Analyzing traffic flow and geographical distribution of origin-destination on highway using passive mobile positioning data

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OBJECTIVE

- Traffic analysis with passive mobile positioning data
- Correlation with traffic counters
OBJECTIVE

- Traffic origin and destination
- Temporal patterns
  - Seasonal
  - Weekday rhythm
  - 24-hour rhythm
- Distinguish local and transit traffic
- The type of traffic
RELATED METHODS

- Traffic counters
- Roadside questionnaires
- AVI (automatic vehicle identification) systems
- Video licence plate matching
- Postcard surveys
- GPS tracking
- Mobile positioning (based on handovers e.g. ITIS Holdings CFVD technology)
- ...

10th March 2008
SPM 2008, Tartu
DATA

- Passive mobile positioning data
  - call activities of mobile EMT
  - 1 year (October 1 2006 – September 30 2007)
  - > 800 million data records
  - > 0.5 million subscribers
    - > 1/3 of population
  - PostgreSQL database with PostGIS spatial extension
  - People not vehicle
  - Survey
METHODS

Traffic flow model:
- distinguish local and transit traffic
- extracting traffic flow of study area
- calculating traffic frequencies in highway profile

Traffic distribution model:
- *extracting anchor points from the database*
- generating movement vectors from anchor points
- downscaling movement vectors into highway canyon
- analysing geography of movements in perspectives of residence, work place and leisure anchor points
METHODS

- 3 categories of movements:
  - everyday movement (residence-work)
  - regular movements (everyday-leisure)
  - irregular movements
CASE STUDY

Antenna coverage area
- Kose-Võõbu-Mäo
- Alternative route 1
- Alternative route 2
- Others
CASE STUDY
RESULTS

- Traffic frequencies

(Difference from average daily flow)

MONTHLY VARIATIONS

(WEEKDAY VARIATIONS)
RESULTS

- Local community and transit traffic (frequencies)

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- Purpose of travel
RESULTS

- Geographical distribution of traffic flows
RESULTS

- Potential traffic increase
DISCUSSION

Advantages
- High correlation with traffic counters (rho 0.9, p<0.01)
- All year around data
- High number of respondents
- Geographical distribution
- Cost-effectiveness

Disadvantages
- Accuracy
- Daily pattern of call activities, penetration of phones
- Estimation of vehicle types
- Privacy (data access)
- A lot of analyses
THANK YOU
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