Trajectory Data Analysis
Master Thesis

Route Reconstruction on Time-dependent Road Networks

Implement algorithms to extract/reverse engineer routes from trip data on time-dependent road networks

Tasks
- Investigate existing approaches to generate time-dependent road networks from trajectory data
- Implement algorithm(s) to compute a trip between two locations on time-dependent networks given the desired duration of the trip
- Compare the similarity of given trajectories with the paths computed by the implemented algorithm(s)

Requirements
- Basic knowledge of graph theory and algorithms
- Basic experience in JAVA and/or C++ programming

Preferable
- Knowledge of spatio-temporal data management
- Course on Graph Data Management/Analysis (INF-21320 or equiv.)

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Master Thesis

Network Construction from Trajectory Data with User Preferences

Design and implement solutions to generate road networks from trajectory data and distribute preferences associated with each of the input trajectories

Tasks
- Investigate existing approaches to generate road networks from trajectory data
- Design methods to distribute preferences among road segments generated from the input trajectories
- Implement algorithm for personalized route planning on the generated network algorithm(s)

Requirements
- Basic knowledge of graph theory and algorithms
- Basic experience in JAVA and/or C++ programming

Preferable
- Knowledge of spatio-temporal data management
- Course on Graph Data Management/Analysis (INF-21320 or equiv.)

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Bachelor/Master Thesis

Computing Variable Length Paths on Graph Databases

Investigate the computation of variable length paths on Neo4j and implement algorithm(s) to compute variable length paths as resource-constrained shortest paths

Tasks
- Investigate the computation of variable length path queries on Neo4j
- Implement algorithms to compute variable length path as resource-constrained shortest paths in Neo4j
- Evaluate the implemented algorithms against the current ones used by Neo4j

Requirements
- Basic knowledge of graph theory and algorithms
- Experience in JAVA programming

Preferable
- Experience with Neo4j
- Course on Graph Data Management/Analysis (INF-21320 or equiv.)

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Bachelor/Master Thesis

Graph Query Processing on Relational Databases

Implement indexing methods to process distance and shortest path based queries on relational DBMS

Tasks
- Investigate existing approaches for the evaluation of distance and shortest path queries on relational DBMS
- Implement algorithms to evaluate distance-based queries on relational DBMS
- Evaluate the implemented solution against real-world relational and/or graph DBMS

Requirements
- Knowledge of Relational Databases and SQL
- Knowledge of JAVA programming (or similar)

Preferable
- Basic knowledge of graph theory and algorithms
- Course on Graph Data Management/Analysis (INF-21320 or equiv.)

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Master Thesis

Online Approximation of Graph Analytics

Identify graph analysis measures that can be approximated only using the results of previously executed queries

Tasks
- Analyze query logs on graph databases
- Identify graph analysis measures that can be approximated from the queries
- Investigate the influence that the obtained measures can have on query processing

Requirements
- Knowledge of data analysis methodologies
- Knowledge of JAVA or a similar programming language
- Basic knowledge of graph theory and algorithms

Preferable
- Course on Graph Data Management/Analysis (INF-21320 or equiv.)

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