Research Fact Sheet

Research project: Traffic State Prediction: A Traveler Equity and Multi-modal Perspective

What's the issue?

Traffic congestion saps money and time. One report found that the hours Americans wasted in traffic increased fivefold between 1982 and 2005. Smart cities integrate transportation so that people can combine different modes—cars, public transit, and bikes—for a seamless trip. But accurate predictions are needed for all modes to develop into a seamless system.

What did the research discover?

Smart bike share systems are an important connection between transportation networks in a smart city to establish smart transportation. This research developed eight toolboxes of models and algorithms to convert current bike share systems into smart systems:

- a two-level hierarchical framework classifier to distinguish between modes
- a new clustering algorithm
- a bike availability model, a Markov chain model for each station and day of the week
- the adaptation of machine learning and statistical algorithms to model the available number of bikes
- a new quality-of-service measurement
- an agent-based simulation approach that investigates the advantages of portable bike stations
- bike travel time prediction models that address distance, subscription type, time, day, temperature, and humidity

For private vehicles, this research develops a comprehensive traffic prediction tool by including different categories of prediction models.

How can I implement this?

The tools developed in this research can be used to upgrade existing bike share systems, transforming them into an effective, equitable service that connects users to other modes of transportation.

Learn more:

The full report is available at
https://www.morgan.edu/school_of_engineering/research_centers/urban_mobility_and_equity_center/research/completed_research/traffic_state_prediction.html