Analysis of Imperfections of Vehicular Communication on Cooperative Intelligent Transportation Systems
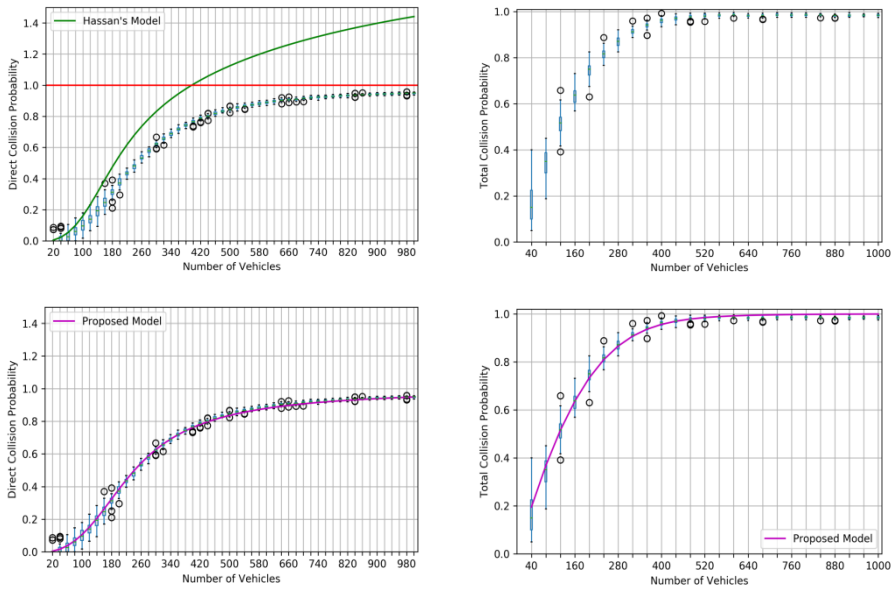
Master's Thesis of Meng Xie

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The present Master's thesis seeks to develop a better understanding of how to evaluate the performance of vehicular communication networks with realistic vehicle mobility impacts. As a starting point, vehicular communication network technologies and different performance assessment methodologies as the fundamentals were carefully studied. In particular, this thesis argued that from the perspectives of efficiency and scalability it is possible to exploit more potentials and opportunities from analytical approaches in analysing the performance of vehicular communication networks. Despite the extensive body of research on statistical models in vehicular communication networks, unrealistic assumptions, oversimplifications and ignorance of realistic vehicle mobility impacts lead to their limited usage. Thus, on the basis of both a study of the literature and improvements of an existing analytical model, this thesis established an interlink between vehicle mobility and wireless communication network with a focus on the performance analysis.

Extending upon Hassan and Vu's (2011) model, a new integrative analytical module was developed, which merges realistic vehicle mobility impacts and wireless channel characteristics. As a result, an integrative module was tested on urban scenarios, compared and validated with a widely used simulator, with the intention of proving its effectiveness of providing rich insights in the performance assessment of vehicular communication networks.

Features	Loss-free	Simulators	Proposed Module
Plausibility	Low	High	High
Flexibility	High	Medium	High
Efficiency	High	Low	Medium
Scalability	High	Low	High

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