Comparison of passive mobile traces and GPS data for the calculation of mobility indicators

Other Conference Item

Author(s): Molloy, Joseph; Silm, Siiri; Ahas, Rein; Axhausen, Kay W.

Publication date: 2018-06-28

Permanent link: https://doi.org/10.3929/ethz-b-000334285

Rights / license: In Copyright - Non-Commercial Use Permitted

Funding acknowledgement: 167189 - Big data transport models: The example of road pricing (SNF)
Comparison of passive mobile traces and GPS data for the calculation of mobility indicators

Joseph Molloy  
Institute for Transport Planning and Systems (IVT)  
ETH Zürich  
Stefano-Franscini-Platz 5, 8093 Zurich  
phone: +41 44 633 31 51  
fax: +41-44-633 10 57  
joseph.molloy@ivt.baug.ethz.ch

Siiri Silm  
Institute of Ecology and Earth Sciences  
University of Tartu  
Estonia-51014 Tartu  
phone: +372-73-76844  
fax:  
siiri@tu.ee

Rein Ahas  
Institute of Ecology and Earth Sciences  
University of Tartu  
Estonia-51014 Tartu  
phone: +372-50-35914  
fax: +372-7-375825  
rein.ahas@tu.ee

Kay W. Axhausen  
IVT  
ETH Zürich  
CH-8093 Zürich  
phone: +41-44-633-39-43  
fax: +41-44-633 10 57  
axhausen@ivt.baug.ethz.ch

January 2018

Abstract

Mobile positioning technologies are playing a large role in a new wave of travel behavior research. Such technologies, coupled with the ubiquity of smart phones, allow for the collection of data over unprecedented sample sizes, accuracy and duration. In the context of ongoing work with nation-wide trace datasets from Estonia, we compare the ability of three types of positioning data, namely, CDR, MPS and GPS to provide common mobility metrics, such as activity patterns, home and work locations, and travel distances. For 52 persons, 8961 person days of data were collected simultaneously using all three technologies, allowing comparison of the accuracy and usefulness of each data collection method. The first results indicate that the performance of the MPS data is highly spatially dependent. In combination with the large spatial error, the 15 minute periodicity of the MPS data is not fine enough to identify activities of short durations such as grocery shopping. To combat this, multiple days of low frequency data are overlaid to detect average patterns for each day of the week per individual. This approach based on multi-dimensional kernel density estimation successfully delineates activity patterns, and works with both GPS and MPS data.