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# Achieving Differential Privacy of Trajectory Data Publishing in Participatory Sensing

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## Abstract

Trajectory data in participatory sensing is of great importance to the deployment and advancement of several applications, like traffic monitoring, marketing analysis, and urban planning. However, releasing trajectory data without proper sanitation poses serious threats to users' privacy. Existing work cannot achieve differential privacy perfectly because they use random and unbounded noises, which will leak users' privacy and violate the utility of the released trajectory data. Besides, existing trajectory merging method has to remove some trajectories from the input dataset. To solve both problems, we propose a novel differentially private trajectory data publishing algorithm with a bounded noise generation algorithm and a trajectory merging algorithm. Theoretical analysis and experimental results show that the privacy loss of our scheme is at least 69% less; the average trajectories merging time is 50% less than existing work.

*Keywords:* Differential privacy, trajectory, participatory sensing.

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## 1. Introduction

Over the last few years, due to the development of location-aware mobile devices(e.g., GPS navigation systems and smart phones), it is getting easier for mobile users and service providers to generate and collect trajectory data.

5 Trajectory data, such as mobility traces, is being widely used in a variety of

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