Research School for Operations
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Generalizable and Understandable Self-Learning Approaches for Dynamic, Large-Scale Resource Management Optimization Problems

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We study the hybridizations of two families of optimization domains: metaheuristics and deep reinforcement learning (DRL). The basic target of the hybridizations is aimed at providing high-quality solutions, that could enable improving productivity in many areas of industry or services. While the high quality of solutions is necessary, there are two properties to be studied to more extent: generalizability and understandability. Metaheuristics are known to generalize well if they are tuned or customized by the problem. By hybridizing them with DRL, we target solutions that are even more generalizable, as the tuning step could be automatized and performed by DRL. Understandability, understood as lack of complexity of proposed solutions, can decrease time to deployment, and improve robustness and trust in the systems. We plan to allow the metaheuristics to alter the definition of solutions, which can be used to reduce complexity. DRL is the technique of choice to guide this challenging process, which requires balancing performance and complexity. On the other hand, we would like to work on increasing the generalizability and understandability of DRL systems, using metaheuristics for formulating DRL design components.