Developing Data Fusion Techniques to Estimate Travel Time on Urban Arterials

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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

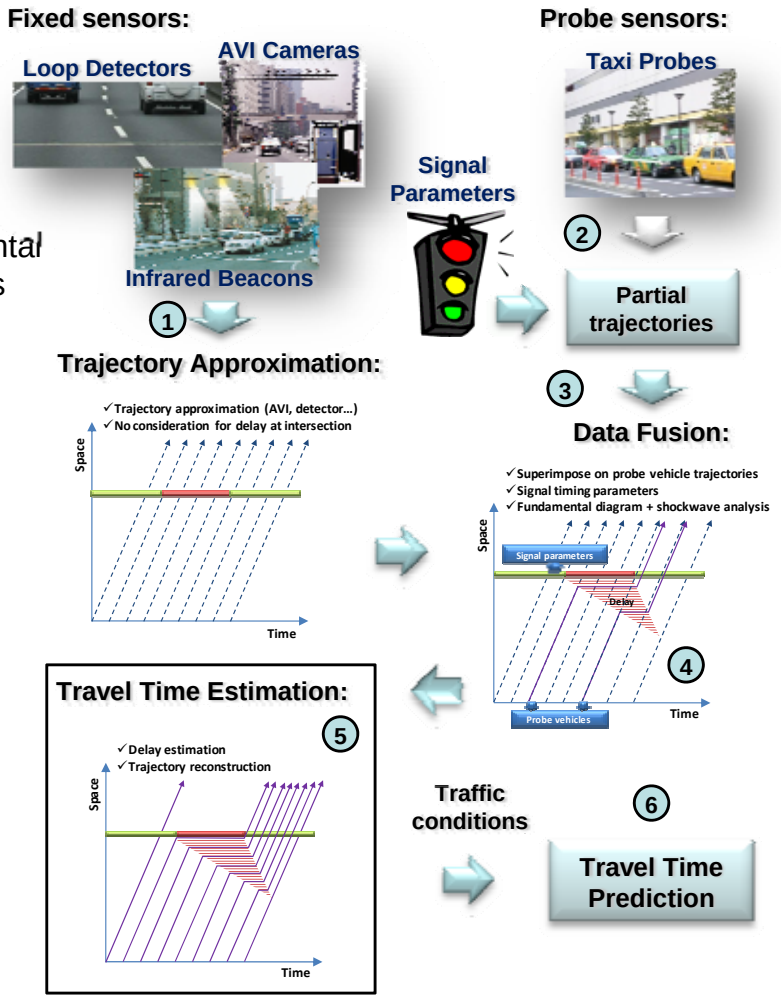
✓Short-term travel time prediction

Fig.1 Travel time varies according to traffic conditions on urban streets

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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