

软件、算法与仿真

SLAM数据关联方法的比较分析

曾文静, 张铁栋, 姜大鹏

(哈尔滨工程大学水下智能机器人技术国防科技重点实验室, 黑龙江 哈尔滨 150001)

摘要:

针对同时定位与地图构建中数据关联的效果好坏易受特征状态影响的问题, 建立了两种仿真场景, 在此基础上布置了不同间隔的特征对, 分别采用最近邻算法、连续兼容最近邻算法、联合兼容算法、联合最大可能性算法进行特征关联的比较分析。结果表明: 特征间隔对数据关联的结果有很大影响, 对于大部分数据关联方法来说, 在小的特征间隔时关联结果较差, 在大的特征间隔时关联结果较好。结合特征在仿真场景中不同的位置, 数据关联方法也各自显示出优劣之处以及在不同特征状态下的适用性。得出的结论将对SLAM中数据关联方法的理解与选择有积极意义。

关键词: 数据关联 最近邻算法 连续兼容最近邻算法 联合兼容算法 联合最大可能性算法 特征间隔

Analysis of data association methods of SLAM

ZENG Wen-jing, ZHANG Tie-dong, JIANG Da-peng

(National Defence Key Laboratory of Autonomous Underwater Vehicle Technology, Harbin Engineering Univ., Harbin 150001, China)

Abstract:

The result of data association is affected by the state of features in the environment. In order to analyze the influence, two kinds of simulation scenes are set up, where feature pairs are arranged at different intervals. Four kinds of data association methods, individual compatibility nearest neighbor (ICNN), sequential compatibility nearest neighbor (SCNN), joint compatibility (JC) and joint maximum likelihood (JML) are tested in different situations for the comparison of feature association. The results show that the feature locations and the interval between features have important effects on the association method. The worse results can be gotten for the most association method when the interval is not large, but good results can be gotten when the interval is large, and each method has its advantages and disadvantages in different situations. The results are of significance in applications to the analysis and selection of the method of data association in simultaneous localization and mapping (SLAM).

Keywords: data association individual compatibility nearest neighbor (ICNN) sequential compatibility nearest neighbor (SCNN) joint compatibility (JC) joint maximum likelihood (JML) feature separation

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通讯作者:

作者简介:

作者Email: E-mail: zenwenjing@163.com

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