Abstract

Empire and Golden Delicious apples were classified based on their surface quality conditions using backpropagation neural networks (BPNN) and statistical classifiers such as decision tree (DT), K nearest neighbour (K-NN) and Bayesian with textural features (and histogram features only with the BPNN classifier) extracted using all the pixels in an entire apple image. Two classification applications were performed: two subsets that included a defective (or stem/calyx) apple group and a good apple group; and five subsets that included all the defective (leaf roller, bruise and puncture on Empire, and bruise bitter pit and russet on Golden Delicious) and good apple groups (good tissue and stem/calyx views). With two subsets, classification accuracy using textural features ranged between 72·2 and 100% for Empire apples while it ranged between 76·5 and 100% for Golden Delicious apples. Results obtained using histogram features were significantly lower than the other classification applications. With five subsets, slightly lower recognition accuracies were obtained; the BPNN using textural features performed 93·8% success rate in recognising Empire apples. However, for Golden Delicious apples, all the classifiers produced similar accuracy rates ranging between 85·9 and 89·7%. Results obtained from the BPNN using histogram features were significantly lower than the classification applications using textural features.