Foreword

Special Issue on AI Drives Our Future Life

This special issue on AI Drives Our Future Life addresses the timely issue of future trends and applications of computer technologies. The special issue includes the extended version of selected papers accepted to the 2020 International Computer Symposium (ICS 2020), which was held on December 17-19, 2020. ICS 2020 was hosted by National Cheng Kung University in collaboration with the Ministry of Education, Ministry of Science and Technology, and the IEEE Tainan Section. All seven accepted papers in this special issue have gone through additional reviews from at least three reviewers. Each paper is briefly described below.

The paper "A Novel Detection Method for the Security Vulnerability of Time-of-Check to Time-of-Use" focuses on application of artificial intelligence to ensure systems security for various intelligent applications. Time-of-Check to Time-of-Use (TOCTOU) is one of the security vulnerabilities in C codes, a kind of bug caused by race conditions. The proposed method statically detects the TOCTOU vulnerability by implementing a tool built atop of a solid static analyzer. The tool is evaluated with the test cases for TOCTOU vulnerabilities and compared with existing detection methods.

The paper "SandboxNet: A Learning-Based Malicious Application Detection Framework in SDN Networks" aims at the malicious software issue on SDN networks. The proposed sandbox network (called SanboxNet) emulates a virtual isolated network environment to verify the SDN application functions. If the system detects some pre-defined malicious behaviors, the system can locate the suspicious SDN application through continuous monitoring. Besides, machine learning techniques are applied to identify unknown malicious applications.

The paper "Spatiotemporal Data Warehousing for Event Tracking Applications" proposes a multidimensional spatiotemporal modeling framework of data warehouse creation for tracing dynamic events, such as crowd contact tracing for Covid-19 prevention. The proposed framework provides a natural and consistent solution for slowly changing dimension management. Based on such a framework, applications with entity-centered resource integration can be rigorously developed, managed and properly tracked.

The paper "A Systematic Literature Review of Volumetric 3D Model Reconstruction Methodologies Using Generative Adversarial Networks" presents

a systematic literature review of the current weakly-supervised and unsupervised methods on volumetric 3D object reconstruction utilizing GANs with a voxel representation. The review aims at offering insights on the constraints and potentials of the studied works for possible future works.

The paper "A Study on Traffic Asymmetry for Detecting DDoS Attack in P4-based SDN" proposes a sketch-based method of data collection in the P4-based data plane, which sends less data to controller than the Openflow-based data plane with limited data size. The proposed method collects data of both attackers and victims by asymmetric characteristics of data flows, which contributes to the mitigation of DDoS attacks by inserting rate-limited rules on the data plane. Performance of the proposed method is evaluated through experiments in terms of F1 score. The results of labeling data by the K-means algorithm on the control plane are also presented.

The paper "Microservice Migration Using Strangler Fig Pattern and Domain-Driven Design" develops a microservice migration scheme based on the Strangler Fig pattern and Domain-Driven Design (DDD). The efficacy of the proposed scheme was evaluated in two cases studies, including the Data-Custodian system of the Green Button project and the BBDP (Bridge between Doctors and Patients) system.

The paper "Deformable Convolutional Neuron Network Model for Detecting Tables and Columns from Document Images" proposes a deformable convolutional neural network model for table detection to identify and extract tables from electronic document images. The model can perform table detection and table structure recognition at the same time, and more effectively detect the location of tables and columns. Performance of the proposed model in terms of precision, recall, and F1-score is evaluated using Marmot extended dataset.

• Introduction to Guest Editors •

De-Nian Yang is a professor in Institute of Information Science, Academia Sinica. He received Best Paper Nomination of the IEEE GLOBECOM, PAKDD Best Paper Running-Up Award, Best In-Session Presentation Award of IEEE INFOCOM, Best Student Paper Award of IEEE ICME, ACM CHI Best Paper Honorable Mention Award, and Emerging Technologies Prize in ACM SIGGRAPH Asia. He is the general

chair of DASFAA, program chair of PAKDD, symposium chair (three times) of IEEE GLOBECOM and ICC, demo chair of WWW, workshop chair of IEEE MDM, and associate editor of ACM Computing Surveys, IEEE Trans. on Multimedia, and IEEE Trans. on Parallel and Distributed Systems. He is a Senior Member of IEEE and a Distinguished Member of ACM.

Wei-Ta Chu received the B.S. and M.S. degrees in Computer Science from National Chi Nan University (NCNU), Taiwan, in 2000 and 2002, and received the Ph.D. degree in Computer Science from National Taiwan University, Taiwan, in 2006. He was a Professor in National Chung Cheng University (CCU) from 2007 to 2019. He is now a Professor in the Department of Computer Science and Information Engineering, National Cheng Kung University, Taiwan. His research interests include digital content analysis, multimedia indexing, deep learning, and pattern recognition.

He won IEEE MSA-TC Best Paper Award at ISCAS 2021 and the Best Full Technical Paper Award at ACM Multimedia 2006. He was awarded Outstanding Youth Electrical Engineer Award by the Chinese Institute of Electrical Engineering in 2017, the Distinguished Alumni Award presented by NCNU in 2014, Best GOLD Member Award presented by IEEE Tainan Section in 2013, the K. T. Li Young Researcher Award presented by Institute of Information & Computing Machinery in 2012, and the Young Faculty Awards presented by CCU in 2011. He was a visiting professor at Nagoya University in 2017 and Columbia University in 2008. He is an associate editor (AE) of IEEE Transactions on Multimedia from 2022, and was an AE of IEICE Transactions on Information and Systems from 2016 to 2020. He serves as a GC of ACM Multimedia Asia 2023, a TPC of MVA 2023, IEEE ICME 2022, ACM ICMR 2021, MMM 2020, and IEEE MMSP 2019; a Publication Co-Chair of ACCV 2020, IEEE VCIP 2018, and ICS 2016.

Shin-Jie Lee is an Associate Professor in Computer and Network Center at National Cheng Kung University (NCKU) in Taiwan and holds joint appointments from Department of Computer Science and Information Engineering at NCKU. His current research interests include software engineering and automated software testing. He received

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