

机器学习与数据挖掘

一种新的基于网络虚拟环境的用户访问模式聚类算法

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摘要:

为了有效地实现网络虚拟环境的个性化信息推荐,提出一种针对网络三维虚拟环境的用户访问模式聚类算法,即基于多目标粒子群优化的模糊C-均值聚类算法(MOPSO-based FCM, MPF)。MPF算法结合了粒子群优化算法(particle swarm optimization, PSO)与模糊C-均值算法(fuzzy C-means, FCM)的优点,通过PSO的全局空间搜索避免了FCM算法对初始值、噪声数据敏感与容易陷入局部最优等。为了改善聚类效果,在PSO中设计一个基于双目标(最小化类内距离与最大化类间距离)的粒子适应度函数。最后用标准数据集与模拟数据集分别对MPF算法进行性能测试,实验结果表明:本算法在聚类精度方面表现良好。

关键词: 网络虚拟环境 用户访问模式聚类 多目标粒子群优化 模糊C均值

A new clustering algorithm for user access patterns based on network virtual environments

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Abstract:

In order to efficiently implement personalized information services in network virtual environments, a new clustering algorithm for user access patterns was proposed, which was the MPF, i.e. the fuzzy C-means (FCM) clustering algorithm based on multi-objects particle swarm optimization (MOPSO). The MPF could combine the respective advantages of PSO and FCM. Through the global spatial search of PSO, it could avoid that FCM was susceptible to initial value, noisy data and easily falling into the local optimum. In order to improve the clustering effect, a particle fitness function was designed based on dual objectives (intra-class distance and inter-class distance) in PSO. Finally, the standard data set and simulation data set were applied to verify the effectiveness of this MPF. Experimental results showed that this algorithm had good performance in clustering precision.

Keywords: network virtual environments user access patterns multi-objects particle swarm optimization fuzzy C-means

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