SerPens - A Tool for Semantically Enriched Location Information on Personal Devices

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Location Information and its Limitations

- Location information could be
  - GSM cell based
  - GPS based
  - WiFi based

- Limitations of raw location information
  - Numeric representation makes little sense to a person (e.g., 60°10′11″N 24°56′18″E)
    - NO semantic information
    - We use semantic description to refer locations
  - Difficult to integrate with location-aware applications
Related Work

• Intel Placelab initiative (Shon et al., ICSE’06)
  – Toolkit for gathering various location information
  – No support for associating semantics with location information

• Li et al., Pervasive’06:
  – Association of semantics to individual GSM cells
  – Size of GSM cells varies ⇒ poor granularity

• Zhou et al., Pervasive’05:
  – User study on finding what kind of locations are important in user’s life
  – SerPens can be used to automate this kind of studies
SerPens

• Goals:
  – Easy gathering of location information
  – Association of semantics with location information
  – Sharing semantics in collaborative fashion

• System Overview
  – Built on BeTelGeuse (A Bluetooth data gathering tool) (Nurmi et al., BodyNets’07)
    http://www.cs.helsinki.fi/group/acs/betelgeuse
  – Client-Server Architecture
    • Client: Enables communication between mobile-devices and server
    • Server: Manages mapping between location information and semantics
SerPens - Architecture

Server

SerPens

BeTelGeuse

GSM

Sensors

GPS
SerPens - Client

• Runs on a mobile device
• Collects location information from different sources
• Enables user to add semantics to different granularities
• Granularities are specified by location taxonomies
  – Taxonomy based on user study by Zhou et.al. (Pervasive,05):
    • Geographic location (street, address etc.)
    • Places (home, university, park etc.)
    • GSM cell specific (country, area etc.)
SerPens - Server

• Maintains associations between location information and user defined semantics
• Semantic labels can be identified as private or public
• Information stored in a spatial database
  – PostGres + PostGIS
• On request by the client
  – executes neighbourhood queries
  – returns relevant public semantics across different users
• Can use third party services for refining information
  – e.g., Geocoder / Location-based services
SerPens - Visualization
SerPens - Usage Scenarios

• Automated diaries
  – Logs semantics for locations a user visited

• Location clustering
  – Discovers important places in user’s life
  – User defined labels can be used to validate performance of different algorithms

• Geographic web
  – We can query the web with different granularities of location information
Summary

• Presented a tool for collecting semantically enriched location information
• The tool allows association of location information with user defined semantics
• Shares semantic information across users in a collaborative fashion
• Built on top of BeTelGeuse, a freely available Bluetooth data gathering tool
• Supports various kinds of research possibilities
  – Location clustering
  – Geographic web