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Editorial

The December 2025 (Vol. 33, No. 4) issue of *CIT. Journal of Computing and Information Technology* brings four papers from the areas of data structures, multimodal modeling, virtual reality systems, and image generation.

The first paper in this issue, titled *Specifying Relaxed Concurrent Data Structures Using NADTs*, deals with an important topic in software engineering, concurrent data structures. Namely, the authors of the paper, Jie Peng and Tangliu Wen address the challenge of specifying and reasoning about relaxed concurrent data structures, which trade strict sequential semantics for improved scalability on multicore systems. The authors introduce Nondeterministic Abstract Data Types (NADTs) as a novel and intuitive specification framework for capturing relaxed behaviors such as out-of-order and local-thread relaxations. Using NADTs, they propose new correctness criteria for relaxed queues and stacks and prove an equivalence between out-of-order enqueue and dequeue relaxations in terms of error bounds. The proposed approach provides explicit, client-facing specification interfaces that enable reasoning without knowledge of implementation details. The value of the framework is demonstrated through the specification and verification of a k-segment queue.

In the paper, titled *Towards Robust Urban Spatial Recognition with Dynamic Optimization: A Multimodal Spatiotemporal Neural Network Approach*, the author Huai Shu proposes an end-to-end framework designed to address the challenges of noisy, incomplete, and heterogeneous sensor data in dynamic urban environments. This Multimodal Spatiotemporal Neural Network (MSTN) integrates modality-specific encoders, adaptive multimodal fusion via hybrid attention and dynamic gating, and a differentiable optimization layer that tightly couples perception with decision-making. The framework is evaluated on the Cityscapes and nuScenes benchmarks, where it demonstrates significant improvements in recognition accuracy, trajectory prediction error, robustness to sensor corruption, and cross-city generalization compared to established related work. Experimental results show stable performance under substantial sensor noise and fast convergence, with low computational overhead.

Efficient task scheduling is essential in distributed multi-user virtual reality (VR) systems to ensure low-latency interaction and effective resource utilization. As collaborative VR applications scale in complexity and number of users, inadequate scheduling can significantly degrade system performance and user experience. In the paper, titled *Multi-Agent Reinforcement Learning with Graph Convolutional Networks for Collaborative Task Scheduling in Distributed Virtual Reality Systems*, the author JieChen Zhao proposes a novel collaborative task scheduling framework for distributed multi-user VR systems. The framework integrates Multi-Agent Reinforcement Learning (MARL) with graph convolutional networks. The scheduling problem is formulated as a Markov game and solved using a multi-agent proximal policy optimization approach, while graph convolutional and attention mechanisms capture dynamic task–user topological relationships. This integration enhances global perception and coordination under partial observability and resource constraints. Experimental evaluations on the ACTP and VRCollaborate datasets demonstrate improvements in task completion rate, system throughput, and resource utilization compared to existing MARL approaches, while maintaining low latency. The author shows that the proposed framework advances scheduling theory by incorporating relational inductive biases into multi-agent decision-making, leading to a scalable solution for complex collaborative VR environments.

In the last paper of the issue, titled *Structurally Controllable Text-to-Image Generation for Architectural Images Using Structural Consistency Loss*, the authors Yuanshuai Lan, Min Liao, Mo Chen and Yi Ou deal with the challenge of structurally inconsistent results in text-to-image generation for architectural and interior scene design, where strict spatial and semantic constraints are required. The authors propose a structural consistency loss function that implicitly enforces architectural rules by constraining spatial concentration and semantic alignment within the cross-attention maps of the Qwen-Image model. The proposed approach jointly optimizes this loss with the base diffusion loss, thereby learning the model to generate images with improved layout rationality, component proportion, and semantic discrimination using text-only prompts, without relying on external control signals. Experiments conducted on the MMIS dataset demonstrate significant improvements over related methods across multiple metrics, as well as enhanced structural realism. The proposed approach advances the practical applicability of generative AI in domains with strong structural requirements.

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