

Swapping trajectories with a sufficient sanitizer

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Abstract

Mobility data mining can improve decision making, from planning transports in metropolitan areas to localizing services in towns. However, unrestricted access to such data may reveal sensible locations and pose safety risks if the data is associated to a specific moving individual. This is one of the many reasons to consider trajectory anonymization.

Some anonymization methods rely on grouping individual registers on a database and publishing summaries in such a way that individual information is protected inside the group. Other approaches consist of adding noise, such as differential privacy, in a way that the presence of an individual cannot be inferred from the data.

In this paper, we consider a different approach consisting of swapping partial trajectories, formalize the concept of sufficient sanitizer and show that the sanitization method based on swapping segments for trajectory data (Swap-Mob), is a sufficient sanitizer for various statistical decision problems as it not

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only preserves the aggregate information of the spatial database in the form of sufficient statistics but also provides privacy to the individuals. We test the utility of the data obtained after applying SwapMob sanitization in terms of Origin-Destination matrices, a fundamental tool in transportation modelling.

Keywords: Privacy Preserving Trajectory Mining; Origin-Destination matrices; Trajectory anonymization; Intelligent Transportation Systems; Sufficient Sanitizer; Mobility Data Mining

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