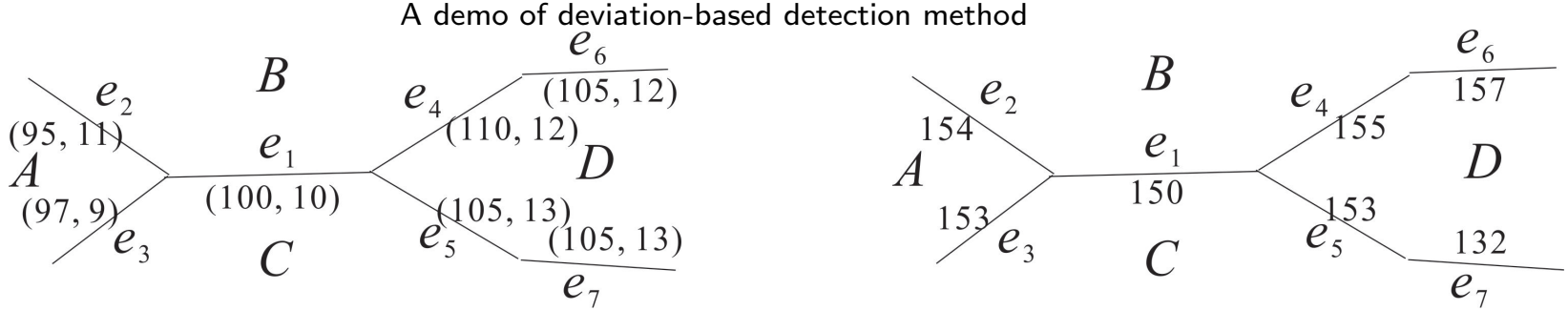
We solve 2 problems:

- Find the road segment-based anomalies (avoiding the serious boundary problem of finding region-based anomalies)
- Find the major causes of the anomalies (the abnormal traffic of a road segment would affect adjacent road segments)

We improve 2 algorithms:

- Deviation-based method with statistical model(for Problem 1)
- Diffusion-based method with diffusion model(for Problem 2)

A demo of deviation-based detection method



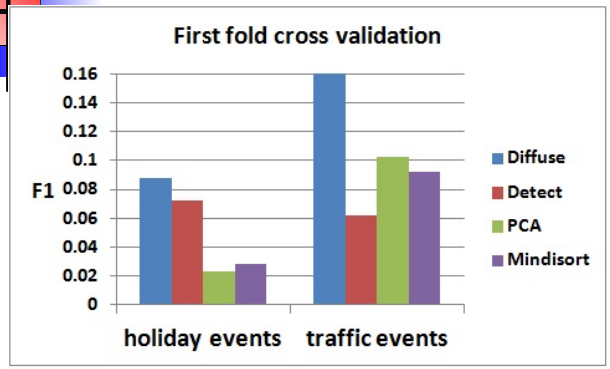
(a) 11:00am every Friday

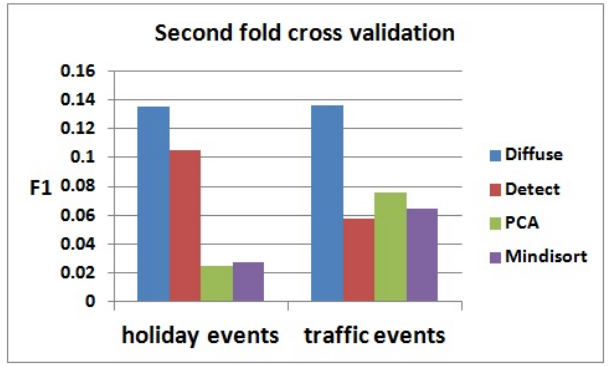
(b) 11:00am June 1, 2012 (Friday)

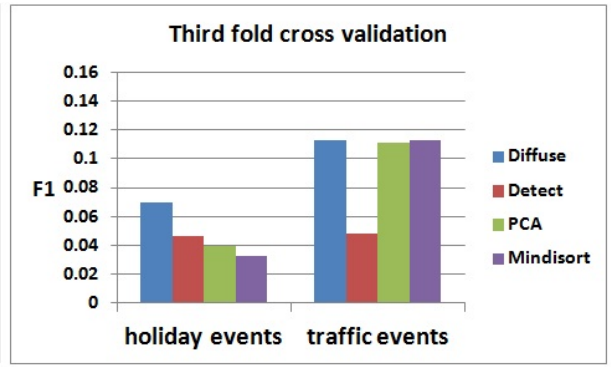
Contributions:

- Segment-based anomaly detection (instead of region-based anomaly detection)
- Apply heat diffusion process to model anomalies propagation
- Experiments on real datasets (23,000 taxis in Shenzhen) and real events

Detection Performance on Real Events



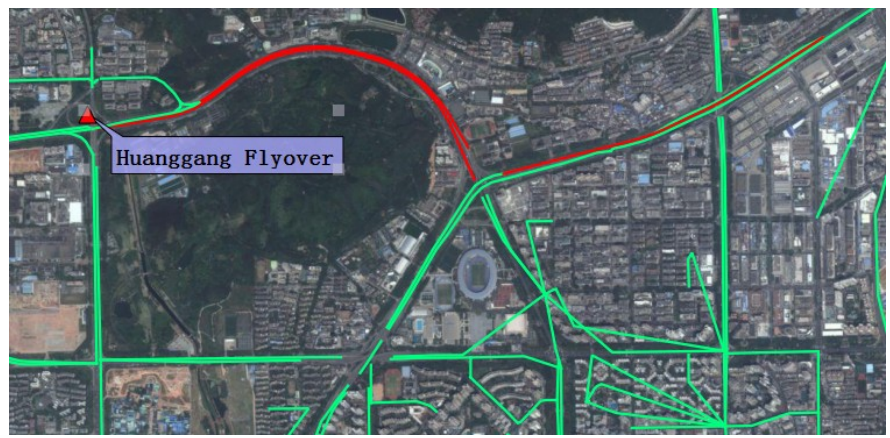




Diffuse is our diffusion-based algorithm, *Detect* is our deviation-based algorithm, *PCA* is the algorithm in [1], *Mindisort* is the algorithm in [2].

A case study on a traffic accident

(a) Detect result(deeper colour means larger anomaly)



(b) Diffuse result(red road segments are the major causes)

[1] S. Chawla, Y. Zheng, and J. Hu, Inferring the root cause in road traffic anomalies, in ICDM'12
[2]W. Liu, Y. Zheng, S. Chawla, J. Yuan, and X. Xing, Discovering spatio-temporal causal interactions in traffic data streams, in KDD'11