Guest Editorial: Special Issue for ICS 2022

Ling-Ju Hung*, Chia-Wei Lee, Sanpawat Kantabutra

The International Computer Symposium (ICS 2022) was held at National Taipei University of Business, Taoyuan, Taiwan during December 15-17, 2022. ICS is one of the largest joint international IT symposia held in Taiwan. Founded in 1973, it is intended to provide a forum for researchers, educators, and professionals to exchange their discoveries and practices, and to explore future trends and applications in computer technologies. The biannual symposium offers a great opportunity to share research experiences and to discuss potential new trends in the IT industry. Extended versions of select exceptional papers have been invited for inclusion in this special issue, and we are also welcoming additional submissions. Rigorous evaluation by a minimum of two reviewers, specializing in the respective research areas, was conducted for each paper submitted to this issue. In the end, five papers have been selected for inclusion in this special issue, and a brief summary of these papers is provided below.

In the paper entitled "*Designing a Multi-Criteria Decision-Making Framework to Establish a Value Ranking System for the Quality Evaluation of Long-Term Care Services*" by Lun-Ping Hung, Weidong Huang, Sheng-Tzong Cheng, Zong-Jie Wu, and Syuan Ou Yang, they studied the imperative for establishing long-term care residential facilities in response to Taiwan's aging population. Emphasizing the need for proper supervision and guidance, it advocates for the implementation of a value assessment system using a multi-criteria decision-making (MCDM) approach. This system enables a comprehensive evaluation of long-term care service quality, allowing decision-makers to prioritize and strategize improvements based on diverse indicators and weights. The proposed information-based assessment model incorporates consumer reputation, environmental social governance (ESG), and various quality dimensions. Employing the analytic hierarchy process (AHP), it addresses complex multi-dimensional issues to assist care service agencies in making informed decisions, ultimately enhancing their competitiveness, public trust, and recognition in the evaluation of care service quality.

In the paper entitled "*A User-friendly Cloud-based Multi-agent Information System for Smart Energy-saving*" by Yi-Jen Su and Sheng-Yuan Yang, the authors studied the development of a user-friendly cloud-based multi-agent system that integrates various intelligent technologies, including case-based reasoning, data mining, and intelligent user interfaces. This system aims to efficiently gather high-quality cloud information for timely smart energy-saving, utilizing Web services, ontology, open data, and big data analytics. Built upon advancements in the Dr. What-Info system, the study conducts a thorough review of relevant technologies for constructing a Web services platform and explores methods to seamlessly integrate and facilitate cloud interaction. Performance and operational experiments are rigorously conducted to showcase the effectiveness and efficiency of the system interface, providing detailed insights into relevant research and development technologies and results.

In the paper entitled "*TV-ADS: A Smarter Attack Detection Scheme Based on Traffic Visualization of Wireless Network Event Cell*" by Zhiwei Zhang, Guiyuan Tang, Baoquan Ren, Hongjun Li, and Yulong Shen, the authors studied the increasing need for cybersecurity measures, highlighting the use of attack detection systems (ADSs) and intrusion detection systems (IDSs) in various network environments. With recent advancements in big data, machine learning, and artificial intelligence (AI), there is a growing trend towards AI-based ADSs/IDSs. The focus on computer vision algorithms, known for their efficacy in image classification and pattern recognition, has led to their application in detecting malicious software and traffic. However, the authors identified those challenges in wireless networks, particularly in the varied results based on mapping methods for transforming network traffic data into visual images. To address this, the paper proposes an AI-based attack detection scheme (TV-ADS) with a novel traffic-image mapping method. This method segments sequential network traffic, transforms images to a standard size, and employs a CNN model to recognize normal and malicious traffic based on these visual network event images. Experimental results on the AWID3 dataset indicate that TV-ADS outperforms existing schemes in terms of accuracy, precision, recall, F1-score, and efficiency.

In the paper entitled "*A Construction of Knowledge Graph for Semiconductor Industry Chain Based on Lattice-LSTM and PCNN Models*" by Charles Chen, Sai-Sai Shi, and Sheng-Lung Peng, they studied on constructing a knowledge graph for the semiconductor industry chain, with key research areas encompassing knowledge extraction, storage, and graph construction within the semiconductor field. The methodology involves utilizing crawler technology and character recognition to gather information from various sources such as the Internet, magazines, and institutions, creating the original dataset. The Lattice Long Short-Term Memory (Lattice-LSTM) model is employed for entity

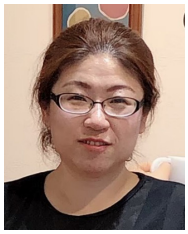
*Corresponding Author: Ling-Ju Hung; E-mail: ljhung@ntub.edu.tw

extraction and recognition, while the piecewise convolutional neural network (PCNN) with a sentence-level attention mechanism is used for relationship extraction and obtaining entity triples. The structured data obtained is used to build a semiconductor dictionary library. A combination of this library and the Chinese natural language toolkit HanLP is employed to annotate unstructured text data for knowledge extraction. The extracted data is stored in the Neo4j graph database, and a knowledge graph system is created using Spring Boot and Vue technology.

The paper entitled "*A Compact Depth Separable Convolutional Image Filter for Clinical Color Perception Test*" by Zheyi Wen, Chenlu Ye, Ming Zhao, and Fang-Chuan Ou Yang, they introduced a depthwise separable convolution filter pruning method based on PCA to address issues such as high computation, time consumption, and memory demands in deep convolutional neural networks. The method replaces conventional convolution in ResNet with depthwise separable convolution, using depthwise convolution to widen the network and enhance feature extraction, and pointwise convolution to reduce computational complexity. PCA is then applied for filter pruning, achieving substantial improvements in calculation speed and model accuracy, with a 91% reduction in model parameters and MACs on ResNet while maintaining a 95% test accuracy on the clinical Color Perception Test Chart.

As the Guest Editors of this special issue, we would like to thank all reviewers and authors for their efforts in making helpful comments and significant contributions to this special. Finally, we thank Dr. Han-Chieh Chao, the Editor-in-Chief of JIT journal, for his encouragement and support to publish this special issue and to Ms. Sharon Chang, the Assistant Editor, for her professional help during the preparation of this special issue.

Guest Editors



Ling-Ju Hung received PhD degree from the Department of Computer Science in National Chung Cheng University in July 2012. The research topic of Dr. Hung's doctoral thesis is to design and analyze the algorithms for the recognition of probe graph classes. She has published 54 papers including 19 journal papers, 35 conference papers, and edited four books. Moreover, she has served as a guest editor of international journals including Journal of Computer and System Sciences, Algorithmica, Theoretical Computer Science, and Journal of Combinatorial Optimization. From August 2012 to July 2015, she was a postdoctoral research fellow at HungKuang University. In September 2015, she joined the Department of Computer Science and Information Engineering in National Cheng Kung University (NCKU) as a postdoctoral research fellow. In 2018, Dr. Hung applied her algorithm background on solving industrial issues. She joined AROBOT as a senior manager to lead the Department of Algorithms. She led the algorithm team in AROBOT to build a speech recognition engine and won an excellent industrial system award in Formosa Speech Recognition Challenge in 2018. Since 2019, she has joined National Taipei University of Business as an assistant professor. Now she is working on the design and analysis of exact algorithms and approximation algorithms on optimization problems which have applications on networks.

Chia-Wei Lee received the BS and MS degrees in the Department of Computer Science and Information Engineering from National Chi Nan University, Taiwan, in 2003 and 2005, respectively, and the PhD degree in the Department of Computer Science and Information Engineering, National Cheng Kung University, Tainan, Taiwan, in November 2009. He then served the compulsory 11-month military service. From December 2011 to July 2017, he was an assistant research fellow at the Department of Computer Science and Information Engineering, National Cheng Kung University. In 2017, he joined the Department of Computer Science and Information Engineering, National Taitung University, and now he is an associate professor. His current research interests include graph theory and algorithms, interconnection networks, and system-level diagnosis. He has published 38 papers including 24 journal papers, 14 conference papers, and edited a book and four proceedings (COCOON 2021, SocialSec 2021, ICS 2022, IWOCA 2023). He has served as a guest editor of international journals including Theoretical Computer Science, Journal of Combinatorial Optimization, International Journal of Computer Mathematics: Computer Systems Theory and Algorithms.

Sanpawat Kantabutra is currently Associate Professor in the Theory of Computation Group in the Faculty of Engineering in Chiang Mai University, Thailand, and a researcher in the Research Center for Quantum Technology in Chiang Mai University. He has awarded Doctor of Philosophy (Theoretical Computer Science) from Tufts University, USA in 2001. From 2021 onwards, he is serving as the Director of the Center of Excellence in Quantum Technology at Chiang Mai University. He is also serving as Visiting Mathematics Lecturer, School of Integrated Innovation, Chulalongkorn University, Thailand. He has regularly published his research findings in some of the world's top journals in theoretical computer science. His current research interests are in approximation and randomized algorithms and quantum computation and algorithms.