

This topic is “practice ready.” Yes No

Integrating Spatial-Temporal Traffic Data on an Urban Network for Change Detection

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Abstract

Early detection of traffic speed and volume change in an urban network is useful for many applications. In this paper we present an approach to detect changes in spatial temporal traffic data observed on an urban network using multivariate quantiles. The INRIX data and Wavetronix data from Des Moines area are used to fit the model and test the program. The INRIX data is spatially dense but of lower quality, while the Wavetronix data is sparse in space but more accurate. Spatial functional model and curve Kriging method are used to integrate the INRIX data and the Wavetronix data to create a data set which is dense in space and has good quality. We treat consecutive four hour traffic data as a function in time, and use the integrated historical traffic data to estimate the quantile curves for specific time of day and day of week for change detection. An online app is developed to visualize the outlier detection results for I-35, I-80, US-65 and IA-5 in the metropolitan area of Des Moines. It has a user friendly interface, and the computation is fast and can be done in real time. As an example, we applied this approach to the traffic data in January 2013, which is effective in detecting the spatial extent of the impact of a winter weather event on traffic.

Keywords: anomaly detection—kriging—data integration—urban traffic—functional data

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