

基于机器视觉的非结构环境下黄瓜目标特征识别Feature Acquisition of Cucumber Fruit in Unstructured Environment Using Machine Vision

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摘要: 提出了一种基于近红外光谱成像技术的温室黄瓜信息检测方法。根据黄瓜的光谱反射特性, 选用特定波长的近红外光谱图像解决与背景颜色相近的果实信息表征; 利用图像内作物灰度分布差异确定果实所在区域, 区域内采用矩不变优化阈值分割和特殊形态学模板滤波, 实现果实目标有效识别; 结合黄瓜物理性状和纹理特征检测果实的可抓取部位, 并引入形心主惯性轴思想确定果柄的切割点位置。实验结果表明果实的正确识别率为93.3%, 抓取点、切割点位于有效区域的几率分别为96.7%、93.1%。A machine vision approach for the detection of greenhouse cucumbers with near-infrared spectral imaging was presented. Firstly, a spectral image using certain near-infrared wavelength was applied to resolve the fruit information representation within the similar-color background. Secondly, fruit was recognized based on the following steps: region partition according to gray distribution of vertical histogram, optimized threshold of invariable intensity moment on divided local image, noise elimination using specified morphological template. Thirdly, the region for robotic grasping of cucumber fruit was determined by texture feature analysis and the cutting point was located with inertia axis principle. The experimental results showed that the correct recognition rate of fruit is 93.3%, as well as the rates of the grasping point and cutting point within the effective range are 96.7% and 93.1% respectively.

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