Part 4
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Research agenda

Trajectory Modeling

- There is a substantial agreement on trajectory modeling concepts

- Ongoing research addresses formal definition of additional concepts for specific application domains
  - Transport and traffic
  - Robotics
  - Interdisciplinary research

- Research is mainly active on automatic inference of trajectory episodes and annotation
  - Identifying stops and Points of interest
  - Inferring behavior of the moving object (persons in particular)

Trajectory reconstruction

- Error correction

- Outliers removal

- Noise elimination

- Interpolation methods

- Data compression

- Map matching

- Trajectory identification

Behavior

- Lack of formal definitions

- Lack of agreed classification

- More group behaviors than individual behaviors

- Classification techniques: decision trees, Markov models, …

- Sequence pattern mining

- Ontology-assisted methods

- Trajectory interactions

- Prediction

Mining sets of trajectories

- Methods for discovering patterns by focusing on the geometrical properties of the set of trajectories

- Mining sets of trajectories in order to get more information about geo-objects of the application (e.g. places of interests, frequently used routes

- Partition the set of trajectories in *clusters* sharing common properties

- Trajectory sampling: finding a representative trajectory for each cluster. Applications include trajectory summarization, visualization, searching and retrieval

Trajectory Data Warehousing

- Devising a semantic model for trajectory data warehouses.

- Make trajectory as a first class component in data warehousing.

- Currently, a model based on episodes has been defined, and some basic operations specified and implemented. The work needs to be extended to OLAP operations for trajectories and the use of complex trajectory objects in fact table

Semantic Trajectory Visualization

- Suitable visual artifacts can be powerful tools for understanding trajectories

- Relying on semantic trajectory models makes visualization readily useful for application users.

- Methods for describing and choosing automatically trajectory visualization artifacts by using ontologies exists but further work is needed.

Privacy

- **Protection against disclosure of sensitive places**
  - A place is sensitive for an individual if the individual does not want to be known that he has been in this place.
  - Examples of sensitive places are hospitals and religious buildings.

- Anonymization of semantic trajectories datasets
  - Semantic trajectories datasets, representing the places where people stop, may disclose sensitive information, even when the identifiers of the trajectories are removed.
  - This problem has led to novel methods for privacy-aware trajectory data publishing.