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基于机器视觉的苹果最大横切面直径分级方法

**Grading method of apple by maximum cross-sectional diameter based on computer vision**

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中文摘要:

针对中国苹果产后分选率和分选精度均较低而影响其商品价值等现状,在GB/T 10651-2008《鲜苹果》颁布的背景下,设计了一套基于机器视觉技术的苹果分选系统。针对红富士苹果,采用了一种利用RGB颜色模型R-B通道进行阈值分割和均值滤波后,通过行扫描提取出轮廓的方法。提出了2种对苹果进行大小分级的理论模型:一种以苹果轮廓线上两点之间的最大距离作为分级标准;另一种以苹果最大横切面直径作为分级标准,其中苹果最大横切面直径通过曲线拟合得出。利用VC 6.0软件编程实现了上述2种分级模型的算法。通过40个苹果6次在线分级试验表明,模型一分级正确率为93.3%,模型二分级正确率为87.1%,双通道分级效率最高可达12个/s,达到了苹果在线分选商品化应用的基本要求,为近球形果蔬参照行业分级标准进行大小自动化分选提供参考。

英文摘要:

Given the issued GB/T 10651-2008 "Apples", an apple sorting system based on machine vision technology was designed according to the realistic condition that the commodity value was devalued because of the low rate and accuracy of sorting. For Fuji apple, the process of pretreatment was conducted with threshold segmentation of apple image by using R-B channels under the RGB color model and mean filter. And then the contour of the apple was extracted by line scanning. Two theoretical models were established for the classification of apple size: model one took the maximum distance between two points of the contour line as the grading standards, while model two took the diameter of apple maximum cross-section which was obtained by curve fitting. The two algorithms of classification were programmed by using VC 6.0. The test of forty apple samples indicated that the classification accuracy of model one was 93.3% while model two was 87.1%. The highest classification efficiency of two channels was 12 apples per second which satisfied the online commercial application requirement. It can provide references for the automatic sorting industry of the nearly spherical fruit and vegetable according to the industry standard.

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