# AUTOMATIC FRUIT CLASSIFICATION AND FRUIT QUALITY DISEASED DETECTION USING MACHINE LEARNING.

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## ABSTRACT

*Nowadays in farming industry exporting the fruits to other countries in bulk quantities is a difficult task. In this field farmers need manual examination. Our system helps the farmhand to pack their fruits as soon as possible by detecting the fruits and vegetable and recognize the sickness this helps the farmers to save their time and they can carriage fruits and vegetable as soon as possible. We use CNN algorithm for fruits and vegetable detection and disease recognition. Using neural network, the image is split which is followed by moving of some features from the segmented image finally fruits and vegetable picture is identified and labeled.*

**Keyword:** - *Image Processing, Classification, CNN Algorithm, Fruit detection,farmers,picture.*

## 1. INTRODUCTION

India is an agriculture state. various group of fruits and vegetables are made in India. India is at second number afterwards china in manufacture fruits. In India all the preharvest and post-harvest procedure are done manually with help of labor. Physical process is very time consuming, ineffective so to get correct result automation in agriculture industry is needed. The post- harvest procedure includes sorting and classify of fruits. Different standard factors are considered for classify and grading of fruits. These factors are internal quality factors and external standard factors. The external classification factors are texture, shape, color, size and volume, and internal standard factors are test, sweetness, flavor, aroma, nutrients, carbohydrates present in that fruit.

Automatic fruit recognition and cleanness detection system with music output by using machine vision is introduced. Here, fruit identification algorithm depend on Convolution Neural Network (CNN) is proposed. Deep learning is a modern machine learning which point to achieve high correctness in image recognition and classification. This system can be used to forecast the type of fruit by building a complexity neural network. Convolutional Neural Networks (CNNs) is the most approved neural network model being used for image classification tasks. We use Vignette which is CNN architecture, to discover type of image. Here, the dataset contains of Apple types (Apple A, Apple B, Apple C, Apple D, Apple E, Apple F). A method for discovering the freshness of apple is also included. After discovering Ing the apple type, we use

YOLOv3 a deep neural network model to discover freshness of apple. We use this model for identifying freshness of fruit. The output of the structure.

## 2. Literature Survey

In, they have accepted nine different classes of fruits. Fruit picture databanks are obtained from web as well as given image are determine by using mobile phone camera. These picture are pre-processed to abstract the background and extract the spot appear for fruit. For constitute fruits and capturing their visual feature, mixture of color, figure and

quality features are used. These more modern datasets is further proceed to two different categorize multiclass SVM and KNN. The color image is firstly International Journal Conference make a start Volume 7, Issue 08 Special Issue - 2019 1 converted to grayscale by GLCM (Gray Level Co-occurrence Matrix). The image is converted to binary image. Further, Morphological operations are used to fill the block and to pull the largest spot or object from the picture which would further be study as fruit. After that this biggest drop is cropped and the binary values are restore with original intensity values. From the investigation it can be concluded that the combination of color texture and shape gives better approximate results in most of the cases than when any two categories of characteristics are used. Also, the second conclusion which can be done is that KNN gives good output for this case than SVM. In, has different steps of the training process in this research which are as follows: Initially collect fruits image, then feature removal process using FCH & MI method to get the characteristic of fruits image then transformed into aim characteristics form which will be stored in the database. Later clustering process is done using the K Means Clustering method on the vector of the fruits image in the dataset. The steps of the checking process in this research are as follows:

Open file image query to detect fruits. The next step is to get the feature of the face image then change into the vector feature form same as training process. Then, the process of identification using the KNN method by calculating the distance between the new fruits image features and features of the survive on the database by using Euclidian distance which then matched with the clustering aggregate. This paper [3] is based on the use of speeded up strong feature. The method extracts the local feature of the segmented image and report the object recognition. The basic steps are to create a database of image to be categorized. Then image pre-processing done by means of different image processing techniques to improve the quality of the image and later several strainers are applied to de-noise the image. Finally, image classifiers are used for classification. Image is transform from RGB picture to intensity images. Based on speeded up strong technique local feature is extracted and described. To classified the texture of the input picture, analytical measurement of randomness. Other features extracted such as object recognition, image registration, recognizing parameter and image recapture. Objects and boundary lines of images are obtained by image cleavage. Then characteristics extraction like shape, size, color and texture of fruits are calculated using algorithm. Then for disease categorize pattern matching is be relevant. The system also includes particular skin defect detection algorithms not only to locate them, but also to determine their distribution, which can affect to their assignment to a standard category. In this paper [4], multi-dimensional fruit pictures are distributed on figure and color based on analysis technique. Used a method to grow the accuracy of the fruit quality detection by using artificial neural network [ANN]. The first is to of all get the picture of fruit. Image of the fruit samples is catch by using regular digital camera with white background with the help of a stand. In the second step the image of the fruit is filled into the MATLAB to include the feature extraction of each and every sample in dataset for training of neural network. In third step characteristics of the fruit samples are extracted. In next step neural network is used for instructing the data. In fifth step fruit trial is select for testing from database. In step sixth testing is execute by using ANN training module button. Finally, ANN based output are acquire where user has the option to select the sample of fruit which it wants to test and finally want to obtain it. In paper [5], Green and orange color fruits are selected under different lighting conditions. The steps of the process are picture dissolution it means that the original picture is divided into many parts. Its purpose is to cluster the pixels which have the same features on the image. In observation fruit, it is purposed to unrelated the fruits and background in the picture. The method which has been to use is k-means algorithm. K-means algorithm requires iteration. Firstly, clustering centers are determined and the data is clustered according to these centers. The centers can be valued of pixels which are selected randomly. There are 3 presiding colors in the image where the fruits are orange color, because of this, the number of collection sets are 3. The green color ones are clustered 6-8 sets, because the dominant color is green in the image. Straining operators get to delete some details which are unwanted or to be cleared according to the aim. By this process, the pixel values are determined again**.** Determining of Round objects for finding easily the round objects, the image is change to binary image. This paper [6], presents a novel approach to fruit detection using deep convolutional neural networks. The task of fruit determines using image obtained from two modules: color (RGB) and Near-Infrared (NIR). Methodology Fruit segmentation is an essential step in order to distinguish the fruits from the background. This section, describes the DCNN approach, Faster R-CNN, which forms the basis of our proposed method Fruit Detection using a Conditional Random. The CRF uses both color and texture features. The color features are constructed by directly converting the RGB values to the HSV color space. Visual texture features are extracted from the NIR channel. NIR images are used to calculate texture features. Three sets of visual texture features are used: (I) Sparse Auto-encoder (SAE) features (ii) Local Binary Pattern (LBP) and (iii) a Histogram of Gradients (Hog). Each feature captures a different property, such of local gradient, edges and texture, respectively. It uses

Faster R-CNN using deep convolutional neural networks on large-scale image classification and detection. Fine-tuning consists of updating, or adapting, the model parameters using the new data. Late fusion combines the classification decisions from the two model. The VGG network is modified and adapted to receive RGB and NIR information simultaneously. In [7], the K-Nearest Neighbors algorithm is the methodology that has been used as a classifier to classify fruit based on mean color values, shape roundness value, area and perimeter values of the fruit. The area and perimeter values of fruit are estimated in term of pixels values, whereas the area of a fruit can be estimated by fine the sum of the total number of pixels that are enclosed by the detected fruit boundary area. The user selects a scalar value to sign up the fruit image so that its size is approximately the size of fruit in real time environment. After selecting a desired scalar value, the algorithm will compute the new area and perimeter values for the fruit image. After interject training data, system is ready. The Euclidean distance determines the distances between the feature's prize of the test input fruit with stored training fruits. The recognition system that has been developed is able to recognize all the test fruit images which are being selected by user or system analyses from the fruit selection menu on the system. This paper [8] elaborated the fruit quality and propose a novel classification method based on a multi-class kernel support vector machine (sum). First, fruit images were captured by a digital camera, and then the background of each image was removed by a split-and-merge algorithm. Second, the color scatter diagram, consistency and form features of each fruit pictures were remove to comprise a feature space. Third, principal component analysis (PCA) was used to reduce the length of feature space. First, we use Image Segmentation with Spilt and Merge Algorithm which will put off the background area and based on a quadtree partition of an image. This method starts at the root of the tree that represent the whole image. If it is found inhomogeneous, then it is rived into four son-squares. Contrarily, if four son-squares are homogeneous, they can be merged as several connected components (the merging process). Then the circle graph is merely the count of pixels that have each feasible color. Third step is using Unser's Texture Features, Gray level co-occurrence matrix and local binary pattern are good surface descriptors. It eliminates the components in the data set that donate the least variation.

## 3. System Architecture

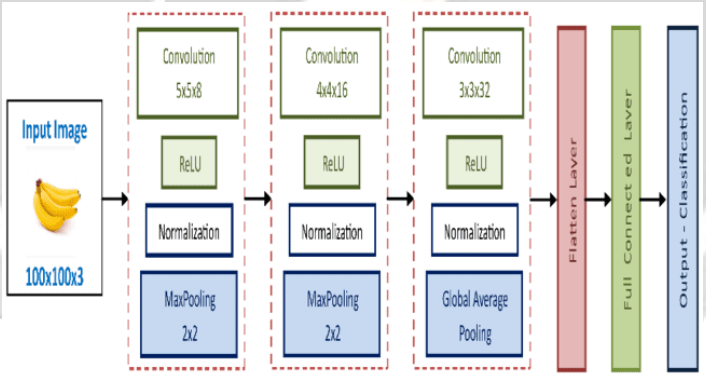
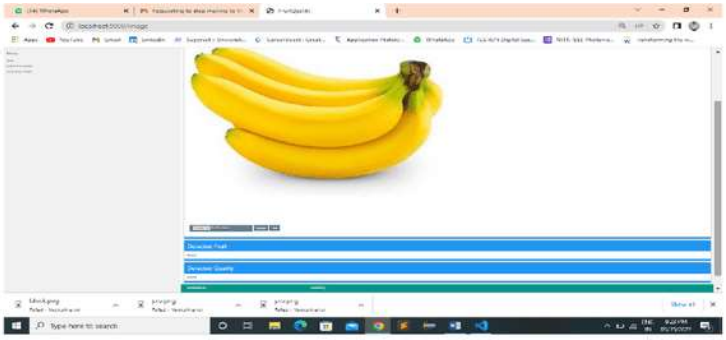



**Fig-1**: Architecture of CNN Algorithm

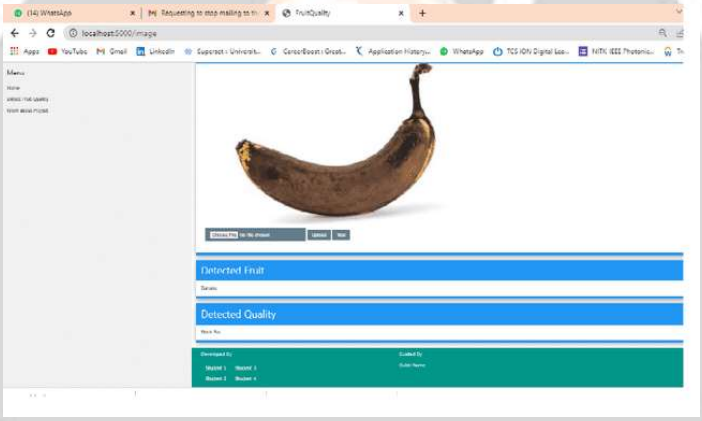
The system is trained by our image database. When the fruit picture is record by the camera the system recognized the fruit using on Convolutional Neural Network (CNN) algorithm. CNN is composed of two considerable components: 1. Feature extraction: At this point, the network will perform a number of complexity and pooling operations during which the features are discovered. If you had a image of a watermelon. This is the constituent where the network would fuss its smear and formation. 2. Classification: Here, the totally associated wrapping will adapt as a categorize on best of these disencumber highlights. The probability will be allocated out for the challenge on the image being what the enumerate presages. The fruit or vegetable picture is captive and recognize utilizing CNN algorithm. In the next level, the captured and recognize image is filtered for disease detection. If the fruit or vegetable is desert then it is unhealthy is recognize and labelled as despicable standard else it is labelled as better quality Steps in CNN Algorithm.

## 4. Result and Discussion:

In this result when we upload the image on this web site that time it will desisted, this image is good quality or bad quality.



This is the first display view of our output. Here we can see that the labels upload picture and output. And also, there are two icons with named categorize and freshness in order to categorizing the fruits and detect the freshness. Here we upload the picture we want to know and the agree with result may appear on the other screen.




Then we can see the photo that we are upload from the dataset. And check the freshness then we can identify that the fruit we upload is an undamaged fruit and the freshness of the fruit are labeled there.

## CONCLUSIONS

In this paper automatic creative based structure is discussed for classify and grading of fruits based on its color and individually. The check performed based on banana for identify detection identify defected fruit. And for three different categories good, medium and Low. The variation in speed of conveyor and light, camera resolution affects the system.

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