Traffic-Light Control at Urban Intersections Using Expected Waiting-Time Information

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Monday 11 October 2021
2pm
Via Microsoft Teams

Abstract:

Traffic congestion at the Intersections have a negative impact on the economy and the environment. We consider an optimal traffic-light control framework for urban traffic intersections to alleviate congestion phenomena. We analyse a scenario in which we provide drivers with information about the waiting time at the intersections. We model the drivers' lane-changing information-based behaviour as the solution to a convex optimization problem. We compute the optimal traffic-light control mechanism as the solution to a bi-level optimization problem. We provide a complete analysis in terms of (i) the existence of a solution; (ii) an iterative algorithm to compute it; (iii) sufficient conditions for the solution's uniqueness and the algorithm's convergence. Our simulation results show the proposed control scheme's effectiveness compared with an optimal control algorithm in the absence of waiting-time information.