柑橘采摘机器人障碍物识别技术 Obstacle Identification of Citrus Harvesting Robot

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关键词： 柑橘 采摘机器人 障碍物 区域骨架 特征点 立体匹配

摘 要： 根据柑橘采摘机器人遇到树枝等障碍物的特点，通过提取和处理障碍物图像的骨架恢复障碍物的三维信息。首先采用图像分割、形态学处理、区域细线化等步骤提取障碍物骨架，并进行骨架修剪、恢复遮挡骨架等处理；然后找出骨架中端点、分支点等特征点并记录其连接关系；最后通过对特征点的立体匹配恢复障碍物的三维信息，试验表明障碍物的正确识别率为67.3%。 A method of branch identification for citrus harvesting robot was proposed. According to the characteristics of obstacle that citrus harvesting robot met, such as branch, the 3-D information of obstacle was restored by extracting and processing the skeleton of obstacle image. The branch region was obtained using image segmentation, morphologic processing and region labeling. Then the skeleton of obstacle was extracted by thinning, and the feature points such as endpoint and branch point of the skeleton was found out, to record their connecting relationship. Finally the 3-D information of obstacle was restored by stereo matching on feature points. Experimental results showed that the identification accuracy of obstacle can reach 67.3%, and the identification error ratio is increased when the actual distance of obstacle is more than 1.5m.

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