Guest Editorial: Special Issue for I-DO 2024

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I-DO 2024 is a leading conference designed to unite academic researchers and industry professionals from a wide range of disciplines, fostering cross-disciplinary collaboration on data-related challenges. In today's data-driven era—marked by complex issues impacting society and human well-being—the conference serves as a dynamic platform for scientists, engineers, researchers, practitioners, educators, and students. Participants will have the opportunity to exchange insights, present cutting-edge research, and discuss technological innovations in Information Technology, Data Science, and Optimization. By encouraging collaboration and creating valuable networking opportunities, I-DO 2024 aims to stimulate innovation and advance progress across these critical fields.

This special issue invited selected authors to submit extended versions of their outstanding papers, while also welcoming additional contributions. All submissions underwent a rigorous peer-review process, with each paper evaluated by at least two experts in the relevant field. In the end, five papers were accepted for inclusion in this issue, and a brief overview of them is provided below.

In the paper entitled "*A Two-Echelon Location-Routing Problem for Optimizing Agro-Logistics and Sustainability Enhancement*" by Jia-Rong Kang, Meng-Huai Chang, Shih-Jung Wu, Chih-Kun Ke, and Yi-Chun Peng, they proposed an enhanced contract farming model. To enhance the sustainability and practicality of contract farming logistics, this study proposes a two-echelon location routing problem (2E-LRP) that determines both the placement of intermediary facilities and the routing of vehicles across two distribution levels. The objective is to minimize total carbon emissions while incorporating realistic constraints, such as facility and vehicle capacities, farm production levels, and the effects of route types and travel distances on fuel consumption. To solve this complex problem, an elitism-based genetic algorithm (EGA) is developed and evaluated against other metaheuristic approaches, including genetic algorithms (GA), particle swarm optimization (PSO), and VaNSAS. Experimental results demonstrate that the proposed EGA can efficiently generate high-quality solutions across test instances of varying sizes.

In the paper entitled "*Tracking Knee Rehabilitation at Home Using a Smart IoT Wearable Triaxial Accelerometer*" by Syu-Bo Jhang, Jiann-Liang Chen, Shih-Yang Yang, Zong-Jie Wu, and Lun-Ping Hung, this study proposes a home-based knee rehabilitation monitoring and alert system that employs a wearable triaxial accelerometer to continuously capture knee movement data, including joint range of motion, repetition counts, and exercise holding durations. The collected data are transmitted wirelessly to a cloud platform for storage and analysis. Based on predefined rehabilitation protocols and personalized safety thresholds, the system can automatically detect potential risks during exercise, such as excessive joint angles, prolonged holding times, abnormal movement patterns, and unexpected interruptions, and promptly send alert notifications to caregivers or healthcare professionals via mobile devices. Preliminary results suggest that, when integrated with professional therapists' evaluation and feedback, the proposed system can enhance adherence to rehabilitation programs, reduce the likelihood of improper movements, and enable effective remote monitoring by clinicians. These findings highlight its potential as a foundation for intelligent rehabilitation support systems and remote healthcare services.

In the paper entitled "*Revocable and Conditionally Anonymous Certificateless Authentication for VANETs*" by Peiyong Sun, Yangfan Liang, Mingrong Xiang, and Yining Liu, the authors propose a revocable and conditionally anonymous certificateless authentication scheme with protection against physical theft. The scheme utilizes a pairing-free certificateless aggregate signature to enhance computational efficiency. It also incorporates a conditional anonymity mechanism that assigns dynamic pseudonyms to protect vehicle identities, while allowing a trusted authority (TA) to reveal the true identity when necessary. In addition, a Dynamic Sparse Merkle Tree (DSMT) is adopted to enable efficient pseudonym revocation and real-time identity management with low communication overhead. To further strengthen security against physical attacks, the scheme integrates Physical Unclonable Functions (PUFs) and a fuzzy extractor, binding cryptographic keys to unique hardware characteristics and preventing key extraction. Comprehensive security analysis and performance evaluations demonstrate that the proposed approach achieves superior reliability and efficiency compared to existing methods.

In the paper entitled "*A Style-Transfer-Based Augmentation Framework for Ship Recognition in Infrared Imagery*" by Yan-Ann Chen and Hung-Wen Lin, this study proposes a multi-stage data augmentation framework that combines style transfer, conditional generative modeling, and class-specific augmentation guided by large language models. By progressively enriching and diversifying IR training data, the framework effectively mitigates data scarcity and improves recognition accuracy. Experimental

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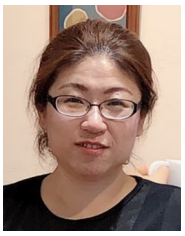
results show notable performance gains. For a five-layer convolutional neural network (CNN), accuracy improves from 53.34% to 79.94% (+26.6%), while for VGG16, accuracy increases from 59.89% to 78.95% (+19.1%). These results demonstrate the effectiveness of the proposed approach for IR ship recognition and suggest its broader applicability to computer vision tasks with limited and low-quality datasets.

For the final paper entitled "*Using SVM to Predict the Protein Spots in 2D-GE Images*" by Kuan-Yi Tung, Shu-Fen Chiou, Cheng-Ying Yang, and Min-Shiang Hwang, this study proposes a method for separating and detecting protein spots in 2D-GE images using Support Vector Machines (SVMs), with image contrast as the primary feature. First, contrast values are computed from the 2D-GE images. Protein spots and background regions are then manually labeled, and their contrast values and pixel intensities are used to construct the training dataset. A predictive model is subsequently developed using LIBSVM to identify protein spots within the images. Experimental results indicate that the proposed method achieves promising performance in accurately detecting protein spots from 2D-GE images.

As guest editors of this special issue, we would like to thank all reviewers and authors for their 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



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