Developing Data Fusion Techniques to Estimate Travel Time on Urban Arterials

Keywords: travel time, data fusion, probe data, detector

Background

- **Travel time estimation and prediction on urban streets**: significant for transportation system management, traveler information and real-time routing.
- **Travel time estimation**: directly (i.e., probe vehicles) OR indirectly (i.e., loop detector data)
- **Traffic data from various sources**: different accuracy/coverage → inconsistent travel time estimations
- **Data fusion**: considers quality of data provided by various sources → increase accuracy of estimations

Purpose

Developing data fusion techniques for:
- Travel time estimation
- Short-term travel time prediction

on urban arterials using data provided by different sources (i.e., probe vehicles, AVI system, detectors…).

Method

1. Trajectory approximation: fixed sensor data
2. Real but partial trajectories: probe data
3. Superimpose trajectories
4. Reconstruct trajectories: considering fundamental diagram, signal timing and shockwave analysis
5. Travel time estimation
6. Short-term travel time prediction: considering signal timing and traffic conditions

Application

- Providing accurate and reliable travel times to road users considering current and future traffic conditions and signal control parameters
- Developing a performance measurement tool for traffic management on urban arterials
- Optimizing signal control strategies to reduce delay, improve mobility and eliminate emission

Conclusion

- Existing fusion techniques: relay on statistical methods without considering traffic engineering principles
- Proposed methodology: implements principles of traffic engineering for fully utilization of available data and provision of accurate and robust travel time estimations and predictions.

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