Context-Aware Online Spatiotemporal Traffic Prediction

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Introduction

- Real-time traffic prediction
  + Drivers, policy makers, urban planners, civer engineers
- Large volume of Loop-detector (Sensor) dataset
  + Around 9300 traffic sensors covering 5400 miles of LA

Motivation

- Existing works cannot handle various traffic situations
  + Naïve Bayes, Decision tree, KNN
  + Work well under either typical, rush hours, accident scenario
- Predict future traffic based on current traffic
  + Google map suggests route only based on current traffic
- Our focus: Spatiotemporal long/short-term prediction handling various traffic situation
  + Context: time of day, location, weather condition, accident

Framework

- System Diagram
- Using context to select the predictor

Context-aware Adaptive Traffic Prediction

- Context management
- When to partition? When to explore/exploit?

Experiment Results

- Setting: a freeway segment of 3.4 miles on I-405 during daytime 8am-5pm
  + Contexts: time of the day (10am, 2pm, 5pm) and location (0.8 mile, 2.1 miles, 3.1 miles)
- Six Base predictors [8am, 12pm, 4pm] X [0, 3.4miles]
- Experiment results
  Accuracy for one fixed sensor located at 0.8 mile

Conclusion and Future Work

- New perspective for traffic prediction
  + Spatiotemporal stream data
  + Data-driven online knowledge extraction
- Real time traffic prediction for the whole road network
  + Overcome the sparsity of sensor distribution
  + Effectively use the historical traffic information
  + Large scale dataset
  + Streaming data, online update