Workshop title
Deep Reinforcement Learning for Traffic Signal Control

Workshop proposer(s)
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Abstract
Traffic congestion is a growing problem that continues to plague urban areas with negative outcomes to both the traveling public and society as a whole. Signalized intersections are one of the most prevalent bottleneck types in urban environments, and thus traffic signal control plays a vital role in urban traffic management.

There have been many promising methods developed for the selection of timings at traffic signals. The typical approach that transportation researchers take is to cast traffic signal control as an optimization problem under certain assumptions about the traffic model, e.g., vehicles come in a uniform and constant rate. Another promising avenue appears to be reinforcement learning (RL). The advantage for RL applied to signal control is, it can directly learn from the observed data without making unrealistic assumptions about the traffic model.

This tutorial is to provide an overview of the recent development in RL and provide a hands-on experience for RL-based traffic signal control approaches, including both controlling a single intersection and multiple intersections. In this tutorial, we first introduce the formulation of traffic light control problems under RL, and then classify and discuss the current RL control methods from different aspects: agent formulation, policy learning approach, and coordination strategy when facing multiple intersections. In the third section, we provide hands-on experience on how to use the simulators to enable RL for traffic signal control. Specifically, we provide the experimental setups and detailed process for RL-based traffic signal control problems, including both single intersection and multi-intersection control. We then discuss some future research directions.

Keywords
- Theory and Models for Optimization and Control
- Road Traffic Control

Topics of interest
- Deep reinforcement learning
- Traffic signal control
- Intelligent transportation