Paid position with option to extend into a Bachelor's/Master's thesis

Anonymizing Trajectory Data

Implementation and evaluation of privacy mechanisms in the field of trajectory data

Background  Everyday, the value of and interest in trajectory data are becoming more and more noticeable. Traffic management, urban planning, transportation system design, routing advice, or homeland security are just a few of the many applications relying on the analysis of trajectory data. Despite the economic and societal benefits, the processing of trajectory data can violate the privacy of individuals, as trajectory data can contain a lot of sensitive information and be used to infer sensitive attributes (e.g., medical conditions, sexual preferences, political activities). A promising mitigation to these privacy risks is to anonymize the underlying trajectory data. Unfortunately, a variety of conditions complicate the anonymization of trajectory data without destroying their utility, as they are sequential, high-dimensional, bound to geophysical restrictions, and easily mapped to semantic points of interest.

Many privacy mechanisms have been proposed to anonymize trajectories, ranging from location perturbation, suppression, and clustering, to synthetic generation. These mechanisms also verify different privacy notions and satisfy multiple utility requirements. However, most mechanisms are only proposed in research paper and are not readily available as libraries for further use.

Task  As part of a team of researchers and a current research project, your task will consist of, but is not limited to:

- Implement trajectory anonymizing mechanisms from research papers into code
- Implement evaluation and utility metrics from research papers into code
- Adapt public trajectory databases and road maps to different privacy scenarios

Possible extension to Bachelor's/Master's Thesis  The implementation of these protection mechanisms can be preparatory work for a potential thesis topic. The precise topic is up for discussion based on the student's preferences. It can consist, for example, of grand-scale comparisons of the mechanisms and evaluations using new utility metrics, which have not been extensively studied extant literature.

Prerequisites  Primarily interest in the topic. Coding skills in Python or similar languages, basic software development practices (e.g., Git), and English communications skills are required.

If you are interested or have further questions, please contact Àlex Miranda-Pascual (alex.pascual@kit.edu), Felix Morsbach (felix.morsbach@kit.edu), or Patricia Guerra-Balboa (patricia.balboa@kit.edu).

Nov'22