Methods to Identify and Mitigate Congestion Onset
(STRIDE Project J3)

PROJECT OVERVIEW

This project aimed to help transportation agencies use "big data" to mitigate congestion and improve system performance for both freeways and arterials. With improved tools, agencies can respond more quickly and take helpful actions like changing route guidance advisories on freeways, changing signal timing on arterials, or revising operation plans and tactics to minimize the congestion.

GOAL

The project created tools that improve the ability of agencies to 1) respond to incidents and recurring congestion more quickly and effectively and 2) improve transportation systems' ability to provide quality service consistently.

PRODUCT DESCRIPTIONS

1) Onset of Congestion Detector
The algorithm tracks the travel rate (min/mi) for highway segments or routes and sets flags when a threshold value is exceeded, indicating Demand-Induced Congestion (DIC) or Incident-Induced Congestion (IIC) has occurred. The algorithm produces no false negatives, meaning it never determines that DIC or IIC has occurred when it has not.

2) Speed-based Traffic State Transition Detector
The algorithm clusters different speeds into categories and then looks at transitions from one cluster to another to spot both DICs and IICs. When tested with machine learning tree-based classifiers, the algorithm demonstrated superior accuracy performance.

3) Travel Rate-based System State Transition Detector
The algorithm clusters traffic states into six "operating condition" clusters based on speed, standard deviation of speed between vehicles, standard deviation between points, as well as deceleration values. The machine learning-based algorithm achieves good accuracy and precision in predicting breakdowns.

For more information, contact the Lead PI or visit STRIDE Project J3.

PRODUCTS

Three tools for identifying when incidents or congestion occurs on freeways and arterials.

IMPACT

Improving the ability of system managers to take timely actions in response to incidents or congestion can reduce delays and improve system performance.

CLIMATE CHANGE

Reducing delays through faster and more focused responses can reduce carbon emissions and heat from operating engines.

WHO BENEFITS?

- System Managers
- Drivers

RESEARCH TEAM

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About STRIDE