

A Review: Queue length estimation using connected vehicle technology for adaptive signal control

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Abstract:-This paper displays a scientific model for ongoing line estimation utilizing associated vehicle (CV) innovation from remote sensor systems. The goal is to evaluate the line length for line based versatile sign control. The proposed model can be connected without sign timing, movement volume, or line qualities as fundamental inputs. The model is likewise grown so it can work with both settled time flags and impelled signs. Besides, a discrete wavelet change (DWT) is connected to the line estimation calculation in this paper interestingly. The motivation behind the DWT is to upgrade the proposed line estimation to be more exact and predictable paying little respect to the arbitrariness in the infiltration proportion. Test results are given to accept the proposed model in both pre-timed control and impelled control with a minute test system, i.e., VISSIM. The outcomes demonstrate that the proposed calculation can gauge the line length from VISSIM in the experiment with pre-timed signal control sensibly well. The outcomes in impelled control cases, which have not been concentrated beforehand, demonstrated that the proposed calculation stays as exact as the pre-timed control cases. The precision of the proposed line estimation calculation is gotten without depending on fundamental inputs that different models commonly require yet are frequently unreasonable to acquire. Consequently, it is normal that the proposed line estimation model is appropriate for versatile sign control utilizing CV innovation as a part of practice.

I. Introduction

TRAFFIC congestion has become a major issue in urban areas, particularly at major intersections. Congestion at intersections is the results of insufficient capacity or the ways that existing demands are being served by signals. Thus, traffic engineers need to develop more effective strategies and signal control to manage conflicts at intersections. However, the more precise and advanced signal control is, the more real-time traffic data is needed as inputs, which usually require practical and cost-effective detectors. A loop detector is commonly used, however, it is a fixed-point sensor which can only measure at specific locations.

Its disadvantage is high cost when collecting data in large scale since a number of devices are needed to cover all the necessary locations. Moreover, additional cost, maintenance and operation cost per device, is relatively high. To solve the aforementioned problems, many alternative methods have been considered over the years. Recently, connected vehicle technology (CV) has been getting attention as the alternative traffic detector. Traffic data are collected through a probe vehicle, which is a vehicle, equipped with GPS and wireless communication devices. Location and speed of probe vehicles can be gathered to estimate travel time, speed, and queue length.

CV allows vehicles to transfer data to each other, vehicle to vehicle (V2V) and vehicle to roadside infrastructure (V2I). The roadside infrastructure can use the obtained data from V2I to set the traffic signal corresponding to the traffic demand in real time. However, even though the penetration ratio of CV is expected to increase in the future, at this time, it is still relatively small when available. The penetration ratio heavily affects the estimation error of traffic state. How CV collects data is also different from a loop detector. For loop detectors, all vehicles are detected only at specific locations where loop detectors are installed. On the other hand, CV can collect

traffic data at most locations from a sampling from vehicles in a road network. In other words, only probe vehicles are detected. Thus, traffic state algorithms of these two kinds of detectors are not the same; hence new traffic estimation algorithms need to be developed.

II. Brief Literature Survey

Paper [1] "Vehicle trajectory reconstruction for signalized intersections using mobile traffic sensors,"

This paper presents improvement based and defer based models to assess shockwave limits at signalized crossing points, which are utilized to reproduce short vehicle directions by applying the variety plan (VF) of movement stream. The models are tried utilizing the NGSIM information and small scale recreation information. The outcomes demonstrate that the proposed models are not exceptionally touchy to infiltration rates. When all is said in done, the improvement based model beats the deferral based model.

Paper [2] "Vehicle index estimation for signalized intersections using sample travel times,"

We present in this paper the idea of vehicle files in a cycle at a signalized convergence which are the positions of vehicles in the flight procedure of the cycle. We demonstrate that vehicle lists are nearly identify with the vehicle entry and the flight forms at the crossing point. Taking into account vehicle lists and test travel times gathered from versatile sensors, a three-layer Bayesian Network model is developed to depict the stochastic capturing so as to cross point activity stream the relationship of vehicle lists, and the entries and takeoff forms. The non-homogeneous Poisson process and log-typical disseminations are utilized separately to show the stochastic landing and flight forms. The strategies for parameter learning and vehicle record surmising are displayed in view of the watched crossing

point travel times. Rearrangements to the techniques is examined to diminish the computational exertion of parameter learning and vehicle list estimation. The model is tried utilizing information from NGSIM, field test, and reenactment with sensible results.

Paper [3]: “Effect of stop line detection in queue length estimation at traffic signals from probe vehicles data,”

This paper concentrates on combining so as to ongoing estimation of line lengths these two information sorts, i.e., incitation from stop line finders with area and time data from test vehicles, at secluded and under saturated convergences. Utilizing fundamental standards of factual point estimation, diagnostic models are created for the normal aggregate line length and its fluctuation toward the end of red interim. The study addresses the assessment of such estimators as a component of the business sector infiltration of test vehicles. Precision of the created models is analyzed utilizing an infinitesimal reenactment environment-VISSIM. Different numerical samples are introduced to show how estimation mistakes carry on by the incorporation of stop line discovery for various volume to limit proportion and market infiltration levels. Results show that the expansion of stop line location enhances the estimation precision as much as 14% when flood line is overlooked and 24% when flood line is incorporated for under 5% test infiltration level.

Paper [4]: “Estimating queue length under connected vehicle technology: Using probe vehicle, loop detector, and fused data,”

The paper presents IntelliFusion, an algorithm that fuses inductive loop detector data with real-time vehicle probe data obtained from Connected Vehicles to enhance back of the queue estimates. The work also presents an evaluation of the data fusion algorithm using datasets produced by teas, a microscopic traffic simulation model for signalized intersections. Results of the evaluation show queue length estimates produced by the IntelliFusion algorithm are accurate to within the length of a single vehicle even at low levels of market penetration (e.g., LMP = 20%).

III. Conclusion

Aalgorithm for anticipating the number and areas of individual vehicles, both with and without an upstream locator, have been proposed. The calculation utilizes velocity, area, and speeding up information gathered once every second from a part of vehicles going about as versatile sensors. In an arrangement, this information could be gathered with GPS and accelerometers on PDAs, or in an associated vehicle environment utilizing DSRC. The calculation demonstrates that breaking down the conduct of 25% of vehicles on the roadway to recognize likely collaborations with unequipped vehicles can precisely gauge most densities amid clog. The calculation is additionally ready to foresee the densities of vehicles promptly after a clog period, by expecting that created vehicles drive as anticipated by the Weidman auto taking after model.

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