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Automated Fruits Detection and Monitoring System by Raspberry pi

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Abstract - Agriculture is the main vocation of Indian people. Detection and counting of fruits manually are arduous when implemented in sizably voluminous scale projects. Manual counting of fruits has been carried out but it takes a lot of time and requires more labor. The purpose of the system is to minimize the number of human-computer interactions, expedite the identification process, and amend the usability of the graphical utilizer interface compared to subsisting manual systems. Raspberry Pi hardware module is used in this project and all the operation is being implemented using this hardware module only. This system includes preprocessing of images, extraction of features, and relegation of fruit utilizing machine-learning algorithms. Machine Learning, OpenCV, and CNN algorithms are used for the detection and counting of the fruits using the Raspberry Pi module.

Keywords - Detection, counting, CNN algorithm, open cv, image processing, raspberry pi, camera.

I. INTRODUCTION

The world is growing rapidly every day and hence everything should be automated to minimize cost and preserve time. Astronomically immense manpower is needed for sorting and counting of fruits and this takes an extravagant amount of time which minimizes the productivity and it is not productive additionally. Keeping this in mind we came up with the conception of fruit detection, counting, and freshness of the fruit by utilizing the raspberry pi module.

Anteriorly implemented projects have some drawbacks that include a circumscribed area to detect and no other shapes or regions are sanctioned because of constrained data sets.
This proposed system has raspberry pi, camera, sd card, python, machine learning, data analysis and counting, CNN algorithm, etc.

In this project, we are going to implement a system with the raspberry pi module utilizing python and machine learning. This system will run on a genuine-time substratum as well as it has the option to upload images or we can verbally express data sets for detection, counting, and freshness detection. First, the system will read the image then send this uploaded image for image processing for precise results. Then the processed image will be taken to the computer vision module to detect the designation of the fruit. Once the fruit is detected now it will count how many fruits are present there, utilizing the CNN algorithm it will detect the freshness of the fruit.

II. LITERATURE REVIEW

1. A smart fruit counting system was proposed by H. Pasternak et.al.(2020). He explained image compression techniques by which one can detect a particular area of fruit to detect its freshness.

2. The paper proposed by K. Balderas Ruiz, suggests accurate image analysis of fruit detection and counting. This paper proposes the method for finding dimensional area and its measurement.

3. Apple detection "APPI" was proposed by S. Narayana el. at. (2019) made with deep learning and machine learning, that finds various categories of apple with proper size and color detection. This helped to identify a variety of apples among the collection.
4. Multipurpose detection with camera and deep learning modules was proposed by Meera Yaneek el. At (2018). The suggested paper clarifies the use

of a camera module to detect multiple fruits and recognize them by training and testing. Deep learning is used here.

III. METHODOLOGY

The suggested system initiates the procedure by clicking the fruit's image or uploading image. Then, the image is transferred to the Image processing section where the properties like size, shape and colour of fruit samples are withdrawn to detect the name of the fruit.

Therefore, we tend to use a way to extend the accuracy and perfection of the fruit freshness detection with the assistance of size, form and color based mostly technique with the union of Convolutional Neural Network (CNN).

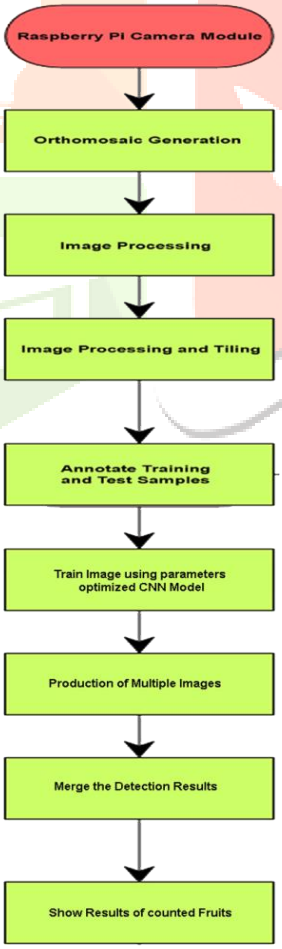

Fig. 1 Flowchart

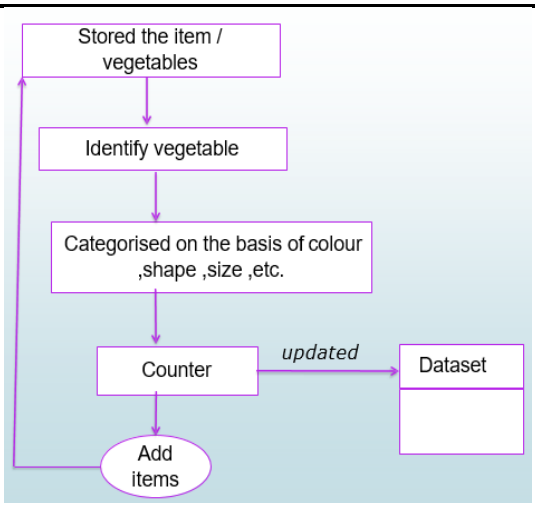

Fig. 2 Flow of system

In this project, we are utilizing a Raspberry Pi module with a camera that will avail us to analyze the fruit shown in front of the camera utilizing the fruit 360 datasets utilized in this project. After the detection, it will count the number of fruit available with a precision of more than 90%. All the program is aliment inside the raspberry pi module, as it is the most vigorous module among others.

IV. RESULTS

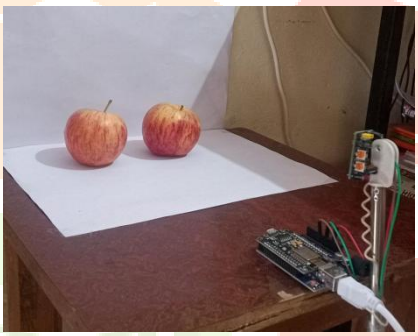

Fig. 3 Raspberry Pi Camera Module

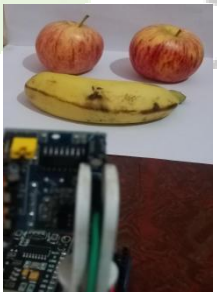

Fig. 4 Raspberry Pi Camera Module 2

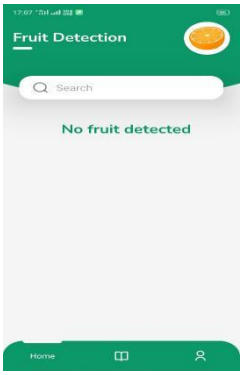

Fig. 5 Android App Screen

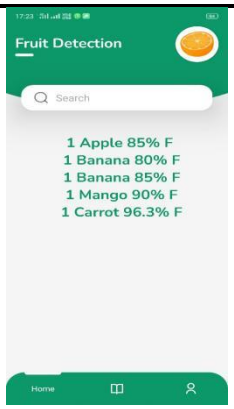

Fig. 6 Fruit Detection Display

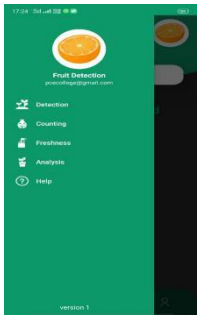

Fig. 7 Side Menu Display

V. CONCLUSION

We utilized a vigorous system with 90% precision utilizing raspberry pi and a camera module. Python, machine learning, and CNN are habituated to perform all the tasks of detecting fruit, counting, and show analysis. The system is capable of detecting multiple fruits utilizing the fruit 360 datasets, we have utilized both training and testing concepts here to show precise results. In future we will try to implement this project using voice command and work on 100% accuracy.

VI. REFERENCES

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