

# Dummy-Based User Location Anonymization Under Real-World Constraints

## AIM:

The aim of the project is to anonymize a user's location to preserve location privacy in a real environment when using LBSs with mobile devices.

## ABSTRACT:

Location-based applications utilize the positioning capabilities of a mobile device to determine the current location of a user, and customize query results to include neighboring points of interests. However, location knowledge is often perceived as personal information.

According to the growth of mobile devices equipped with a GPS receiver, a variety of location based services (LBSs) have been launched. Since location information may reveal private information, preserving location privacy has become a significant issue. Previous studies proposed methods to preserve a users' privacy; however, most of them do not take physical constraints into consideration. In this paper, we focus on such constraints and propose a location privacy preservation method that can be applicable to a real environment. In particular, our method anonymizes the user's location by generating dummies which we simulate to behave like real human. It also considers traceability of the user's locations to quickly recover from an accidental reveal of the user's location.

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Our method ensures to anonymize the user's location within a pre-determined range. It also avoids fixing the relative positions of the user and dummies, which may give a hint for an LBS provider to identify the real user.

### INTRODUCTION:

According to growing popularity of mobile devices equipped with a GPS receiver, location based services (LBSs) are getting popular. LBS providers offer a variety of services based on a user's location information, such as local search, route planning, and location based advertisement. However, location information provides, or enables to infer, a lot of private information, e.g., where an LBS user lives, to which school his/her children go etc., And that only using the User location, it is possible to estimate a user's home location within the range of 60 meter surrounding.

To preserve users' location privacy, a lot of studies have been conducted. There are two requirements to deploy a system to preserve users' location privacy:

- 1) It should be a closed system, i.e., being executable on the user's mobile device, not to leak the user's location information outside and
- 2) It should not disturb benefits of the user and LBSs. The second requirement is important to have the entire ecosystem beneficial, otherwise, no users and LBSs would use the privacy preservation system. Among the previous studies, dummy-based methods] satisfy these requirements.

They generate dummy users and send their locations with the user's actual location to an LBS provider, so that the LBS provider cannot distinguish locations of the user

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and dummies. However, these previous methods do not consider physical constraints in a real environment, and thus, their actual robustness on privacy preservation is questionable. The robustness of a dummy-based method strongly depends on the naturalness of behavior of dummies. If dummies behave unlike human, it is easy to distinguish them as dummies, such as moving at unreasonable speed and being in the middle of the sea and top of the mountain.

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