IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, June 2022
Impact Factor: 6.252

Pomegranate Fruit Disease Detection Based on Machine Learning

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Abstract: *This project presents the recent development in automatic vision-based technology. Use of this technology is increasing in agriculture and fruit industry. An automatic fruit quality detection system for sorting and grading of fruits and defected fruit detection discussed here. The main aim of this system is to replace the manual inspection system. This helps in speed up the process improve accuracy and efficiency and reduce time. This system collect image from camera which is placed on conveyor belt. Then image processing is done to get required features of fruits such as color and size. Defected fruit is detected based on image pixels. Sorting is done based on color and size.*

Keywords: Image Recognition, CNN, Machine Learning, Neural Network

I. INTRODUCTION

India is an agriculture country. Different types of fruits and vegetables are produced in India. India is at second number after China in production fruits. In India all the preharvest and post-harvest process are done manually with help of labor. Manual process is very time consuming, less efficient so to get accurate result automation in agriculture industry is needed. The post- harvest process includes sorting and grading of fruits. Different quality factors are considered for sorting and grading of fruits. These factors are internal quality factors and external quality factors. The external quality factors are texture, shape, color, size and volume, and internal quality factors are test, sweetness, flavor, aroma, nutrients, carbohydrates present in that fruit

Most real-life applications can use fruit recognition and classification systems. An image classifier has been trained and tested to identify images of fruits and vegetables. Nevertheless, the problem of developing a fast and reliable fruit detection system persists. This is due to large variability in fruit appearance in the field, including properties of colour

II. METHODOLOGY

1. Pre-Processing

Preliminary processing of the input image is done by converting the given image to a gray scale. Usually, a standard color image consists of three channels - a red channel, a green channel, a blue channel commonly known as RGB. Then the color image changes to a gray scale with a single monochrome channel to avoid unwanted noise in the image. The input image provided will be of various sizes which can lead to the loss of accurate prediction when the image is compared to that of a trained convolutional neural network. So the image is resized and resized to a blank image of 224 x 224 pixel.

2. Feature Extraction

Feature releasing is the process of converting input data into a set of features that can best represent input data. Feature removal is related to size reduction. When input data is too large to be processed, it can then be converted into a reduced set of features (also called element vector). Determining the subset of the first elements is called the element selection. Selected features are expected to contain relevant information from the input details, so that the required work can be done using this reduced caption instead of the full initial data. After resizing the image, the pixel values obtained by the same 1D elements represent values between 255 and 0 depending on the pixel density. Refer figure 7.1 for feature extraction and classification structure.

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3. The Min-Max Scalar

The standard min-max scalar form uses mean and standard deviations to include all data in the range between a certain min and size. It modifies features by measuring each element in a given range. This rating scale also translates into each individual feature that is at a given level in the training set, e.g. Between zero and 1. This change is often used as an alternative to zero, to measure unit variability. It reduces the width as the width is now between 0 and 1 (or -1 to 1 if there are negative values).

4. Image Normalization

Normalization is a process that changes the pixel density of the intensity. Normal performance is sometimes called differential stretching or histogram extension. In this image insert normalization is done by removing the background pixels and one character will be provided as it is found in the image. This can be done by using a random value so that the background pixels will have a value less than the pixel values of the character's shadows. In this way the image is usually made to match the image in the Kaggle database

5. Classification

Convolutional neural network is used as a feature extractor from an input image. CNN contains input and output layer, as well as many hidden layers. CNN's hidden layers usually consist of convolutional layers, cohesive layers, fully connected layers and standard layers. CNN consists of three main elements which are the convolutional layer, the compound layer and the extraction layer. The most common activation function used by CNN is ReLU representing the Rectified Linear Unit

III. CONCLUSION

The system takes an input image of a Pomegranate, processes it using Convolutional Neural Network algorithm by image augmentation , RGB color gradient and feature extraction from image successfully categorizes it under different diseases like bacterial blight, butterfly pomegranate, bitter rot. It also provides preventive measures to the farmers in the form of various pesticides and fertilizers to be used on the crop for better harvesting and to avoid loss of fruits. After increasing successfully epochs, the system shows high model accuracy chart for better understanding of the improvised algorithm for both training and testing datasets. By increasing the number of training datasets images we can increases training model accuracy and try to provide best results for farmers.

IV. FUTURE SCOPE

We plan to make it a IOT based system and test it under real world conditions using cameras for live footage capturing. Further, to enable the system to be effective for other fruits and crops and provide a better harvest to the farmers by reducing manual labor.

V. ACKNOWLEDGEMENT

There is always a sense of gratitude that people express towards others for their help and supervision in achieving the goals. This formal piece of acknowledgment is an attempt to express the feeling of gratitude towards people who helped me in completing my presentation. I would like to express my deep and sincere gratitude to my seminar guide, Mr. P.B. Wakhare for allowing me to do this work and providing invaluable guidance. I would like to express my deep gratitude to Dr. P. B. Mane, Principal, Dr. Meenakshi A. Thalor, Head of Department, and Dr. J. B. Patil, Project Coordinator for their constant cooperation. They were always there with competent guidance and valuable suggestions throughout the pursuance of this presentation. I would like to convey my sincere gratitude to Algorithmic Electronics Pvt. Ltd. for sponsoring my project and also for providing all the necessary information. I would also like to appreciate all the respondents and group members whose responses and coordination were of utmost importance for the presentation and who helped me a lot in collecting necessary information. Above all, no words can express my feelings to my parents, friends, and all those people who supported me during my seminar. Vivek Gaikwad, Gaurav Shinde, Yugal Jagtap, Vijay Shastri AISSMS IOIT, Pune

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