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Fruit Classification and Detection using Deep Learning

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Abstract: -
Object Recognition is an essential Observed in Computer Science. Object recognition is Focusing on technology and detecting a classifying fruit object based on their characteristics. Automatic classification is also a domain of object recognition and it's still a complicated task due to the various properties of numerous types of fruits. Different fruits have different shapes, sizes, colors, textures, and other properties. This project aims to find a way better way of fruit classification method using Keras documentation. Using CNN preprocessing images
The Training sample of fruits images. Preprocess-ing images which include separating foreground and background scaling the cropping the image to reduce the dimension of the image using ReLU rotation.
Then, we extract features from the fruit's image, which include the color, texture, and shape of the fruit image. Extracted features of Fruit Image are fitted into the neural classifier machine-learning algorithm.
Keywords:-Preprocessing image using CNN Fruit Image classification [flask]

INTRODUCTION

India is Agriculture country. All the pre-harvest and post-harvest processes are done with labour. The Post-Harvest process includes sorting as well as grading of fruits. Different quality factors like texture, shape color size and Volume and internal quality factors are taste, sweetness, flavor, aroma nutrients, Carbohydrates present in the fruit are considered for sorting and grading of fruits. Automation is playing important role in our life .their main source for income is agriculture .Exporting of fresh fruit is increase day by day from India. People are very conscious about their health they also prefer only fresh good quality fruit. Fruit recognition implements pattern recognition of different objects. Object recognition builds up from different areas such as statistics and machine learning. The achievement of accuracy its differ from different to different algorithms. Hence, we need to Choose the (best) algorithm with the Precise classification and prediction is High.. And also, while training the system, The proper learning rate also plays a vital role.

Many agricultural applications using Image processing to automate their duties. Detecting crop diseases are one of the Major applications in which the crop images are analyzed in order to discover the affected diseases. Currently, the most common

Artificial neural network (ANN) type is used across multiple domains in the CNN Classification.
CNN is used for classifying 2-D Fruit images and recognizing the objects. Based on pooling and convolution layers. Artificial Neural Network architecture consists of three layers Starting with the input layer, followed by the hidden layer, and ending with the output layer. Each layer is composed of multiple neurons. Each Input of the next layer's neurons consists of the summation of the output of the neurons from

the previous layer. An output is compared with the target values based on the cost function. This is important because accurate recognizing fruits is of paramount importance in the yield mapping field. In this paper, an optimal scheme is introduced for differentiating between a variety of fruits using a dataset, which is accessible and simulates real-time prediction using Keras, python flask implementation.

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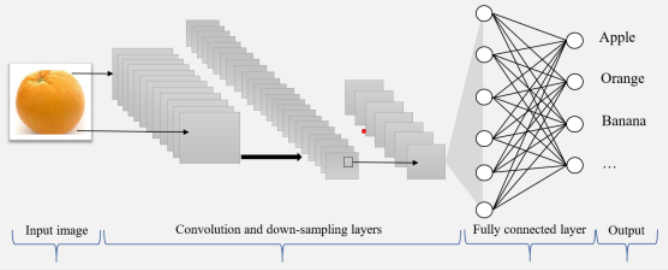
2. Deep learning algorithms: - Deep Learning is the sub-field of Machine Learning And Machine Learning is the sub-field of Artificial Intelligence. It is a collection of techniques that models high-level abstractions in data. In Deep learning, a computer-based statistical model understands and learns from pictures, sound, as well as text to conduct analysis. These models can attain state-of-the-art accuracy and sometimes exceed human-level performance. Models are trained by using a large set of labeled data and neural network architectures that contain many layers in terms of accuracy. While the concept of Deep learning was first put forward back in the 1980s, the idea subsequently became renowned because of two reasons: it needs a huge amount of labeled data and substantial computing power. The number of Deep learning applications has been experiencing research growth in the last decade, including natural language processing, image classification, information retrieval, etc. The Deep learning term could be divided into two parts and understood individually: Deep and learning. Learning is about taking previous understanding and information as well as creating an inner depiction of the matter that the agent can use to act. Typically, the internal depiction is an intensive representation for summarizing the data. The field of Machine Learning offers different functions and techniques for learning automatically from the available information and this learning from the information is used for forecasting and projections in the future Artificial Neural Network gets the inspiration from the human brain system and is the most commonly Position algorithm in the field of Machine Learning. It consists of integrated processing units named neurons. ANN is comprised of an input layer and a hidden layer, as well as an output layer. The input layer takes an input, for example, an image, and passes it to the hidden layer, and then the output layer gives output - the maximum probability that what object in an image is. We can have multiple hidden layers for more complex functions

3. Convolution Neural Networks: The convolution operation is performed in a CNN classifier over pixels in an image. It consists of four commonly used layers. The first one is the convolution layer, which is tasked with convolution the pixels in an image with a chosen kernel (Harris) to extract or remove different features. The Second Layer is the ReLU layer, which defines an activation function, which can be a sigmoid or any non-linear function. The image is passed several times between the convolution, and ReLU layers, where all the negative pixels are converted to zero, and trends and attributes are analyzed in an image. The third layer is known as the Pooling layer, and the main motive of this layer is to transform the image into the required dimension without blurring it. For that purpose, the pooling layer surrounded different kernels to identify the sharp edges and to detect different contours in an image. The image is then converted into a 1-D linear matrix. The end layer is the fully connected one, which is used to identify the images and classify them as per the accuracy (confidence value) achieved. The architecture of the CNN is Shown figure



Convolution neural network

Proposed System

Data Collection:

Due to this Project deadline, manual data collection was not performed. The data consist of 300 images of training in Dataset. Each image of fruit has approximately 1210 images in test and train images. the images were used to train the system using a neural Classifier Machine-learning algorithm. The data set was considered enough for this project.

Data Selection:

There are around 1212 image datasets of 6 fruits categories in the collected data. Out of six Fruit in the validation dataset are selected for training Purpose that has 1212 images. The fruits categories for this project are chosen Randomly

Algorithm:

Different algorithms are implemented in this project. The algorithm implemented is the image preprocessing feature Extraction algorithm and machine learning algorithm. Image feature Extraction using K-Nearest Neighbor (KNN) in this Project. K-NN algorithm is used to Store all the available data and classifies a new data Point based on similarity. This means that when new data appears then it can be easily classified into well suite category by Using K-NN Algorithm. The training phase just stores the dataset and when it gets new data, then it classifies that data into a category that is much the same as a new Data. In the image preprocessing period it just looks like Haar-like Feature Extraction. The neural classifier of machine learning identifies things in an image picture. This Feature extractor takes in color images and returns a normalized Color histogram of the pixel of each hue. b)Edge histogram detector. This method takes in an image applies an edge detector and Calculate the length and Direction of lines in the Image An Neural classifier is a meta-estimator that begins by fitting a classifier on the original dataset and then fits additional copies of the classifier on the same dataset but the weights of incorrectly classified instances are adjusted The Neural Training algorithm is situated below: a) the initial weight for each instance in the training dataset weighted as

Weight (xi) = 1/n

Where error is the misclassification rates correct are the number of training instances predicted correctly N is the total number of training instances.

Error = (correct – N) / N

RESULT DISCUSSION

It can be concluded that chosen images the machine Learning algorithm is not suitable for fruit classification problem. The Cross and Validation of Dataset it checks the weather which type of fruits and check also freshness of fruits Using CNN classification.

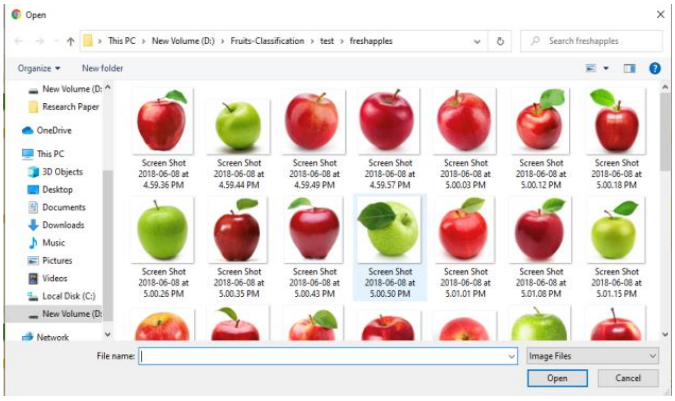
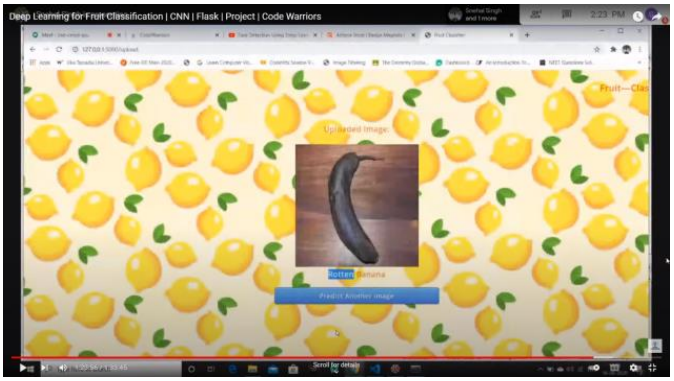
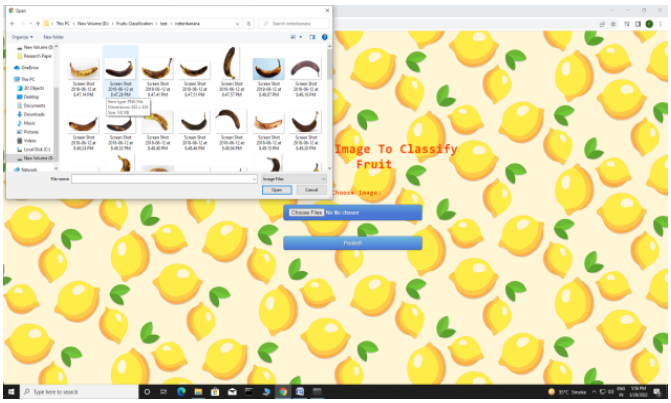


Fig – 1: Input Image 1

Expected Output:





User Interface

CONCLUSIONS

This project aims to classify the fruit Image classification on flask CNN implementation. This Project is designed in such a way that it reads the image, extracts features, and preprocesses. It implements a machine learning algorithm and generates Output based on the input which the user wants to Provide. The Project has been able to classify the fruit images base on the k-means algorithm or KNN [Algorithm] on the Fruit features. It checks the images whether the fruit image is Fresh or Rotten In this Project YOLOV3 Model is Used to detect the type of fruit Image which We are Choosing and the VGGnet model pertained to the model type of fruit which we have chosen. It Checks wheater the Fruit image is Fresh or Rotten.

The result is not satisfactory since the cross-validation score and Probability of Prediction accuracy is very Less In some case only I provided the fruit dataset in the Validation Dataset Upto those images only help to classify the Fruit Image Classification

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