Hyperparameter tuning using Bayesian optimization

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This PhD dissertation aims to develop algorithms to tune the hyperparameters of machine learning approaches. Hyperparameter tuning is a relatively new field in the OR/ML community. We intend to contribute by considering the tuning effort as a multi-objective problem: indeed, the quality metrics with which ML models are judged may contain trade-offs. We intend to focus the research on the structural design of (convolutional) neural networks. Bayesian optimization (using Gaussian Processes) has already shown its power for multi-objective optimization, yet the hyperparameter tuning problem for CNNs entails some specific challenges (for instance, the size of the decision vectors varies according to the value of some of its components). For this research, we intend to team up with the engineering faculty of Ghent University and/or KU Leuven.