Geocontext extraction methods analysis for determining the new approach to automatic semantic places recognition

Mark Zaslavskiy, Dmitry Mouromtsev,
ITMO University,
{mark.zaslavskiy, d.muromtsev}@gmail.com

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Motivation

Context-aware computing is chaning rigtht now:

- Positioning sensors become cheaper and more available;
- Context-aware become social-aware.

Goal: determine actual trends in geocontext extraction methods and understand which types of geocontext information are the most interesting.

Compared works

1) SensLoc: sensing everyday places and paths using less energy.
2) Predicting future locations with hidden Markov models.
3) Inferring hybrid transportation modes from sparse GPS data using a moving window SVM classification.
4) The places of our lives: Visiting patterns and automatic labeling from longitudinal smartphone data.

Questions

- Which **new types of geocontext information** can be received?
- Which **data** is used for analysis?
- What **approach** is used?
- What **limitations** does the method have?

Comparison conclusions

- Actual challenge - automatic **semantic places recognition** algorithm.
- Getting new geocontext information types:
  - **joint processing** of GPS with other sensors data;
  - **group geocontexts** building.
- **Hybrid processing** is the most effective approach.
- **Strong cloud backend** is necessary for mobile geocontext app.

Geo2Tag

- OpenSource platform for location-based services:
  - geo-tagging of annotated media content;
  - storing of geotags;
  - geo-search and spatial filtering;
  - geotags markup with semantic tags.

Geo2Tag

- **Geotag** — tuple <t, L, B, H, data>,
  - t – time
  - B,L,H – coordinates
  - data – text data ~1K
- **Semantic tag** — word of a natural language with its wordforms, which appears in geotag data and has semantic information for user.

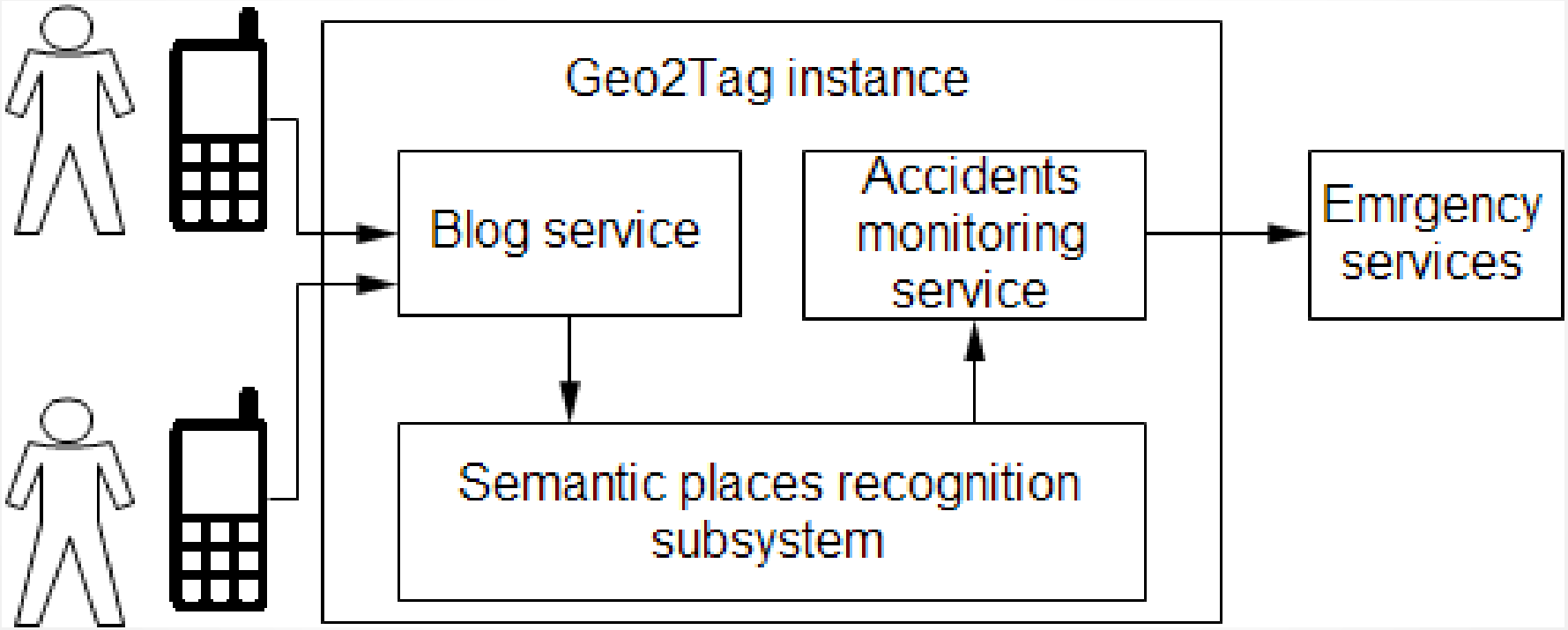
Proposed approach

1) Statistical determination of semantic places location.
2) Semantic tag markup of related geotags.
3) Calculation of total statistic for each semantic tag at the semantic place.
4) Decision making about the most important semantic tags at the semantic place.
5) Result of the algorithm work – set of the most important semantic tags for each semantic place.

Approach pros and cons

- **Pros**:
  - No syntax analysis.
  - No training during semantic places labeling.
- **Cons**:
  - Dependence from word form dictionary.

Example of use case



Conclusion

- New approach for semantic places recognition and labeling.
- Illustration use case proposed.
- Future plans:
  - New approach implementation.
  - Statistical criterions applicability to different domain fields analysis.

Questions

Terminology

- **Entity** is a person, place, or object that is considered relevant to the interaction between a user and an application.
- **Context** is any information that can be used to characterize the situation of an entity.
- **Geocontext** or **geocontext information** is location information that can be used to characterize the situation of an entity.