

An analysis of the performance of Artificial Neural Network technique for apple classification

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Abstract The purpose of this paper is to develop Artificial Neural Network (ANN)-based apple classifier. Testing effort is calculated using ANN method. The complete system is divided into two modules. In the first module, input (surface level apple quality parameter) from the different sources is collected by the software developed in Visual Basic through different input device like web camera, weight machine, etc. In the second module, the input data are used by ANN simulator to classify the apple according to their quality. The final result of an ANN model for apple classification is discussed; however, the modeling results showed that there is excellent agreement between the experimental data and predicted values. A low level of error prediction confirmed the fact that the Neural Network model is an effective instrument of the apple quality estimation. There is not any misclassification during testing. The paper presents alternative method for quality assessment of apple and provides consumers with a safer food supply.

Keywords Machine vision · Scaled conjugate gradient · Artificial Neural Network · Mean square error · Back propagation · Root mean square error

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1 Introduction

The Artificial Neural Network (ANN) models are based on the neural structure of the brain. The brain learns from example and so do Artificial Neural Networks. Previous research has shown that Artificial Neural Networks are suitable for pattern recognition and pattern classification tasks due to their nonlinear nonparametric adaptive-learning properties. Successfully trained ANN model can perform tasks such as predicting an output value, classifying an object, approximating a function, recognizing a pattern in multifactorial data, and completing a known pattern (Suen and Eheart 2003). As a useful analytical tool, ANN is widely applied in analyzing the business data stored in database or data warehouse nowadays. Customer behavior patterns identification and stock price prediction are hot areas of Neural Network researching and applying (Ye et al. 2005). ANN-based research and application has tremendous growth over the past few years.

Artificial Neural Networks are computational modeling tools that have found extensive acceptance in many disciplines for modeling complex real-world problems. Agriculture is a most important sector for Economy of the country. According to our survey at local level and through the literature, we find that the farmer manufacturer of apple product is having no computerized apple sorting method and also found that they all are using manual fruit sorting system. Therefore, we are applying ANN for the apple quality detection. The farmers and manufacturers of apple fruit-based product (like juice, jam, etc.) very much require the automatic apple sorter. Therefore, we are proposing a low-cost ANN-based classifier. The complete system is divided into two modules; in the first module, we are collecting input from the different sources by the software developed in Visual Basic through different input device