"i"-on-the-road: Can Artificial Intelligence Save the Commuters' Day?

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Congestion can be alleviated by infrastructure expansions; however, improving the performance of the existing infrastructure using intelligent traffic control is more plausible due to the obvious constraints on financial resources and physical space.

Applications of Adaptive Traffic Signal Control (ATSC) and freeway Ramp Metering (RM) have shown promising potential to alleviate urban traffic congestion by adjusting the signal timings in real-time in response to traffic fluctuations to achieve desirable objectives (e.g., minimize delay at intersections or minimize travel time along freeway corridors). This presentation will introduce the traffic control problem as an closed-loop optimal control problem and show a pragmatic solution using multi-agent reinforcement learning, from Artificial Intelligence. Results from simulation of 59 intersections in the lower downtown core of the City of Toronto during peak hour have shown reduction in the average intersection delay up to 39%; and travel time savings of up 2to 26% along the busiest routes. Additionally, simulation results of controlling the on-ramps to the Gardiner Expressway in Toronto showed 50% reduction in total travel time compared with no freeway control. Ongoing effort to date to test the technology in the field will also be highlighted including successes and challenges.