

# Master project in Information Security at the University of Luxembourg

*Title: Privacy in spatio-temporal data publication*

The Security and Trust of Software Systems group, led by Prof. Dr. Sjouke Mauw, is looking for outstanding master students who want to develop their master thesis within our group.

## Project description

Analysing and mining spatio-temporal data, also known as trajectories, might reveal new trends and previously unknown knowledge to be used in traffic, sustainable mobility management, urban planning and supply chain management. By doing so, resources might be optimized and business and government decisions can be solid and well-founded. Despite of all these benefits, there are obvious threats to the individuals' privacy if their trajectories are published in a way which allows re-identification of the individual behind a trajectory. Just considering the locations visited by a trajectory, it may reveal sensitive information about users like religious, political, or sexual preferences. The privacy threat grows when the time information exposes user's habits that may be used for unauthorized advertisement and user profiling.

Several privacy-preserving methods for trajectory anonymization based on  $k$ -anonymity have been proposed. These methods normally rely on suitable distance measures in order to preserve data utility. For example, the Euclidean distance is used in [1], the Edit distance in [4], and an ad-hoc distance measure for trajectory anonymization is proposed in [3]. However, empirical results have shown that information loss after applying those methods is still huge.

**General goal.** In this project, we will investigate new distance measures and privacy-preserving algorithms for trajectory data publication. In addition to the distance between trajectories, we also expect to consider the semantics of location data, which might improve further both the utility and the offered privacy of the released dataset. To validate results, we will perform experiments on real-life trajectory datasets.

## Contact Information

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## References

- [1] Osman Abul, Francesco Bonchi, and Mirco Nanni. Anonymization of moving objects databases by clustering and perturbation. *Inf. Syst.*, 35(8):884–910, 2010.
- [2] Helmut Alt and Michael Godau. Computing the fréchet distance between two polygonal curves. *Int. J. Comput. Geometry Appl.*, 5:75–91, 1995.
- [3] Josep Domingo-Ferrer and Rolando Trujillo-Rasua. Microaggregation- and permutation-based anonymization of movement data. *Inf. Sci.*, 208:55–80, 2012.
- [4] Mehmet Ercan Nergiz, Maurizio Atzori, Yücel Saygin, and Baris Guc. Towards trajectory anonymization: a generalization-based approach. *Trans. Data Privacy*, 2(1):47–75, 2009.