.25, respectively, while maintaining the same running speed as existing image compression methods based on deep learning.

FORMAL SESSION 4

Session 4 Virtual Technology and Multimedia June 20th 16:00-18:00 | Online Zoom ID: 947 7484 9084		
	Chair:	
16:00-16:15	W1025	**Long Short-Term Memory for Hate Speech and Abusive Language Detection on Indonesian Youtube Comment Section** Presenter: **Mr. Calvin Erico Rudy Salim** Bina Nusantara University, Indonesia Hate speech is one of the most challenging problem internet is facing today. With increasing numbers of users online, hate speech also rise and takes time to be classified manually particularly in languages other than English. This research examines hate speech detection problem in form of Bahasa Indonesia. Millions of comments and text posts are added to various social media and discussion platforms. Manual classification in all of the internet as hate speech and offensive language is a near impossible and time-consuming task. This research uses Long Short-Term Memory (LSTM) and Bidirectional Long Short Term Memory (Bi-LSTM) for the method of classifying hate speech and abusive language. The final accuracy is 88,44% by using 200 neurons with Bi-LSTM method. Most common challenges are different languages, out of vocabulary words, long range dependencies, and sarcasm.
16:15-16:30	W1050	**Nline Ordering and Recommender System of Combine Harvester Parts and Equipment with 3d Modelling and Augmented Reality Brochure for Blaze Equifarm and General Merchandise** Presenter: **Assoc. Prof. Heintjie Vicente** FEU Institute of Technology, Philippines Agriculture has a big contribution in the life of most of the residents of Isabela having rice as the main crop. Having a large farm cannot be easily harvested manually so using a harvester machine helps the farmers get the rice and sell immediately without hustle. Through this, researchers aim to provide an easier and more comfortable way of purchasing harvester parts to the consumers without going on the physical store. This online ordering with recommender system displays the products and suggest relevant items to consumers. The integration of augmented reality in the physical brochure shows the 3D animations and descriptions of the 10 major parts of the machine which gives the consumers the knowledge about a certain part before it will be used in farm operations. In summary, the developed system is aimed at giving agricultural marketing information to all the farm owners in Isabela as well as to help increase the sales of the company.
16:30-16:45	W1045	**Cities Talking – A Social Media Platform: Crowdsourcing with Sentiment Analysis and Recommender System**

		Presenter: **Asst. Prof.Ma. Corazon G. Fernando** FEU Institute of Technology, Philippines Cities Talking is a crowdsourcing system where users can check-in in local stores (restaurants, food stalls, merchandise stores) located in the Philippines using the geolocation of their device as well as leave comments, stories, and even guides that will be processed under Lexicon Based approach of Sentiment Analysis to determine the polarity (Positive or Negative) rating of the particular location. The system will also have a leaderboard system where users can collect points and badges by checking-in on different places and be ranked up against their friends and other users. The system will also offer a recommendation system to the user where the application suggests near local restaurants, malls, or restrooms, to name a few, based on their proximity and the rating of the place. Since the main essence of the system is crowd sourcing, users can also share the safety level they feel while they are on their pin-location. Their friends can also see the score they inputted as well as the average score of the area based from the total score of all users who checked-in there. To test the effectiveness of the software, the proponents conducted a survey to 5 I.T. specialists; using FURPS model, the result showed a weighted mean of 4.90 which corresponds to excellent.
16:45-17:00	W1009	**Research on Desktop Delivery Device Based on Virtualization Technology** Presenter: **Ms. Yingying Zhang** Shanghai Dianji University, China This paper introduces a method of desktop delivery device based on virtualization technology[1].Desktop delivery device creates virtual desktop[2] and makes-desktop image through virtual desktop delivery management engines.When the thin client[3] requests, the virtual desktop is assigned to the thin client and recycled from the thin client;when the fat client requests,the desktop image is assigned to the fat client and recycled from the fat client;when the zero client requests,the client image is transferred to the zero client,and then works in the way of thin client or fat client.The method can support multiple clientsin one virtual desktop architecture.
17:00-17:15	W1052	**Beast Chasers: A 3D PC-based Third Person Action RPG Game used to Spread Societal Issue Awareness** Presenter: **Prof. Maria Rona L. Perez** FEU Institute of Technology, Philippines In the video game industry, games are purposely developed and designed for entertainment, but with the innovative technology we have right now, various video games have been created that are not just for entertainment. Nowadays there are video games for education, medical rehabilitation, awareness campaigns, and applications that target a specific type of illness or impairment

		or simply to enhance the way of life. To motivate people with these predicaments, gaming has been modified to offer not only entertainment but also a way to help others. The proposed game entitled Beast Chasers — an Action Role Playing Game (ARPG) for PC Platform will make use of symbolism and deep storyline as an instrument to deliver societal issue awareness. The proponents used the Analysis of Variance (ANOVA) to figure out which age group, gender, or economic level will be most interested in the game as the project's target audience. The proponents used Convenience Sampling because it is considerably faster and easier to get findings. To assess the game impact, a questionnaire based on the Likert Scale was given to 30 people and it is used to measure opinions or perceptions about the game and it can also identify where the areas of the game can improve. The results of the game evaluation received a total of 5.54 mean implying that the game was quite satisfying and that the sample was enthusiastic about the game. Therefore, Beast Chasers has promoted and raised an awareness about the Societal Issues that the world is dealing with also making it into a form of ARPG Video Game.
17:15-17:30	W13007	**AEMT: an analytic hierarchy process-based evaluation model for IP traceback** Presenter: **Mr. Hongcheng Tian** Chinese PLA General Hospital, China Distributed denial of service attacks continue to pose major threats to the Internet. Attackers often forge source addresses to escape detection, how to effectively trace the attackers back is an important issue of Internet security. Researchers have proposed various IP traceback schemes, but for these schemes, there exist some shortcomings in the aspects of computation overhead, storage overhead, traceback accuracy, traceback time and so on. Furthermore, in the field of IP traceback, comparisons among different IP traceback methods are mainly ones of multiple evaluation indexes one by one, and there does not exist an evaluation model (or an evaluation method) to comprehensively evaluate different schemes. The paper has proposed an analytic hierarchy process-based evaluation model for IP traceback (AEMT). Subsequently, the paper takes the network supervision department (an evaluator) and selecting a method under all scenes for the random deployment (a model target) for example, and applies AEMT to evaluate four typical traceback methods based on unified simulation experiments. In the end, the evaluation result conforms to the design and application characteristics of traceback methods. AEMT can supply the traceback field with an evaluation model, which can comprehensively quantitatively evaluate different traceback schemes.
17:30-17:45	W1053	**Lost: The Search For One's Self (A Rhythm-Based Application That Promotes Awareness On Depression)**

		Presenter: **Asst. Prof. John Heland Jasper C. Ortega** FEU Institute of Technology, Philippines With the fast-paced growth of technology in our generation today, a lot of different applications has been developed in order to make people's lives more convenient and comfortable. However, due to the people's attachment to these technology, they have grown more and more sensitive with what they read from the internet (especially social media) — this in return takes toll on their mental health capabilities and provides problems for them and their families. This study aims to promote the presence of a mental health issue that has been frequently discussed by a lot of people through the years — this disorder is known to be depression. The researchers' aim in this study is to develop a game that can aid people in understanding how depression affects the character through the said game's story — and help alleviate some possible factors that saddens or disrupts the player's mind from the gameplay and music. One of the main elements from this study is that interviews from psychologists, psychiatrists, and guidance counselors would be conducted and analyzed in order to know the possible problems that the target audience of the project may or may not face in their own lives — the researchers would then conduct a survey accompanied with the Patient Health Questionnaire (PHQ-8) in order to test the game's effectiveness and enjoyment. Based from the overall results of the study, the researchers were able to analyze the gathered PHQ-8 survey and has successfully rejected their null hypothesis — which means that the project has an effect on decreasing the severity of depression of the players. Overall, the researchers were able to satisfy their objectives which makes the project a step closer in developing an application that can be positively used for both entertainment and depression awareness in the future
17:45-18:00	W2011	**Users' Application Persistence Analysis of Short Video based on Technology Acceptance Model** Presenter: **Assoc. Prof. Jia Ke** Jiangsu University, China With the development of network technology and the wide use of mobile terminals, short video has become the main carrier of people's understanding of the world, for information analysis and social interaction. It is one of the main ways for short video application platform to improve users' experience, enhance users' continuous use intention, and improve design functions. This paper constructs a technology acceptance model based on Perceived availability, Perceived ease of use, Users' satisfaction perception behavior, Value perception, Willingness to use, these five dimensions. The results show that Perceived availability, Perceived ease of use, Users' satisfaction perception behavior have a direct positive impact on users' satisfaction and willingness to use, which provides a good theoretical basis and practical guidance for short video applications to effectively improve users' stickiness.

FORMAL SESSION 5

Session 5 Intelligent Algorithm and Mathematical Calculation June 21st 10:00-12:00 | Online Zoom ID: 951 7520 9496		
	Chair:	
10:00-10:15	W1004	**SCEA: A Speed-Changing based Algorithm to Optimize Decision Time for Emergency Rescue** Presenter: **Dr. Qinyong Li** Institute of Software Chinese Academy of Science, China Decision time optimizing is a core problem during the process of disaster emergency response. Traditional methods are mainly based on expert experiences, which is lack objectiveness and error prone. In this paper, based on the practical disaster assessment results and the disaster model we built, we propose two algorithms, DCEA and SCEA, to cope with the problem. DCEA is a distance-based algorithm to convert disaster assessment results series to unevenly time series. In this algorithm, we utilize Hausdorff distance as the distance operator. Compared to DCEA, an optimized speed-changing based algorithm SCEA is proposed. Experiments on real earthquake disaster events demonstrate the effectiveness and superiority of proposed work.
10:15-10:30	W1005	**An in-silico study: Investigating the blockade mechanism of therapeutic antibody durvalumab** Presenter: **Dr. Wenping Liu** Guangdong Food and Drug Vocational College, China Durvalumab, approved by the US Food and Drug Administration (FDA) in 2017, is a human monoclonal antibody targeting the programmed death receptor 1 (PD-1)/ programmed death ligand 1 (PD-L1) pathway. Although the crystal structure of the durvalumab/PD-L1 complex is reported in 2017, some key residues might be missed in that static structure. Here, molecular dynamics simulation (MD) was used to investigate the blockade mechanism of antibody durvalumab dynamically. Our results showed that the interfacial residues of PD-L1 upon durvalumab binding locate on the C strand (PD-L1GLU58), CC' loop (PD-L1GLU60), F strand (PD-L1ARG113) and G strand (PD-L1ARG125). The overlap binding region on PD-L1 for PD-1 and durvalumab is the G strand. Thus, antibody durvalumab block PD-1/PD-L1 interaction through competitive binding of the G strand of PD-L1.
10:30-10:45	W1015	**Improved RRT Algorithm Path Planning Combined with Artificial Potential Field Algorithm** Presenter: **Ms. Xiufen Wang** University of Science and Technology of China, China

		In order to solve the problem of low path planning efficiency in complex obstacle environment, an improved Rapidly-exploring Random Trees (RRT) algorithm is proposed. It utilizes artificial potential field to guide the fast expanding random tree to growing towards the target and away from obstacles. Considering the gravitational field of the target node and the repulsion field of the obstacle in the artificial potential field, a certain number of random nodes generated in one iteration are evaluated and selected. The simulation results show that the improved RRT algorithm has strong advantages over the basic RRT algorithm in search ability and computation time.
10:45-11:00	W1034	**The β-differential for the square lattice** Presenter: **Mr. Lei Zhang** Qinghai Normal University, China In this paper, we study the β-differentials of the square lattice graphs. By the adjacent vertex number sequence of a given vertex set, some closed-form formulas of the β-differentials in the square lattice graphs are obtained. The results show that the differentials of the square lattice graphs are periodic, so we can get the differential recurrence formula of the general square lattice graph.
11:00-11:15	W1058	**A Novel Testing Method for Interrupt Response Time** Presenter: **Mr. Zhen Liu** Fudan University, China Interrupt response time is an important index to measure the real-time performance of real-time operating system. Accurate test data can be the evaluation index for selecting real-time operating system. This paper proposes a test method for interrupt response time based on W2 chip. It can test the statistical distribution of interrupt response time quickly and accurately. The results show that the Linux real-time preemptтion patch has better real-time performance than Linux and the two operating systems have better real-time performance under no load. The results also prove that the test method is effective. The test method provides a basis for the development of real-time tasks.
11:15-11:30	W1057	**A Hybrid grasshopper Optimization Algorithm Based on simulated annealing** Presenter: **Mr. Cong Yang** Dongguan University of Technology, China This paper proposed a hybrid grasshopper optimization algorithm to overcome the disadvantages that the grasshopper optimization algorithm was

		easy to fall into local optimal solution and low accuracy. Firstly, this work used reverse learning strategy to generate the initial population to enhance the global search efficiency and the quality of the solution; secondly, the dynamic compression factor is introduced to replace the linear adaptation of the key parameters in the basic grasshopper optimization algorithm to enhance the global search ability of the algorithm; finally, this paper adapts to the metropolis receiving criterion of simulated annealing algorithm to receive the poor solution with a certain probability, so that the algorithm can be used Enough to jump out of the local optimal solution. Experiments show that the hybrid grasshopper optimization algorithm has stronger global search ability, better accuracy, and can effectively jump out of the local optimal solution.
11:30-11:45	W1023	**Research on Collaborative Scheduling Algorithm for Container Cloud Task** Presenter: **Mr. Kai Huang** Institute of Electronics, Chinese Academy of Sciences, China The early task scheduling algorithm generally completes the static scheduling action from the perspective of the inherent resource usage. This way also lacks the feedback regulation of the running environment, and it is easy to fall into local optimum and cannot achieve the best convergence. To solve this problem, a rule-based collaborative scheduling algorithm for container cloud (CSC2T) is proposed. Firstly, we construct the scheduling rules according to the relationship between nodes and tasks, and describe the problem of finding the best node for scheduling. Then, the nodes are divided into task-related nodes and task-irrelated nodes according to their states. For task-related nodes, the correlation coefficient of twin services and dependent services are described by AHP model. For the task-irrelated nodes, pearson similarity model is used to describe the correlation coefficient of the nodes with twin instances. Combined with two scoring methods, the forward scheduling calculation based on multi-objective is realized. Finally, four kinds of indicators are selected as the feedback evaluation criteria to update the parameters. The experimental part verifies the feasibility of the algorithm from different angles such as resource imbalance degree, resource utilization rate, replica scheduling imbalance degree and dependency scheduling imbalance degree, and improves the overall efficiency of task scheduling in container cloud.
11:45-12:00	W1029	**System Dynamics Model of Supplier Function in ERP construction Project** Presenter: **Mr. Ruikang Liu** Sichuan University, China ERP plays a huge role in the development of enterprises, but the implementation of ERP construction projects is usually affected by many factors, and the role of vendor is an important part. In this paper, we integrally consider the overall project and the role of vendor to explore the utility of efforts of vendor in different directions and the influencing factors for the

		effort of vendor. Based on the method of system dynamics, we conduct modeling and simulation, and analyze the role and influencing factors of vendor in ERP construction projects through the analysis of the simulation results.)

FORMAL SESSION 6

Session 6 Communication and Signal System June 21st 10:00-12:00 | Online Zoom ID: 947 7484 9084		
	Chair:	
10:00-10:15	W1008	**Design of Underwater Robot Operation System Based on Visible Light Communication Technology** Presenter: **Ms. Mengyu Yang** Tianjin University of Technology and Education, China In this paper, visible light communication technology is applied to the operation system of underwater robot. The underwater robot in the system is controlled by STM32 single chip microcomputer. The blue LED light source of the underwater robot is used as the transmitting end of visible light communication, and the PIN silicon photodiode is used as the receiving end of visible light communication. The operation system network of underwater robot based on visible light communication technology is established, The functions of ranging, positioning, grasping and placing the target are realized.
10:15-10:30	W1013	**Design of water quality and quantity ecological compensation monitoring system based on wireless sensor network** Presenter: **Ms. Shumin Wang** Beijing Normal University, China As an effective means to solve the environmental resource problems of the river basin and coordinate the economic and social development of the upstream and downstream, a number of pilot projects have been carried out internationally.The establishment of river basin ecological compensation standards requires monitoring of a number of indicators in the river basin to formulate corresponding assessment targets.In order to solve the problems of single monitoring indicators, inconsistent water quality and hydrological monitoring points, and low monitoring accuracy in the current river basin monitoring system in my country, this paper designs a pollutant flux ecological compensation monitoring system that can be used for ecological compensation in the river basin. Compensated river temperature, redox potential, conductivity, pH, transparency, ammonia nitrogen, permanganate index, water level, flow rate and flow rate and other indicators for real-time monitoring. The system realizes the real-time collection, transmission, display and storage of water environment and water resources data in the river basin, and meets the current needs of constructing water quality and quantity river basin ecological compensation with the advantages of low cost, flexible and convenient layout, and high precision.

10:30-10:45	W2014	**Training Instance Segmentation and Lane Detection Models in One Network Architecture** Presenter: **Mr. Dunan Ye** East China Normal University, China A new network architecture with a novel training method is proposed in this paper which can achieve two tasks of road defects instance segmentation and lane detection. It is composed of a backbone and two independent output branches for instance segmentation and lane detection. The experiments are conducted on new datasets collected by us. Through our method of alternately training two network branches while continuously reducing the learning rate, it can be found that he accuracy of our two branches can be similar with the accuracy training with two different models. This shows the effectiveness of our training method. Furthermore, our method can reduce model memory.
10:45-11:00	W1002	**Overview of Beamforming Research** Presenter: **Mr. Pengcheng Ge** Space Engineering University, China Beamforming is one of the core technologies in the field of array signal processing. It is widely used in different fields, especially in wireless communication, radar, sonar, medical engineering and microphone voice array processing. For beamforming, the most important problem is the selection of optimal weighting coefficient and the comprehensive consideration of robustness. On this basis, this overview classifies and summarizes beamforming algorithms in recent years, which can be divided into five categories: based on covariance matrix reconstruction algorithm, based on steering vector correction algorithm, based on second-order cone programming algorithm, based on broadband subarray algorithm, based on neural network algorithm. Finally, the future development trend of beamforming technology is discussed.
11:00-11:15	W1014	**Pilot Contamination Attack Detection Method Based on OFDM Pilot Signal** Presenter: **Mr. Jianqiu Xiong** Hunan University, China Pilot contamination (PC) attack is a well-known active eavesdropping attack. Because of the public transmission protocol, frame structure and pilot sequence set, the eavesdropper (Eve) can send the same pilot as the legitimate user (Bob) to actively affect the channel estimation process at the base station(BS). This results in the contamination of the channel state information (CSI) measured at BS, the alteration of the legitimate beamformer

		design and information leakage. In this paper, we use the statistical characteristics of the channel to detect whether there is a pilot contamination attack. The secure region is deduced theoretically, which makes the detection of pilot contamination attack more accurate.
11:15-11:30	W1011	**Muffler used on civil aircraft air condition noise reduction** Presenter: **Mr. Xudong Yan** ShangHai Aircraft Design and Research Institute, China Civil aircraft air condition noise is one of the main resource of cabin noise. Muffler is widely used to reduce aircraft air condition noise. Muffler acoustics performance is related to the interior structure and sound absorption material in muffler. The noise reduction effect is varied by simulation and laboratory test. Acoustics test result on aircraft with muffler indicate that cabin noise drop more than 6 dB with muffler.
11:30-11:45	W2005	**Improved State-Recovery Attacks on Modified KETJE JR** Presenter: **Mr. Guo-Shuang Zhang** Chinese Academy of Sciences, China KETJE, a lightweight authenticated encryption cipher is a third-round candidate of CAESAR competition whose design principles are similar to SHA-3 hash function. Fuhr et al. studied the security of KETJE JR against divide-and-conquer attacks and proposed state-recovery attacks on modified KETJE JR. In this paper, we study the relations among the algebraic representations of internal state bits, and find new guessing strategies based on Fuhr et al.'s method. With the usage of new guessing strategies, we improve the state-recovery attacks on KETJE JR v1 when r=40 and r=32. Compared with Fuhr et al.'s work, our results are more efficient. The relults do not threaten the security of KETJE in practice, but provide evidence for improving the efficiency of KETJE by increasing the rate.
11:45-12:00	W2016	**EMI Signal Classification based on Improved HHT and CNN** Presenter: **Hongyi Li** Beihang University , China This paper proposes a new single channel EMI signal classification method. In this method, we propose to use an improved HHT algorithm, BEMD algorithm + HT algorithm, to convert nonlinear and non-steady-state single-channel electromagnetic interference signals into time-frequency domain matrices, which solves the problem of traditional EMD algorithms. The mixed-mode problem is extracted to a better time-frequency domain feature matrix. After that, we use the time-frequency domain matrix as the input of the CNN to classify the EMI signals. By the simulation signal experiment and EEG signal experiment verification, the proposed algorithm has a good classification effect

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Chair:

14:00-14:15	W3007	**Electric Load Combination Forecast Method Based on EEMD** Presenter: **Ms. Yajing Wang** Beijing Institute of Technology, China Load forecasting is of great significance to improve power system safety and reliability. Aiming at the problems of low electric load forecast accuracy and strong randomness, a combined load forecast method based on ensemble empirical mode decomposition is proposed. First, ensemble empirical mode decomposition is used to decompose the load data into intrinsic mode functions with different frequencies, and the sample matrix is formed according to decomposed components. Then, principal component analysis is used to construct a transformation matrix which is used to reduce the noise of the sample matrix, unit root test is used to judge the stability of each component of the sample matrix after noise reduction. If the component is judged to be stationary, multiple linear regression is used to forecast. If the component is judged to be non-stationary, long short term memory is used to forecast. Superimpose the results of each component to get the final load forecast result. Based on the proposed method, the load of a certain area in Shanxi is forecasted and compared with other methods. The results show that this method can forecast the load more effectively while reducing the noise of the load.
14:15-14:30	W1022	**Research on Intelligent Processing Technology of Alarm in PowerMonitoring System** Presenter: **Mr. Li Zeke** State Grid Electric Power Research Institute Nanjing ,China In the power monitoring system, the control center collects a large amount of alarm and status information from the main station system and the plants under its jurisdiction every day. Most of duty officers deal with the alarms based on experience, so that it is difficult to ensure the correct judgment and handling of the alarms. This paper proposes a knowledge base-based alarm processing and solution recommendation function, using big data storage,data mining technology,machine learning technology to achieve the extraction of alarm attribute characteristics, online real-time analysis and reasoning of alarm processing methods or suggestions. Adopt the method of constructing knowledge base to assist on-duty personnel to analyze and process alarms in time And intelligently recommend alarm solutions, which

		are of great significance to ensure the safe operation of power grids and equipment, and significantly improve the comprehensive management and control capabilities of power monitoring systems for security threats.
14:30-14:45	W1024	**Design of Smart Southwest Tourism Monitoring and Management System** Presenter: **Dr. Xuejie Hao** Beijing Normal University, China With the rapid economic development, the improvement of material and cultural levels, and the transformation of people's consumption consciousness, the tourism industry has shown full of vitality, especially in the southwestern region with lucid water and lush mountains, and primitive landscapes have become a tourist hotspot. On the one hand, there is a surge in tourists. Another aspect is the protection of the environment. How to better promote the development of tourism in the protection, so that both have a harmonious development, it is necessary to invest heavily in management. This paper designed a smart southwest tourism monitoring and management system based on wireless sensors for the southwest tourism area. This system changed the design of the previous monitoring system that focused on pollutant monitoring but instead monitors the beautiful environmental quality parameters such as air quality (PM2.5, negative oxygen ions, etc.) and the ecological environment that can reflect the original characteristics of the Southwest. At the same time, it can also conduct real-time monitoring and early warning of pest control, human activities, and fire conditions. The system can collect, transmit, display, store and analyze environmental indicators in real-time. It has the advantages of low construction cost, flexible and convenient layout, and high precision, which can meet the current needs of building tourism area monitoring and management.
14:45-15:00	W2007	**A Decision-making Module for Fertilization and Irrigation Control System in Rice Farming using Markov Chain Process and SARSA Algorithm** Presenter: **Mrs. Peace Bamurigir** University of Rwanda, Rwanda The merging of modern sensor technologies, the Internet, and advanced control of irrigation and fertilization with an Internet of Things (IoT) approach allow a relatively precise control of agriculture. This IoT approach can thereby increase the resilience of agricultural systems in the face of complex demands for water and fertilizer use, even in countries such as Rwanda with low levels of economic development as long as appropriate and low cost technologies are used. In this work, we add to our previous IoT design for an irrigation system by adding a fertilization system. The proposed low cost system will provide individual farmers fertilization and irrigation options informed by reservoir capacity, water level, predicted rainfall, and temperature along with soil

		condition and pH. IoT data are assessed in the context of rice growth stages as a Markov Chain process, or in the case of IoT system fault, assessed using the SARSA temporal difference technique. Simulations for the Muvumba Valley rice project in Northeast Rwanda demonstrate the potential of this IoT system to increase rice yield while decreasing fertilizer and water use.
15:00-15:15	W2301	**A Novel Static Sector Capability Evaluation Method and Correlation Study** Presenter: **Mr. Jiawei Kang** Nanjing University of Aeronautics and Astronautics, China At present, there is no clear definition and quantitative standard of static sector capacity for air traffic control, which leads to an unsafe phenomenon that the number of aircraft far exceeds the static sector capacity. Furthermore, economic losses and safety issues are brought when the static capacity is exceeded, but the dynamic capacity is not reached. This paper builds a novel calculation model of static capacity with the proposed concept of Operational Complexity. Then the relationship between Static Sector and Dynamic Sector Capacity is established based on the numerical result of Operational Complexity. Finally, a case study shows the assessment procedure of the proposed correlation for the air traffic control sector.
15:15-15:30	W3005	**Failure Prediction for Temporal Dependency of Hard Drives** Presenter: **Ms. Liyu Zhu** Guangxi Normal University, China Cloud service providers strive to predict hard drives' failure in advance to enhance user confidence in cloud storage resources. We explored the failure property from the self-monitoring, analysis, and reporting technology features of hard drives, finding that the long-term temporal changepoint dependency (LTCD) of hard drive failure creates new reconstruction challenges in failure prediction. The failure prediction for temporal dependency (FPTD) presented in this paper has three characteristics: primary identifying features and changepoint features and enhancing changepoint dependency, all of which make FPTD more sensitive to the failure of hard drives with LTCD. The experimental results show that the five evaluation metrics of FPTD are all above 94% while maintaining a low false alarm rate, among which Accuracy can reach 99.0% and Recall can reach 97.6% on average. In general, the FPTD has higher prediction quality and better stability, and is more suitable for predicting hard drive failures in the long-short temporal.
15:30-15:45	W2015	**EMI Signal Encoding based on Deep Auto-encoder Combined with Wavelet Transformation** Presenter: **Zhen Peng**

		Beihang University , China With the development of electronic technology, digital devices are becoming more sensitive to electromagnetic interference. As a result, the recognition methods are under scrutiny. To find the way to improve the accuracy of electromagnetic interference recognition, this paper presents a signal encoding method based on deep auto-encoder and wavelet transformation. We use wavelet de-noising as the first step on our method to reduce the noise interference. Then a deep auto-encoder is trained for extracting EMI signals' feature. Results on evaluation the reconstruction error and recognition accuracy demonstrate that our approach outperforms comparison methods, which indicates that the proposed method could better capture the data structure of the high dimensional EMI signals.

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