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Redefining Efficiency: The Rise of AI/CI-Assisted Innovations



In sci-fi novels and movies, AI is often portrayed as a symbol representing either an ultimate adversary threatening human existence or a focal point provoking ethical and societal debate. While public perception of AI oscillates between recognizing its widespread benefits and fearing the chaos it could unleash upon humanity, it is undeniable that AI and CI technologies are increasingly integrating into every facet of our daily lives. A growing number of AI/CI-assisted systems, such as recommendation systems,

chatbots, autonomous driving, materials design, and various emerging applications of generative AI, are enhancing human efficiency in numerous tasks. These technologies demonstrate convenience and advantages, yet they also prompt concerns regarding their reliability and fairness.

This issue contains several articles that explore the technical advancements of CI- and AI-assisted systems. In the *Features*, the first article compares genetic programming and reinforcement learning in learning heuristics for dynamic scheduling, unveiling each method's distinct advantages and potential in different scenarios. The second article presents a novel self-improving framework for large-scale conversational AI, notably used in devices like Alexa, that enhances its performance autonomously through user feedback and eliminates the need for manual data annotation. In the third article, a hierarchical bipartite graph convolutional network is developed to improve accuracy in recommendation systems by utilizing hierarchical user-item relationships in bipartite graphs. The fourth article introduces a novel multiobjective optimization approach that adopts the diffusion model to iteratively refine solutions from Gaussian noise to feasible schedules, addressing inherent complexities and constraints in gasoline blending scheduling.

In the *Columns*, the first article provides a comprehensive survey of recent developments, analyzes the issues such as robustness, data bias, and fairness, and suggests future directions in recommender systems. For autonomous driving, the second article introduces a novel reinforcement learning algorithm, which does not require manual sorting rules and excels in dynamic environments. The third article leverages an objective space constraint to efficiently navigate feasible and infeasible regions, significantly improving feature subset quality and the performance of evolutionary algorithm in high-dimensional feature selection. The fourth article introduces FairerML, an extensible platform designed to analyze fairness of datasets and models and to train models considering both accuracy and fairness.

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In *Society Briefs*, we welcome our newly elected Administrative Committee members who will help govern and manage our society. We also extend our congratulations to the

newly elevated IEEE Fellows and celebrate their outstanding contributions and achievements in their fields of expertise. Please enjoy the inspiring articles in this issue. If you have any

suggestions or feedback for this magazine, please do not hesitate to contact me at ckting@cs.nthu.edu.tw.



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