

Emma Frejinger, Department of Computer Science and Operations Research, Université de Montréal

Tactical transport planning under imperfect information by combining machine learning and discrete optimization

Abstract:

In this talk we present a novel methodology at the intersection between machine learning and operations research. Namely, we use deep learning to predict tactical solutions to an operational planning problem. The tactical solutions are less detailed than the operational one but have to be computed in very short time and under imperfect information. The training data consists of a large number of deterministic problem instances solved independently and offline. Results on our motivating application - load planning for rail transportation - show that deep learning algorithms produce highly accurate predictions in very short computing time (milliseconds or less). The prediction accuracy is comparable to solutions computed by sample average approximation of the stochastic program.

The talk is based on joint work with Yoshua Bengio, Sébastien Lachapelle, Simon Lacoste-Julien, Eric Larsen and Andrea Lodi (ArXiv: 1807.11876v3).