Real-Time Queue Length Estimation for Congested Arterials in Tehran

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ABSTRACT

Queue length is one of the fundamental parameters of traffic flow on arterial streets that is the performance and flow optimization criteria However this measure of arterials less attention and has been investigated. This could be caused by periodic disruption on traffic flow by signal lights that make difficult evaluation of traffic flow on arterials. On the other hand the problem gets even more difficult when signal links are congested. In this paper, queue length on congested arterials is considered as one of the fundamental traffic parameters. This parameter estimated by investigating occupancy profile changes using real-time second-by-second advance detector data and signal timing. It has improved queue estimation model by considering the effects of upstream intersection and released platoon on the downstream queue in this paper. The result of the improved queue length estimation model is demonstrated through a field study at two intersections in Tehran. It has been also calibrated input parameters of Tehran intersections include the reaction time of the first queued vehicle (t_r) and the uniform starting time difference between two adjacent queued vehicles (t_s) using statistical analysis and used in model. This two parameters gathered by recording at 3 intersections and data frequencies for t_r and t_s are 70 and 120 respectively. After testing Data for Normal distribution, median of this two parameters $\bar{t}_r = 2.6s$ and $\bar{t}_s = 1.7s$ are used in model.

Liu (et al) model and improved model of this article were run with field gathered data and compared with field results of Queue length shown in two following diagrams.
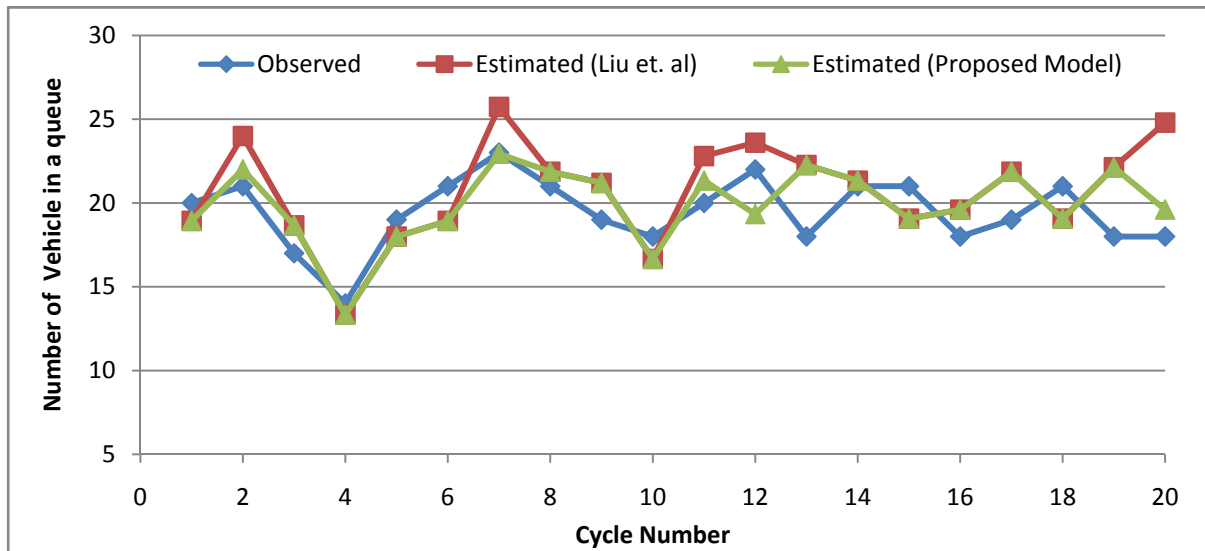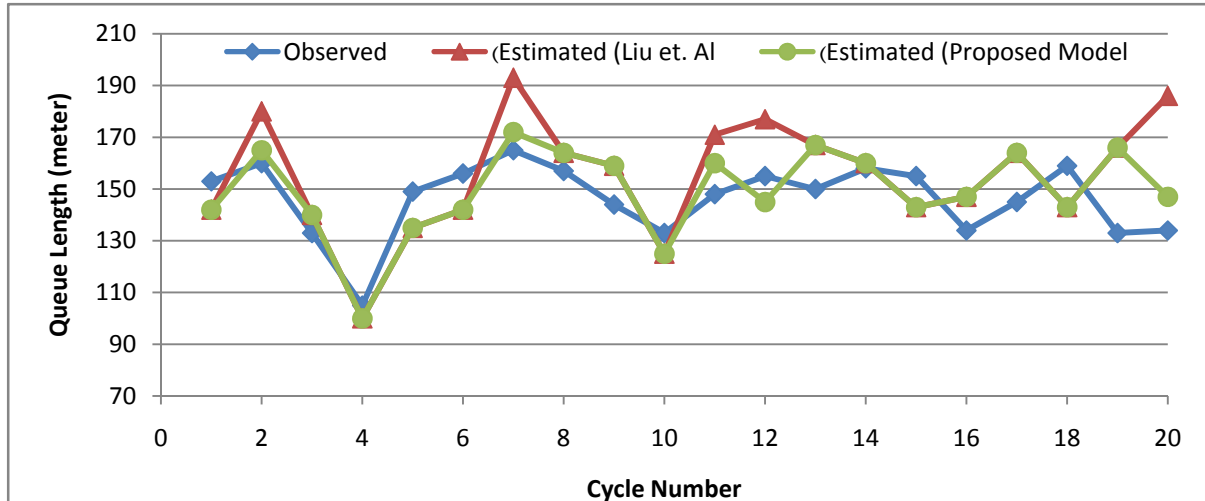
The results of this evaluation are shown 15% improvement in error average of queue length estimation in terms of meters and 10% improvement in error average of queue length estimation in terms of number of vehicles.

Keywords: Congested Arterials, Queue Length Estimation, Reaction Time Calibration