ANALYZING SEMANTIC LOCATION CLOAKING
TECHNIQUES IN A PROBABILISTIC GRID-BASED MAP

Maria Luisa Damiani¹, Claudio Silvestri², Elisa Bertino³
Università di Milano(I)¹, Università di Venezia(I)², Purdue University(USA)³

Protecting sensitive semantic locations in LBS

- **Semantic locations or places.** Users visit places of different type, i.e., pubs, churches.
- **Places are differently popular.** Given a set of places \( \{ f_1, f_2, \ldots, f_n \} \), the popularity of such places is specified as: \( \{ P(x \in f_1), \ldots, P(x \in f_n) \} \)
- **Places can be sensitive, e.g., hospitals**
- **Privacy threat:** associating users with sensitive places with a probability higher than a given threshold

Computational model

- **Goal.** To blur the position so as to bound the probability of association with sensitive location while preserving QoS
- **Computational model.** (a) Personalized privacy profile; (b) Robust protection achieved by separating generation of cloaked regions from position enforcement
- **Semantic location cloaking techniques.** Greedy techniques for progressive expansion of sensitive seeds

The SAWL system

- **SAWL** supports the evaluation and comparison of semantic location cloaking algorithms on both simulated and real spaces
- **Multiple cloaking techniques**
- **Various utility measures**
- **Import of real data**
- **Stochastic simulation**

The SAWL environment

- **Position distribution model** derived from the Community based Mobility Model (Musolesi & Muscolo 2007)
- **Probability distribution of positions**
- **Grid-based representation of background knowledge**
- **Privacy profile specification**
- **Generation of cloaked regions**
- **Position enforcement**
- **Cloaking engines**
- **Hilb**
- **Rect**
- **Rect/4**
- **SAWL** supports the evaluation and comparison of semantic location cloaking algorithms on both simulated and real spaces
- **Multiple cloaking techniques**
- **Various utility measures**
- **Import of real data**
- **Stochastic simulation**

Main contribution

A comprehensive privacy model and computational framework to support the privacy of places

Research directions

Privacy usability; time-based place models; integration with mobility models