机器学习与数据挖掘

面向路网限制的位置隐私保护算法

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摘要： 目前关于位置服务中的位置隐私保护研究大多是面向欧式空间,其相关模型及算法无法直接用于解决路网环境下位置服务中可能存在的隐私泄露问题。本研究针对公路网络下用户分布不均可能导致的推断攻击,设计出一种面向路网限制的位置隐私保护算法。本算法通过对公路网络的边权进行排序,并结合路段地理位置分布,进行隐匿边集的构造,以达到降低边权不均引起推断攻击的风险。通过实验对本算法的可行性及有效性与同类算法进行了比较分析。实验结果表明,本算法是有效可行的。

关键词： 位置隐私保护 公路网络 边权不均 边权推断攻击 隐匿边集 查询代价

An algorithm for protecting location privacy in road network

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Abstract: Recently, the privacy preserving location based services has been a hot topic in data privacy preserving research fields. The existed researches on location privacy preserving mainly focused on Euclidean space. However, many location based services were under road network environment, whose distribution of users was possibly unbalanced, which could make the traditional location privacy models and methods under Euclidean space unusable. A location privacy protection algorithm was proposed to prevent the inferring attack caused by the unbalanced distribution of users in road network. The key idea of the proposed algorithm was that the cloaked segment set was constructed by sorting edges with edge weight and taking the geographical position distribution of users into consideration. Experimental analysis was designed by comparing the proposed algorithm and the traditional algorithm on the feasibility and effectiveness. Experimental results showed that the proposed algorithm was effective and feasible.

Keywords: location privacy preserving road network unbalanced edge weight edge weight inference attack cloaking edge set query cost

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