

Guest Editorial: Emergences in Computing and Information Technologies: Towards a Sustainable Wellbeing Environment

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With rapid advances in computing and information technologies, society faces an inflection point: the integration of these capabilities must demonstrably advance human well-being while safeguarding environmental sustainability. As digital infrastructures reshape the contours of interaction and decision-making, their design, development, and deployment must adopt a socio-technical lens that centers people and the environment. This special issue aims to chart a responsible innovation agenda—one that aligns technical progress with sustainability-by-design principles. Our goal is to catalyze a shared effort toward inclusive, equitable, and resilient digital ecosystems that are consistent with global sustainability goals. Through open calls, this special issue received 41 submissions; approximately one third passed editorial pre-screening and proceeded to double-blind peer review under rigorous editorial standards, after which nine papers were accepted.

Against this backdrop, the nine accepted contributions articulate complementary, operational directions: (1) advances in perception and computational imaging that enable robust downstream inference and decision support; (2) humane, fatigue-aware immersive systems for extended reality (XR) that integrate human factors and ergonomics; (3) data-driven methods for health and the life sciences, spanning multimodal analytics and clinical decision support; (4) real-time, embodied interaction for remote participation via edge computing, real-time systems, and telepresence; (5) explainable and accountable modeling (XAI) to increase transparency and trust in digital services; (6) user-centered approaches to equitable data discovery and governance, including FAIR principles and participatory design; (7) privacy-preserving collaborative learning at scale (e.g., federated and split learning with differential privacy and secure aggregation); (8) analytics for sustainable mobility within intelligent transportation

systems to inform resource-efficient planning; and (9) inclusive multilingual language technologies that reduce cross-cultural miscommunication, with attention to low-resource settings. Collectively, these threads illustrate credible pathways by which technical innovation can translate into improved quality of life, greater social inclusion, and more sustainable resource use. The following summaries introduce these contributions in turn.

The first paper, titled “A study on Multi-scale Attention dense U-Net for image denoising method,” by Mingshou An, Xuhang Zhao, Dae-Seong Kang, and HyeYoun Lim, proposes an enhanced denoising architecture that layers multi-scale attention atop a dense U-Net backbone. By improving perceptual fidelity and structural consistency, the method supports more reliable downstream analysis in sensing-intensive pipelines; such quality gains can, in principle, reduce reprocessing and error propagation in large-scale imaging workflows.

The second paper, “The Intersection of Digital Wellbeing and Collection Exhibition: A Study on the Impact of AR Interactive Display Models on Visitor Experience,” by Min-Feng Lee, Guey-Shya Chen, Hui-Chien Chen, and Jian-Zhi Chen, examines augmented-reality interaction models for cultural exhibitions. Through a mixed-method study with a sizable visitor cohort, the work reports enhanced engagement, comprehension, and satisfaction, alongside indications of reduced digital fatigue—evidence toward humane, fatigue-aware immersive systems in XR settings.

The third paper, “Application of the Inception-ResNet-V2 algorithm to the analysis of embryo microscope images for the prediction model of assisted reproduction,” by Yu-Yu Yen, Shao-Ping Weng, Li-Jen Su, Jui-Hung Kao, and Woei-Chyn Chu, applies a state-of-the-art deep vision backbone to embryo microscopy for outcome prediction in assisted reproduction. The approach leverages high-capacity feature learning to improve discriminative performance in a clinically consequential setting, pointing to decision support that may enhance effectiveness and reduce unnecessary interventions.

The fourth paper, “A Study of Real-Time Operations by Converting Human Skeleton Coordinates to Digital Avatars,” by Fei-lung Lin, Jui-Hung Kao, Yu-Yu Yen, Kuan-Wen Liao, and Pu Huang, investigates a real-time pipeline that transforms skeletal coordinate data into responsive digital avatars. The system advances fidelity and responsiveness for motion-capture-based interaction, opening practical opportunities in rehabilitation, remote collaboration, and education through accessible, low-latency embodiment.

The fifth paper, “Implementing Persona in the Business Sector by A Universal Explainable AI Framework Based on Byte-Pair Encoding,” by Zhenyao Liu, Yu-Lun Liu, Wei-Chang Yeh, and Chia-Ling Huang, introduces an explainable persona-modeling framework grounded in byte-pair encoding. By clarifying feature attributions and decision rationales, the study supports transparent and auditable deployment in data-driven business settings; we highlight its contribution primarily as an advance in interpretability and accountability.

The sixth paper, “Formative Interviews for a User-Centered Design Study on Developing an Effective Gateway for Health Research Data Search – Towards a Sustainable Wellbeing Environment,” by Hsiu An Lee, Tung Lin, Hsin-I Chen, Wei-Chen Liu, Yen-Ju Shen, Wen-Chang Tseng, Chien-Yeh Hsu, and Yi-Hsin Yang, reports formative interviews that surface requirements for an effective, user-centered gateway to health research data. The findings map pain points and design principles for findability,

usability, and transparency—laying groundwork for equitable data access and reproducible research.

The seventh paper, “Elastic-Trust Hybrid Federated Learning,” by Yi-Cheng Chen, Lin Hui, and Yung-Lin Chu, presents a federated learning scheme that hybridizes training modes with an elastic-trust mechanism to address client heterogeneity and variable data quality. The framework calibrates contribution and enhances aggregation robustness while safeguarding privacy, aiming to preserve utility under real-world non-IID conditions.

The eighth paper, “A Comparative Study of Key Factors in Travel Time Prediction for Sustainable Mobility and Well-Being,” by Chuang-Chieh Lin, Min-Chu Ho, and Chih-Chieh Hung, systematically evaluates modeling choices—such as preprocessing, temporal windows, and exogenous signals (e.g., weather)—that materially affect accuracy and stability. The analysis offers practitioners actionable guidance for building efficient, reliable travel-time predictors and discusses implications for congestion mitigation and commute reliability.

The ninth paper, “Cultural Pragmatics and Causal Connectives: A Contrastive Study of Korean and English Using the AI-Hub Parallel Corpus,” by Sujeong Choi and Sinhye Nam, provides a contrastive analysis of causal connectives through a cultural-pragmatics lens. The results illuminate systematic cross-lingual differences with implications for natural-language understanding and generation, informing more context-sensitive multilingual technologies.

Acknowledgments. The guest editors extend their sincere appreciation to all authors who submitted interesting and challenging papers; their creativity and willingness to engage with rigorous feedback have substantially enriched the scope and depth of this special issue. We are equally indebted to the reviewers for their insightful evaluations—their constructive critiques materially improved the clarity and rigor of the accepted manuscripts. We also gratefully acknowledge the leadership of the Editor-in-Chief, Prof. Mirjana Ivanovic, whose guidance and high editorial standards shaped the vision and execution of this issue, as well as the journal’s editorial assistants for their professional support. Finally, we are grateful to our readers for their continued engagement; we hope that the contributions gathered here will stimulate further research and practice at the intersection of computing, human well-being, and sustainability.