Fruit recognition from images using deep learning

Domain Background

This project comes from the following Kaggle Fruits dataset : https://www.kaggle.com/moltean/fruits

There are an increasing number of robotics applications aimed at detecting fruits from images or videos. Although various research efforts have been made in this field, challenges still remain for complex scenes with varying lighting conditions, low contrast between fruits and leaves, foreground occlusions and cluttered backgrounds. Most of these applications have been to find the fruits for automatic harvesting. A recently new direction is to find the fruits for plant breeding purposes to automatically recognize, count and measure the fruits in order to assess the differences in quality of the genetic material. When the measurements are made by a computer, this is often referred to as digital phenotype and the field is growing in importance.

Fruits have certain categories that are hard to differentiate, like the citrus genus, that contains oranges and grapefruits.

Historical information relevant to the project is that this project started with small dataset about five hundred images but now it become large about 50000 images, it also implemented by ACTA UNIV. SAPIENTIAE , INFORMATICA.

Problem Statement

this project aims to classify the types of 81 different fruits by there images using convolution neural network (CNN).Thus we want to see how well

can an artificial intelligence complete the task of classifying them. Another reason is that fruits are very often found in stores, so they serve as a good starting point for the previously mentioned project.

Datasets and Inputs

The dataset has about 53250 images of fruits spread across 81 labels.

The data set is available on GitHub and Kaggle. the history of the dataset that they were extracted from movies as screen-caps and remove the background of the images then scaled them to 100x100 pixels images.

The dataset is balanced and the project doesn't have any unbalanced dataset because of the equality of the data and each-other all types of data have the same number of images which enter the model to be trained and tested.

the dataset are available and open source on [Fruit-360] ,i can work on kaggle workbench, it gives 6 hours per session so can work on it and implement the dataset from it. The characteristics of the dataset that every type of the fruits have at least 420 images to train and 160 images to test from all directions and different kind of the same fruit. The dataset is the main component in the project it's divided in two sections train data and test data so their use is appropriate given the context of the problem.

Solution Statement

the solution is to use deep learning technique by using convolution neural network (CNN). Each level learns to transform its input data into a slightly more abstract and composite representation. deep neural networks specifically convolutional neural networks have been proved to obtain great results in the field of image recognition.

Benchmark Model

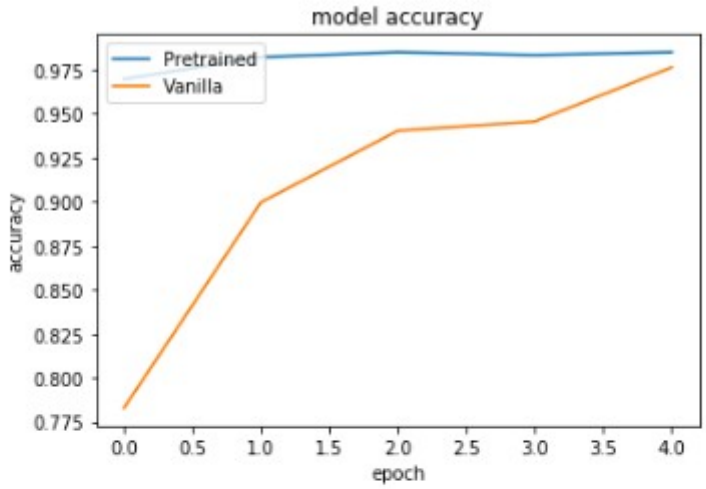
I plan to compare the results of the CNN model which I implement with the result of the same project on kaggle (linked to above). I will compare the model accuracy/model loss and number of epochs used each other to

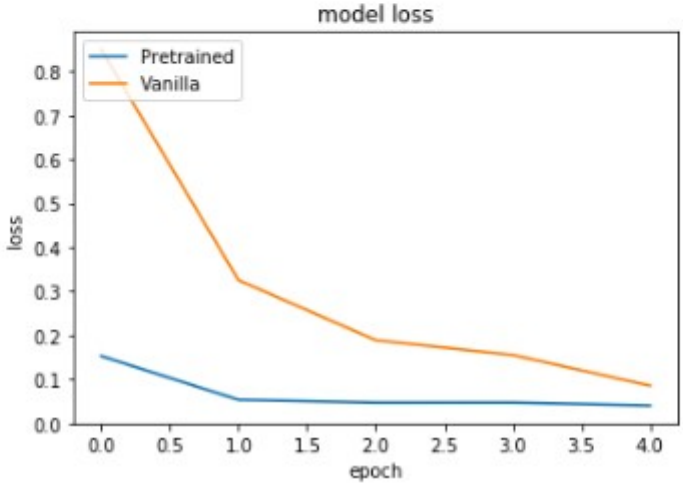
see which is more effective, as well as compare the speed of the two techniques (after training, in the case of the CNN).

Evaluation Metrics

evaluation metrics

Activity	Benchmark	Solution statement
Size of data	About 50000 images	About 53250 images
Quantify the performance of both	The accuracy reach to over 0.9454 %	Hope to reach the accuracy over 94%
Number of epochs	Use four epochs	Use about five epochs





Project Design

the summarize a theoretical work-flow for approaching a solution for the problem is using colab or kaggle GPU to make the training of data more fast. It will be needed to import some of keras library.

The analysis of the data might be required before being used is to separate the data to training data and test data. The algorithms will be considered for the implementation is the deep learning (convolution neural network). Firstly will load the data and separate them then will import the required libraries, secondly will plot the some of the data to make sure the quality of the images and it’s accuracy. Third we will create the sequential model of the CNN and it’s layers using the drop out and flatten to convert the images to vectors then compile them to know there accuracy. The project will flow this steps.