Paper title: Efficient Fruits Classification Using Convolutional Neural Network

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Summary:

We propose a novel learning method to construct a classification model for apples, which can classify types of apples quickly and accurately. The proposed model can obtain good accuracy with little loss.

Deep Learning, Convolutional Neural Network, Classification, Apple

Introduction:

Apples contain vitamins needed by humans, such as vitamins A, B1, and C, and are commonly consumed in large quantities. China produces the most apples globally.

A paper explored deep learning to establish a classification of apple s with a dataset collected from the local market.

In the apple classification problem, many studies proposed SVM which uses color, shape, and texture features. However, the large dataset and difficulty of manual feature extraction remain drawbacks, so the current papers explored various deep learning approaches to deal with the issues such as CNN.

Current studies explore the classification of apple species based on imagery using CNN. We propose a novel solution to deal with fruit classification by adopting a deep learning algorithm to detect apple types more quickly and accurately.

We introduce a new technique for classifying fruit types using the CNN algorithm. Our model can distinguish between granny smith apples and red delicious apples accurately, and we present an evaluation metric chart to convince our model performance.

2. Related Works

Several studies have proposed methods to build a classification model, including a learning technique, a database, and a CNN algorithm. The system can achieve high accuracy of 84.41 percent regarding rose apple categorization.

A new apple segmentation and recognition method was proposed based on an improved Gaussian kernel that combines fuzzy c -means and convolutional neural networks.

A deep CNN model for apple leaf disease detection is proposed. The model achieves a detection performance of 78.80% using a long-term test dataset.

A paper proposed a CNN method for automatic fruit classification using 4,488 for training, 1,928 for verification, and 2,138 for testing. The paper achieved the highest average classification accuracy of 99.8%.

3. Proposed Method

In this experiment, we used the CNN algorithm to classify granny smith apples and red delicious apples. The regression function is used for the classification of categorical classes, and the thresholding technique is applied by changing the Process value to -1 and 1 as the output.

In this paper, we investigate CNN as a sort of deep learning, and investigate how the optimizer, activation function, filter size, learning speed, and batch size affect accuracy.

4. Experimental Setup

We gather a dataset of 1,312 apples from Kaggle and separate the dataset into training and testing data sets. We use the training data sets to create machine learning models.

Data pre-processing was carried out using a vectorization process, and then the training and test data were processed using the CNN algorithm. The dataset was taken from kaggle.com, and the classification method used was image classification.

This study builds a model for the classification of types of apples by using labeled granny and red delicious apples as our dataset.

5. Result & Analysis

This experiment achieved the best trade-off between accuracy and performance time by adjusting various hyperparameters during the training and testing phase.

The evaluation matrix shows that the accuracy of the model is 0.97, with positive predictive precision for Granny apples and red apples.

We present a confusion matrix that describes the performance of the model on known test data. The confusion matrix gives us TP = 130, TN = 120, FP = 0, and FN = 8.

6. Conclusion

The current techniques adopt traditional machine learning, but it remains a shortcoming because it is time-consuming and expensive feature engineering. This study proposes the CNN algorithm to produce a better accuracy and reduce losses in fruit type classification.