Call for Papers

IEEE Transactions on Automation Science and Engineering

Special Issue on Machine Learning for Optimization in Automation - in Honor of Peter B. Luh

Optimization for decision making is pervasive in automation. Examples may be found in real time routing in transportation, scheduling in multi-energy micro grids, path finding in autonomous driving, and supply demand matching in just-in-time distribution. Just to name a few. These optimization and decision-making problems may be mathematically formulated as linear and nonlinear programming, Markov decision process, and the variants. The past decade has witnessed how machine learning has tremendously advances the theory and practice in solving these problems. It is the purpose of this special issue to review the state of art in this field, namely machine learning for optimization in automation, as well as to discuss the future research directions.

Professor Peter B. Luh (1950-2022) was a pioneering figure in the field of automation, and in solving optimization problems in manufacturing and power systems. He co-founded the IEEE T-ASE and served as its first Editor-in-Chief. Throughout his career, Professor Luh was an active researcher and promoter in this field. When he passed away in 2022, one of his last initiatives was to jointly develop an ad hoc on Machine Learning for Automation. In this research, Professor Luh focused on developing powerful algorithms that combine machine learning and optimization with applications to power systems and manufacturing systems. This special issue serves as a tribute to Professor Luh, recognizing his significant contributions to the field of automation and his visionary leadership in advancing the field of machine learning for optimization in automation. Through this special issue, we aim to honor Professor Luh's legacy and his dedication to advancing this field. We invite contributions from researchers and practitioners who are making significant contributions to the field, and who share Professor Luh's vision of machine learning for automation.

Potential contributors to this special issue include researchers on theory, methods, algorithms, and applications of machine learning for optimization in automation. In particular, mathematical formulations like linear and nonlinear programming, Markov decision process, and simulation-based optimization will be studied and discussed. Specifically, we welcome contributions that explore certain structural properties of optimization problems in automation to achieve fast solution of large-scale problems, and with performance guarantees. Besides contributions on rather general theories and methods, this special issue will also welcome works on various application domains such as manufacturing, logistics, transportation, buildings, and power systems.

This special issue intends to summarize the state of the art, to discuss promising research directions, and to further promote research in machine learning for optimization in automation. A key connection among the optimization problems in various different automation systems resides in the shared mathematical optimization formulation, such as linear and nonlinear programming, and the Markov decision process. Advances in solving these optimization problems have rich application potentials. It is important to showcase successful stories as well as to share advances in general theories and methods across different systems. This special issue is of both practical and theoretical interest. Through this special issue, we hope to foster collaboration and exchange of ideas among researchers and practitioners working on machine learning for optimization in automation. We also aim to provide a platform for highlighting successful case studies and innovative applications of machine learning for optimization in different domains, encouraging further research and development in this exciting field.

Planned Publication Schedule

- Oct. 31, 2024, announce the call for papers, circulate through public channels such as the journal website and RAS Technical Committees, and private invitations.
- Apr. 30, 2025, submission deadline.
- Jul. 28, 2025, return of the first round of review.
- Sept. 15, 2025, submission deadline for revised manuscript.
- Oct. 15, 2025, return of the second round of review (plan to accept 6 to 12 regular submissions).
- Nov. 15, 2025, submission of the final version of the manuscript.
- Afterward, enter the publication process.

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