

GAMM Workshop on Computational and Mathematical Methods in Data Science (COMinDS)



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Type: **Talk**

Using Trained Machine Learning Predictors in Gurobi

Friday, 4 November 2022 12:00 (30 minutes)

In recent years, machine learning has become a prevalent tool to provide predictive models in many applications. In this talk, we are interested in using such predictors to model relationships between variables of an optimization model in Gurobi. For example, a regression model may predict the demand of certain products as a function of their prices and marketing budgets among other features. We are interested in being able to build optimization models that embed the regression so that the inputs of the regression are decision variables, and the predicted demand can be satisfied.

We propose a python package that aims at making it easy to insert regression models trained by popular frameworks (e.g., scikit-learn, Keras, PyTorch) into a Gurobi model. The regression model may be a linear or logistic regression, a neural network, or based on decision trees. The resulting optimization models are often hard to solve with the current technology. We also present computational results on improvements that are specifically targeted for those types of models. In particular, we consider optimization models with embedded neural networks.

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