

Bachelor Thesis

Comparison of Different Discrete-Time Dynamic Graphs for Human Mobility Prediction

Are you looking for a Bachelor or Master thesis in advanced data science? Are you interested in data storage technologies? Do you want to get experience in the emerging field of geospatial databases and are you interested in defining new standards? Do you want to be part of the group of leading experts in this field? Then apply now! We look forward to you joining us as a Bachelor or Master Thesis student (d/f/m) within the Big Geospatial Data Management Group at the Department for Aerospace and Geodesy. A Supervision in the School of Computation, Information and Technology is also possible.



Location: Ottobrunn/Munich/Remote

Duration: 3 to 6 months depending on your study program

Your topic:

In recent years mobility data became increasingly available as every single mobile phone can track detailed movement patterns of people. At the same time mobility data is very valuable for various applications such as urban planning, disaster response or market analyses. This requires on the one hand a backwards oriented analysis of this data type, which is already well discussed in science. On the other hand, forward oriented predictions of future movements may allow for new use cases. So far various classical and neural machine learning approaches have been proposed in this regard. One possible solution is to model the mobility as graphs. This allows for the application of Graph Neural Networks for prediction, which already showed to be able to predict node classes, links and full graph classifications. Anyway, so far a comprehensive evaluation of different graph-based prediction approaches is missing.

Therefore, during the thesis, we want to investigate:

- Which Discrete Time Dynamic Graph Models are suitable for mobility prediction?
- How do these models differ?
- Which model features are beneficial for a graph based mobility prediction?

This may include:

- Comprehensive literature review of existing approaches to graph-based mobility prediction
- Development of an Evaluation Framework
- Implementation of different graph neural networks for discrete-time dynamic graph representations of mobility
- Evaluation of the developed approaches on a variety of real world human mobility data sets

Related Work:

- A survey of dynamic graph neural networks (Zheng et al, 2025)
- A Comprehensive Survey on Graph Neural Networks ([Wu et al, 2020](#))
- Mobility Data Science: Perspectives and Challenges (Mokbel et al, 2024)

Qualifications:

- Interest in emerging field of Big (Geospatial) Data
- Advanced programming skills (probably mostly Python, PyTorch)
- Experience with Graph Neural Networks appreciated
- Interest and experience in literature-based work with a good scientific practice
- Enrolled full time student within Computer Science, Geo Informatics or similar field of study
- Fluent English is mandatory; German would be an asset

Applications via Mail with CV and transcript to:

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