The Visit Quantification Monitoring Task

Given a set of
- consecutive time intervals $T = \{t_1, \ldots, t_n\}$,
- mobile entities $E = \{e_1, \ldots, e_m\}$, and
- arbitrary location sets $\Lambda = \{L_1, \ldots, L_m\}$
we want to monitor the visit quantities
- gross visits, average visits and entity coverage for visit class $\lambda$
for all tuples $(\tau \in T, L \in \Lambda, E, \lambda \in I_N)$.

approach ensures that:
- messages do not contain
  person related information (no id) → the coordinator cannot join messages
  of a person
- submission of statistics is
temporally disjoint from
visit events

$\rightarrow$ coordinator cannot infer
current location of a user
or build personal mobility profiles

relationship to k-anonymity:
- level of k-anonymity = smallest visit count in
global frequency distribution for given location set
- lower bound = single location
- increase privacy by
  increasing location set sizes

the users’ rights
- approach allows opt-out and
  local configuration (e.g. typed
  location sets, minimum size)

Privacy-preserving Distributed Monitoring of Visit Quantities

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1. Motivation

Privacy must be respected!

Big Brother is watching you!

2. Visit Quantities

3. Distributed Computation

4. Communication Architecture

5. Privacy

• gross visits: total number of visits for a
given set of locations in a given time
interval (for entities with at least $\lambda$ visits)
• average visits: average number of visits
of entities (with at least $\lambda$ visits) in a
given time interval
• entity coverage: proportion of entities
visiting locations (at least $\lambda$ times)

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Current privacy approaches in trajectory data analysis as
k-anonymity or differential privacy require data centralization.

Crowd sourcing makes life better!

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http://www.iais.fraunhofer.de

http://lift-eu.org