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Target group: MaStat students, familiarity with Bayesian methods

Summary:

In the last decades the city of Ghent has grown quickly. This growth is not expected to slow down in the next years. When looking at present tendencies in car usage this leads to a situation where new major changes concerning traffic mobility in the city centre impose themselves. Therefore the municipality is working on a new mobility plan for 2030. The traffic mobility in the city centre will be thoroughly reorganised, a local traffic control centre will be founded and a new computer system will be implemented for the traffic lights on the R40 beltway. Measures will be taken to avoid traffic passing through the city centre. The city centre will be divided into zones which can only be entered through certain traffic interchanges on the R40: “city gates”. A speed limit of 30 km/h will be implemented everywhere within the beltway. In order to estimate the effect of these changes on the traffic circulation the current traffic situation has to be profoundly analysed. Insight must be gained on the origin and destination of the traffic and the relative intensities on certain trajectories. Since the R40 plays a key role in the redirection of traffic research has to be performed concerning the present mobility on this road. Specifically the travel times on certain intersects are of main importance for the municipality.

The two main available data sources for this study are single loop detectors and bluetooth detectors. The single loop detectors provide a measure for quantifying all bypassing vehicles at certain locations, while the bluetooth detectors give travel time measurements and also provide a measure of vehicle counting. However, since there is only a small amount of bluetooth probed vehicles and since not every single bluetooth signal is recorded, this quantification is sparcer and biased.

The main goal of this study is to obtain a more accurate and more precise travel time estimation for the main intersects of the R40 by using information of both detector types. By combining the larger vehicle count dataset of the single loop detectors with the sparcer travel time and vehicle count data from the bluetooth detectors, we hope to improve the travel time estimation of the latter. Several data fusing techniques will be tested and compared. We will draw inspiration from previous research on similar topics, such as the work of (Bachmann, 2011) that studied data fusion of double loop detector data (enabling local speed measurements) and bluetooth travel time data in order to obtain better speed measurements. We will also analyse the necessity and feasibility for preprocessing the single loop detector measurements into accurate vehicle speed estimations. Statistical approaches developed in earlier studies

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such as (Guo et al., 2006; Guo et al., 2009; Li, 2009; Park and Ritchie, 2010) can be used for obtaining vehicular speed estimation out of single loop data. The travel time estimations resulting from both the separate and fused data will be then be validated. A k-fold and a 5X2 cross validation will be performed to validate the fused data. If the right data are available a validation can be performed with a ground truth dataset. In order to provide a very accurate ground truth test drives can be performed or GPS tracking data can be used.

References:


