

## Developing congestion index based on taxi GPS data

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### Abstract

Urban traffic congestion is rising in China. Place and time specific congestion index can inform transport policy-making, project investment and traffic management. China however does not have robust congestion index for revealing the spatial variation of congestion by road and its temporal variation by hour, not mentioning the comparison of congestion among different megacities.

Aiming to fill this information gap, our research examines the possibility to calculate travel time index (TTI) based on GPS data that tracks the movement of taxi in Chinese cities. This type of data is now available in every megacity in China. We compute TTI with example GPS data that track the movement of 13798 taxies in Shenzhen. Taxi movement is recorded with 30 seconds' interval. Our TTI is the ratio of realized travel time to the free-flow travel time. Since the GPS data has speed information, the central piece of our work is to infer free-flow travel speed and realized travel speed by mining the taxi-GPS data.

We find out that the speed profile of taxies with passengers inside, regardless of its travel speed and location, can well represent the realized travel speed. It well captures the non-congestion situation of the suburban road. It reveals the morning and evening rush hours on the urban expressway. It also records the congestion cycle resulting from the shopping and recreational trips on the arterial road.

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