EJTL Special Issue on

Combining optimization and machine learning: applications in vehicle routing, network design and crew scheduling

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Several families of core problems in transportation and logistics such as vehicle routing, network design and crew scheduling remain formidably challenging to solve for the operations research community and, for most of them, efficient algorithms are still sought after by the industry. One recent research trend explores the possibility of combining optimization and machine learning in innovative ways to design improved algorithms. Machine learning and optimization can be applied sequentially or in an integrated fashion. In the former case, machine learning can be used, for example, to estimate some problem input (e.g., cost coefficients, customer demand, capacity) for the optimization model, to preprocess data with the goal of reducing the size of the model to solve, or to describe customer behavior and preferences. In the latter case, machine learning can be applied, for example, to adjust the values of some of the parameters controlling the optimization algorithm or to make heuristic decisions within the algorithm (e.g., select a branching variable or define a neighborhood to explore) to increase its efficiency.

This special issue focuses on the development of innovative solution methods that combine machine learning and optimization to efficiently solve vehicle routing, network design and crew scheduling problems in all transportation modes (freight, public transit, air, maritime, rail). The proposed optimization algorithms can be exact or heuristic.

Topics of interest include (but are not limited to):

- Vehicle routing and its variants: capacitated, with profits, stochastic, time-dependent, split delivery, pickup-and-delivery, etc.
- Inventory routing
- Location routing
- Transportation and supply chain network design
- Ship routing and scheduling
- Bus scheduling
- Fleet assignment / locomotive assignment
- Duty scheduling / crew pairing
- Crew scheduling / crew rostering