

Automatic Detection of Traffic Stop Locations Using GPS Data

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Abstract : Extracting information from new data sources has emerged as a crucial task in many traffic planning processes, such as identifying traffic patterns, route planning, traffic forecasting, and locating infrastructure improvements. Given the advanced technologies used to collect Global Positioning System (GPS) data from dedicated GPS devices, GPS equipped phones, and navigation tools, intelligent data analysis methodologies are necessary to mine this raw data. In this research, an automatic detection framework is proposed to help identify and classify the locations of stopped GPS waypoints into two main categories: signalized intersections or highway congestion. The Delaunay triangulation is used to perform this assessment in the clustering phase. While most of the existing clustering algorithms need assumptions about the data distribution, the effectiveness of the Delaunay triangulation relies on triangulating geographical data points without such assumptions. Our proposed method starts by cleaning noise from the data and normalizing it. Next, the framework will identify stoppage points by calculating the traveled distance. The last step is to use clustering to form groups of waypoints for signalized traffic and highway congestion. Next, a binary classifier was applied to find distinguish highway congestion from signalized stop points. The binary classifier uses the length of the cluster to find congestion. The proposed framework shows high accuracy for identifying the stop positions and congestion points in around 99.2% of trials. We show that it is possible, using limited GPS data, to distinguish with high accuracy.

Keywords : Delaunay triangulation, clustering, intelligent transportation systems, GPS data

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