



Evaluation of Floating Car Data Systems by Field Trials

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Elmar Brockfeld, Stefan Lorkowski, Peter Mieth, Ralf-Peter Schäfer
Institute of Transport Research, German Aerospace Center, Berlin, Germany

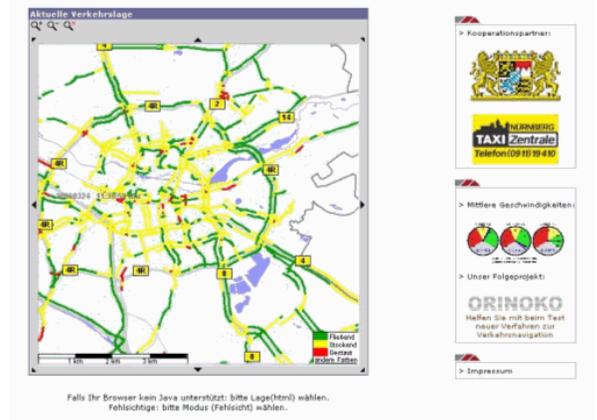


Floating Car Data (FCD) from Taxis

Two research projects

➤ ORINOKO

- founded by German government
- optimizing traffic management for urban corridors
- FCD from 700 taxis in Nuremberg
- position reporting interval: ≈ 30 sec



➤ DYNASTY

- founded by European commission
- bringing TMC to China
- FCD from 2000 taxis in Beijing/China
- position reporting interval: ≈ 20 sec



Accuracy of FCD approach

An open field of research

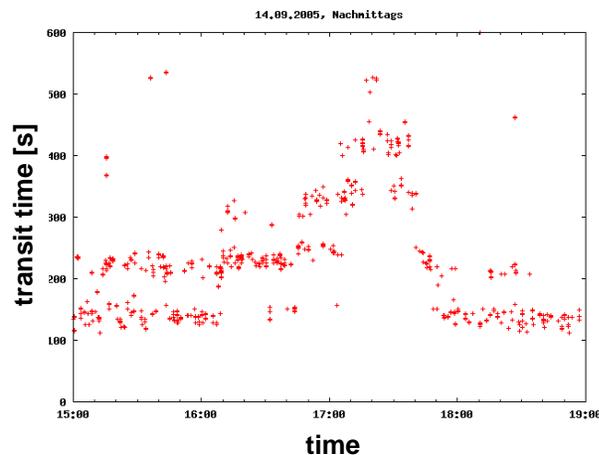
- causes of inaccuracy in FCD systems
 - statistical bias due to low sampling rate
 - positioning error due to GPS inaccuracy, wrong map matching
 - misinterpretation (jam ↔ rest)
 - time delay between measurement and publication of derived traffic information

- two FCD usages, two field trials:
 - (1) travel time estimation (addressed in ORINOKO)
 - (2) incident detection (addressed in DYNASTY)

Travel time estimation (1)

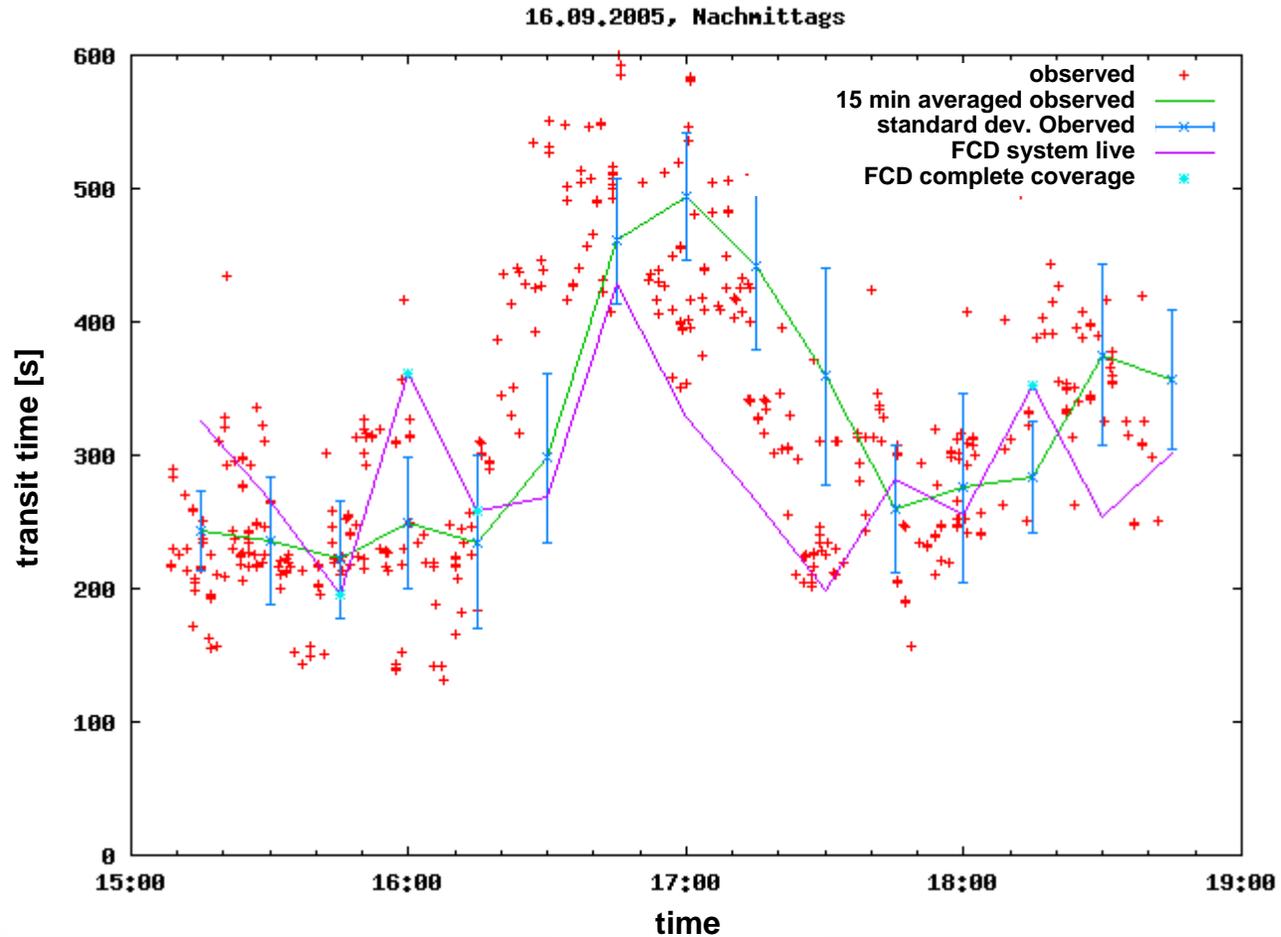
Field trial

- travel time observation by license plate recognition
- Regensburger-, Hain-, Münchener Strasse, ≈ 2 km
- 2005, Sep. 13th and 14th outbound
- 2005, Sep. 15th and 16th inbound
- 7–11 a.m. and 3–7 p.m.
- bi-modal transit time distribution



Travel time estimation (1)

Results of field trial



Travel time estimation (1)

Results

- measurement campaign delivered good reference dataset
- multimodal distribution of transit times. Reason: signalized intersections
- high standard deviation (about. 45 sec) of individual travel times

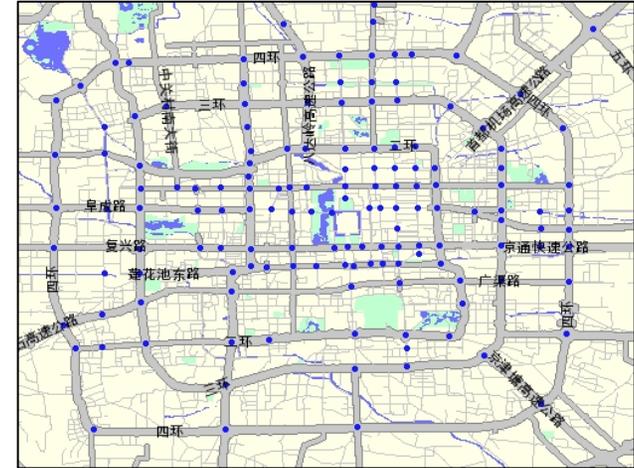
Quality Taxi FCD

- estimated travel times mostly inside variation limit of observed transit times
 - variation coefficient individual travel times to 15 min average: 19,4%
 - variation coefficient Taxi FCD estimation to 15 min average : 17,7%
- incident detection at given penetration (≈ 0.7 %) with stochastic time delay
- not suitable as stand-alone sensor for traffic light optimization

Incident detection (2)

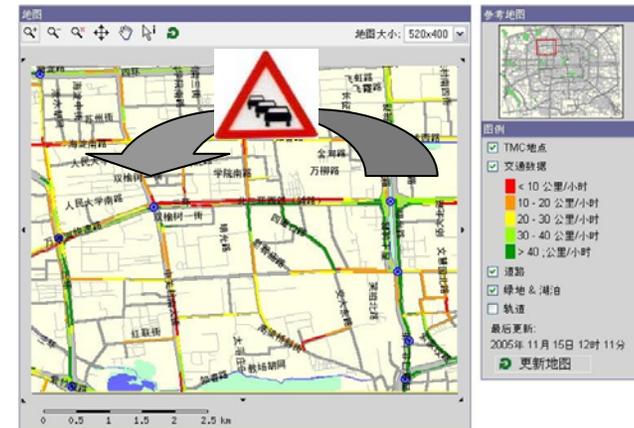
Field trial

- self-defined TMC location table →
- creation of TMC messages
- broadcasted by a Beijing radio station
- about 100 messages simultaneously



Measurement campaign:

- one probe vehicle using 2nd and 3rd ring road (freeway)
- one day , 6 a.m. to 8 p.m.
- comparison of observed incidents with TMC

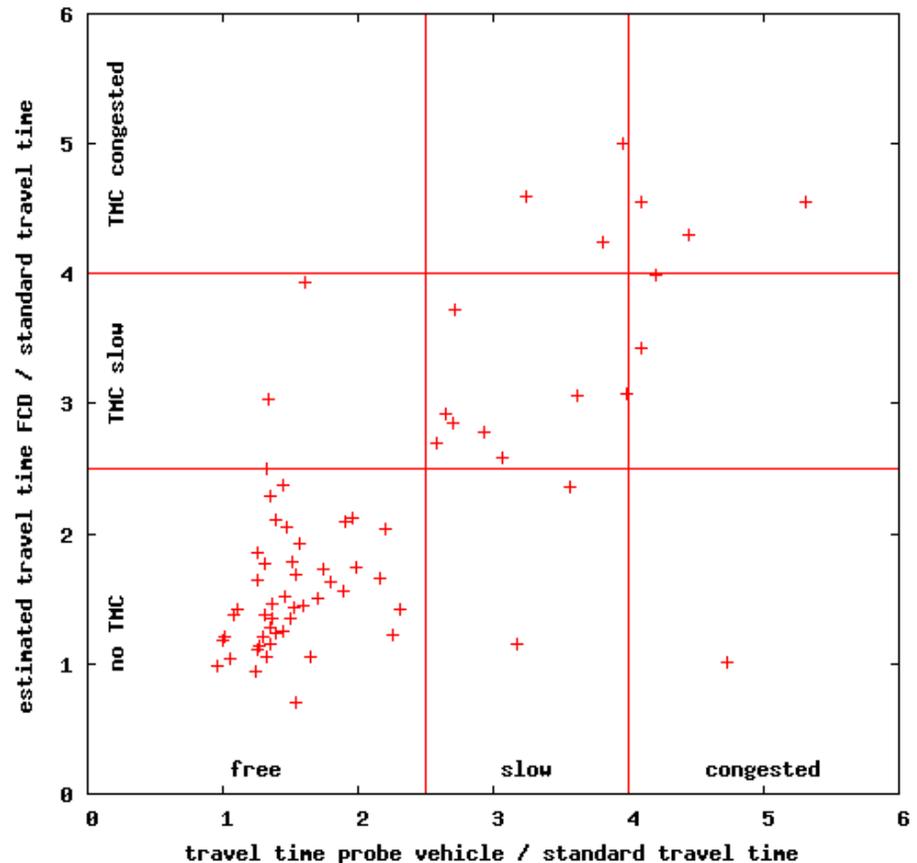


Incident detection (2)

Results

19 incidents observed,
there from ...

- 11 reported correctly
 - 5 reported imprecisely
 - 3 not reported
 - + 2 wrong TMC
-
- satisfying result ...
 - ... but test not very significant; more extensive reference data needed



Conclusions

- Taxi FCD is a valuable traffic sensor for urban regions
- travel time information on a low-cost basis
- reporting frequency should be less than 120 sec
- penetration crucial for accuracy and time delay
- for traffic management purposes a high penetration (>1%) or combination with other sensors needed

