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Abstract:

Urban traffic congestions have become a financial and societal burden in many cities. Efficient traffic management solutions mitigating such congestions require a reliable modeling and estimation of traffic jams. In urban traffic, the modeling challenges are related to flow collisions and gridlocks created at intersections. In this paper, we propose a traffic light extended Cell Transmission Model (CTM), where the influence of flow collisions and gridlocks are modeled by a single CK parameter. Our approach only requires adapting CK for each intersection type/geometry instead of a complex mathematical formulae proposed in related works. We formalize the description of our urban CTM, and evaluate its capability to model traffic volumes and jams against the microscopic traffic simulator SUMO (Simulation of Urban MObility). Results show that the CK parameter is able to closely reproduce the impact of collisions and gridlocks on traffic jam, making the proposed urban CTM suitable to predict traffic congestions in urban environments.

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