

Spatial Interpolation of Passive Mobile Positioning Data to Administrative Hierarchies and Grid-based Networks

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Abstract

Anonymous bulk location data (passive positioning) from mobile operators' networks is a new alternative source for population and tourism statistics. This data can provide new approaches and aspects compared to traditional databases. Though the use of such data source presumes addressing many issues like privacy, data model problems, sampling and representativeness issues and among others spatial and temporal interpolation problems, the method can be a cost-effective supplement to traditional data sources.

Passive mobile positioning provides point-based (locations of antennae) data for areas covered with mobile operators' network antennae. Geographically network antennae locations are spatially unevenly distributed – more antennae are located in densely populated urban areas and along heavy traffic highways. Coverage is smaller in rural areas. When dealing with specifically call activity based datasets (as in current presentation), call activities of people are distributed with correlation to their personal activity regime – i.e. usually people make more calls at places and during times when and where they are more active. An average of 104 calls per month per person (median 62) is registered in used database which were conducted in an average of 14 (median 9) different locations in Estonia. The sample size represents roughly 46% of Estonian population. The focus of that presentation is describing the different aspects, methods and issues for spatial and temporal interpolation of call activity based passive mobile positioning data for administrative hierarchies and density grid systems. This new data source is only effective and usable if correct data interpretation and proper interpolation methods are used. Such data source is increasingly used in academic research as well as in practical applications in Estonia and other countries.