

工程与应用

基于广义预测控制的移动机器人视觉导航

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摘要 研究了室内环境下移动机器人的视觉导航问题。由单目传感器获取场景图像, 利用颜色信息提取路径, 采用最小二乘法拟合路径参数, 简化图像处理过程, 提高了算法的实时性。通过消除相对参考路径的距离偏差和角度偏差来修正机器人的位姿状态, 实现机器人对路径的跟踪。为消除机器人视觉识别和传输的耗时, 达到实时控制, 采用改进的多变量广义预测控制方法预测下一时刻控制信号的变化量来修正系统滞后。仿真和实验结果证明了控制算法的可靠性。

关键词 [移动机器人](#) [视觉导航](#) [多变量GPC](#) [路径跟踪](#)

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Visual navigation of mobile robot based on generalized predictive control

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Abstract

The visual navigation problem of mobile robot in indoor environments is investigated. Firstly, scene image is obtained by monocular camera, then the image features are extracted by color information, at last the parameters of the path are calculated using the least squares method so that the image processing is predigested and the real-time performance of the algorithm is enhanced. The pose of the robot is modified by eliminating the distance error and the angle error between the robot and the given path. To achieve real-time control and to eliminate the delay caused by machine vision identification and transmission, the improved generalized predictive control for multivariable system is adopted to predict the variety of control signal at the next period to modify the delay of the system. Simulation and experimental results demonstrate the validity of the proposed algorithm.

Key words [mobile robot](#) [visual navigation](#) [GPC for multivariable system](#) [path following](#)

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