基于K均值聚类的绿色苹果识别技术 Segmentation Algorithm for Green Apples Recognition Based on K-means Algorithm

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关键词： 苹果 机器视觉 图像识别 K-均值 间隙统计

摘　要： 针对颜色和背景相近的绿色苹果，提出了一种基于K-均值聚类的苹果图像识别算法。该算法以8×8像素的正方形区域为分割单位。选择颜色差R-B作为颜色特征，选择灰度均值m，标准偏差σ和熵e作为纹理特征，形成特征向量空间。采用间隙统计法确定苹果图像的最佳聚类数。 将特征向量空间和最佳聚类数作为输入，运用本文算法对苹果图像进行聚类和分割。对200幅图像识别实验结果表明，在顺光和逆光情况下，算法均能实现果实与背景的有效分割，果实识别的正确率高于81%。 An apple recognition method based on K-means algorithm is proposed for the green apples that have similar color with leaves. The image is divided into 8×8 pixel blocks and the block is taken as the segmentation unit by the algorithm. Color difference R-B was selected as color feature and mean value, standard deviation and regional entropy of gray scale images are selected as texture features. The feature vectors including color feature and texture features are extracted. Gap statistic is applied to calculate the best number of the clusters. The recognition experiment is conducted to test the algorithm with 200 sample images taken in different illumination conditions. The experimental results show that the apple fruits can be recognized successfully both in front light conditions and back light conditions. The recognition rate reaches 81%.

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