Neighbour corridors travel time estimation: concept and a case study

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Abstract
An approach is presented to estimate corridor travel time in urban areas using available data of a nearby corridor. The purpose is to improve the efficiency of real-time traveller information systems when the number of data collection sensors is limited. Field travel time data were collected for two corridors in downtown Vancouver, British Columbia. The association between the travel times of the two corridors was found significant. Models were then developed to estimate travel times on one corridor using data of the other corridor. The developed models included regression, Artificial Neural Network (ANN), Neuro-fuzzy, and K-Nearest Neighbours (KNN). The estimation accuracy was considered satisfactory as the Mean Absolute Percentage Error (MAPE) of all models ranged between 13.7% and 17.6%. It was concluded that the concept of estimating travel time from nearby corridors is promising. The type of modelling technique had a little impact on the results with the KNN method producing slightly better results.

Keywords – travel time estimation, urban areas, neighbour corridors

1. Introduction
One approach to reduce traffic congestion in urban road networks is to provide users with real-time traffic information via Advanced Traveller Information Systems (ATIS). However, ATIS require data collection from one or more sources. One attractive approach to collect travel time data is to use moving sensors that are tracked in real-time while running on the network, traditionally known as probe vehicles. Another approach to collect online travel time data is to use point measurement devices that record vehicles’ passages at certain checkpoints and hence calculate the travel times based on the difference between the check-in and check-out times. Either by using probe vehicles or fixed sensors, it is expected that some gaps may exist in the collected travel time data due to any abnormal condition such as malfunction, loss of GPS signals, etc. Another problem that might limit the efficiency of an ATIS is the limited number of traffic sensors that exist on a road network and could only provide partial network coverage. Accordingly, real-time or near-real-time travel time data may not be always available on some parts of the road network.