

研发、设计、测试

Robocon2007移动机器人视觉系统

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摘要 根据Robocon2007的比赛规则, 设计出了一套适用于该比赛的机器视觉系统。系统基于通用PC机, 利用一个通用摄像机采集彩色图像, 系统构造简单且经济。视觉系统的软件实现了比赛场地导引线的分割、得分点的识别以及机器人与目标的相对定位等功能。在导引线分割中提出了双阈值p-tile自适应算法, 提高了分割算法对环境光变化的适应性; 得分点位的识别中设计了利用导引线交点与目标颜色相结合的综合定位策略, 有效解决了目标点位与地面颜色近似, 无法直接从单目图像识别的难题。在2007年度的Robocon比赛中, 该机器视觉系统表现出了很强的环境适应性和较高的自定位精度, 为国防科大获得最佳策略奖奠定了基础。

关键词 [视觉系统结构](#) [双阈值p-tile自适应分割算法](#) [聚类直线拟合](#)

分类号 [TP242.6+2](#)

Computer vision system for Robocon2007

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Abstract

The architecture of a smart vision system suitable to the Robocon2007 is introduced. The computing is performed by a standard laptop. The images are captured by a general-service color camera. So the whole system is both simple and cost-effective. The software of the vision system can segment the lane marking on the playing ground, recognize the goal object and maintain a relative localization between the robot and the goal object. To segment the lane marking, a self-adaptive double threshold p-tile algorithm is proposed. The segmentation algorithm has a conspicuous ability to adapt to the changeful lighting condition. Because of the similarity of the color character, it is difficult to recognize the goal object from the background by a monocular image explicitly. To integrate the information of the lane marking intersection and the color of the goal object, the problem is solved expectedly. During the Robocon2007 competition, the vision system shows a robust environment adaptive ability and a relatively-high self-localization precision, and makes a great contribution to 'the best strategy' reward.

Key words [the architecture of the vision system](#) [self-adaptive double threshold p-tile algorithm](#) [fitting straight lines](#)

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