

Mobile Application Development for Farmers Using Identification of Fruit Disease and Diagnosis

Shrikant A. Shinde, Mayuri Satish Jadhav, Pooja Vijaykumar Shinde, Kavita Kondiram Margale, Janhavi Gajanan Gosavi
Dept of Computer Engineering,
SITS, Savitribai Phule Pune University, Pune, Maharashtra, India.

Abstract:

Deep structured learning or hierarchical learning or deep learning in short is part of the family of machine learning methods which are themselves a subset of the extensive field of Artificial Intelligence. Each sequential layer uses the output from the previous layer as input. Deep neural networks, deep belief networks and recurrent neural networks have been applied to fields such as computer vision, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, and bioinformatics where they produced results comparable to and in some cases better than human experts have. CNN are appeal for deep feature extraction and LSTM is used to detect the class based on extracted features. Deep learning technique that would sort the fruit into unusual and normal based on the feature such as fruit color, number of fruit spots, and shapes of the fruit, The sensitivity of disease detection was less with lesser availability of enhanced detection methods for detecting disease in earlier stages. The issue with various existing algorithms is that the accuracy was reduced so some problems not removed. Deep learning delivers methodologies, approaches and functionalities that can help to resolve analytic and predictive analysis accurately. The physical recognition of the Expansion is performed by observing and detecting the circumstance, which takes more time and is also more costly with lower precision. So, in order to overcome that there is best choice which is very speedy and errorless diagnosis by using some techniques in android which are more dependable than some other old techniques. The proposed system gives an android application where user can upload image and can detect quality and Disease of the pomegranate by Using CNN .

Key words: Deep Learning, Android, CNN, Python, LSTM.

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I. INTRODUCTION

India is developing country. In this development contribution of agricultural field is major. Smart farming is about empowering today's farmers with the decision tools and automation technologies that seamlessly integrate products, knowledge and services for better productivity, quality and profit. The classical approach for detection and identification of fruit diseases is based on the naked eye observation by the experts. In some developing countries, consulting experts are expensive and time consuming due to the distant locations of their availability. Automatic detection of fruit diseases is essential to automatically detect the symptoms of diseases as early as they appear on the growing fruits. This system helps to detect the diseases of fruits easily. By using this system we can avoid the economical loss of farmers. Some systems has covered apple, mango and grapes etc. There are so many fruits still remaining that are exported from India and give more profit to the farmers need to be covered under automatic fruit disease detection system. Pomegranate is the one of the fruit that is taken in the low rain area region of the Maharashtra state of India. Now days this fruit is under the attack of one major disease called Bacterial Blight due to which farmer's faces economical loss. This disease is more powerful in the cloudy environment and in the rainy season. Symptoms of bacterial blight on young and developing pomegranate fruits are initially, spots are black and round and surrounded by bacterial ooze. Under favorable conditions, spots enlarge to become raised, dark brown lesions with indefinite margins that cause the fruit to crack. The disease may cause up to 90% This disease need to be controlled in the primary stage of the infection otherwise it will difficult to control it in the final state. Due to the lack of knowledge farmers are not able to identify it exactly at the primary stage. Automatic fruit disease detection system takes the input image and show the results directly to the farmer. But if the image taken by farmer having the poor quality in that case the results shown by the system may not be accurate. So we are adding Intent search technique into the system and will help to find the user intension of disease search. It will also help increase the accuracy of the system.

II. RELATED WORK

In order to solve the current fruit surface disease detection algorithm's problems of low accuracy, slow speed and heavy workload of quality classification carried out by HongJun Wang [1] in 2020. They discussed about Experimental research shows that the improved Mask R-CNN algorithm has a detection accuracy of more than 95 surface lesions, and the detection speed reaches 2.6 frames per second when using GPU, which is significantly better than Fast R-CNN and SSD algorithms and has good detection performance and robustness. In this section detailing of related work is presented. The previous researches about plant diseases detection and their proposed methods are described here. Monishanker Halder, Ananya Sarkar, Habibullah Bahar, PLANT DISEASE DETECTION BY IMAGE PROCESSING: A LITERATURE REVIEW (2019) SDRP Journal of Food Science Technology 3(6) had reviewed the work of some previous researchers who had used K-means clustering algorithm along with SVM, ANN, GLCM, SURF, FUZZY Classification of image processing method for detecting plant diseases The images of biospeckles are analyzed using both illustrative and conceptual procedures. Twelve characteristics are retrieved from the dataset of the biospeckles and further identified the oranges. The classifiers included soft independent class modeling simulation, linear discriminant analysis, quadratic discriminating analysis, Artificial neural network (ANN), and Support Vector Machine (SVM) A methodology regarding classification of Fruit Diseases using Feed Forward Back Propagation Neural Network was proposed by S. Abirami and M. Thilagavathi et al.[4] in 2019. They investigated technology. This approach used mobile to capture infected Fruit images. RGB color feature segmentation is carried out to get disease spots. Edge detection technique is used for extraction of image features of spots to detect diseases. Neural network issued to categorize the diseases. If neural network has several layers then training process takes a lot of time if computer doesn't consist good GPU. S.M. Jaisakthi,P. et al. [5] in 2019 Grape Leaf Disease Identification using Machine Learning Techniques. They explored the concept of detection and classification of Grape leaf diseases. The proposed approach is composed of Image processing, SVM. The proposed approach is specific to grape leaf and cannot be extended to other fruit diseases. Nikhitha M, Roopa Sri S, [6] in 2019 proposed a methodology regarding Fruit Recognition and Grade of Disease Detection using Inception V3 Model. Authors select features of TensorFlow, CNN It provides homonyms share similar names. Which makes it confusing to remember. Only allows execution model not to train it. An approach regarding Image based Plant Disease Detection in Pomegranate Plant for Bacterial Blight.was proposed by Sharath D M, Akhilesh, S Arun Kumar, Rohan M G and Prathap C. et al. [7] in 2019. They presented an approach to diagnose the disease using image processing and artificial intelligence techniques. the percentage of infection in fruits is determined and based on the disease with which the fruit is affected, the preventive measures, biological and chemical solutions are provided. In 2020, Pooja Kantale, Shubhada Thakare, et al. [8] Studied different Review on Pomegranate Disease Classification Using Machine Learning and Image Segmentation Techniques. This review concludes that machine learning algorithms provide the best outcome in the detection and identification of plant diseases. Required large amounts of hand-crafted, structured training data. Jiayue Zhao, Jianhua Qu in 2019[9] proposed. The proposed detection method for healthy tomato fruits and tomato fruits with common physiological diseases showed good results. This paper attempts to review the studies in this area done in India. In 2020 Jijesh J.J, Revathi D C, Shivarajini M, Proposed a method for Development of Machine Learning based Fruit Detection and Grading system. The objective of the work is to improve the accuracy and efficiency by automatic sorting system which mainly helps in reducing.

III. RESULT AND COMPARISON.

Our proposed system is deep learning based system using CNN algorithm where we will create a training model with the help of existing dataset for pomegranate where quality and Disease can be detected accurately. The convolutional neural network (CNN) is a class of deep learning neural networks. In short think of CNN as a machine learning algorithm that can take in an input image, assign importance to various aspects/objects in the image, and be able to differentiate one from the other because of its high accuracy. This chapter includes the details of the related papers with this system and the respective author's work. These papers are close to the objectives of this system and the observations of these research papers are analyzed in the proposed work.

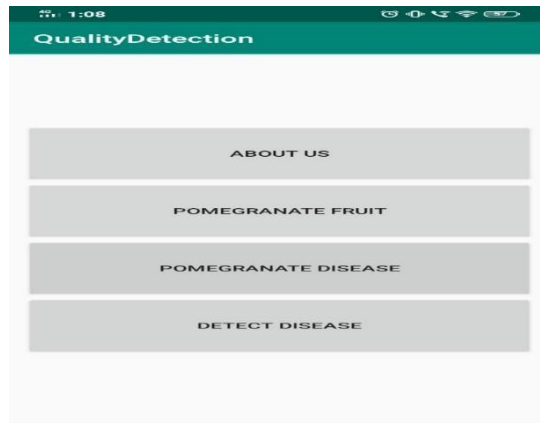


Fig. Home Page



Fig. Outcome1

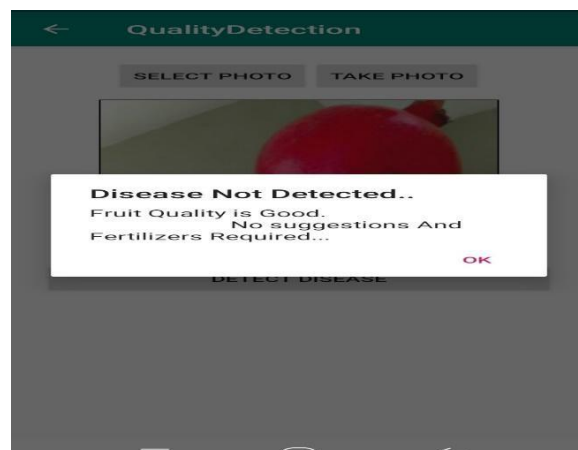


Fig. Outcome2

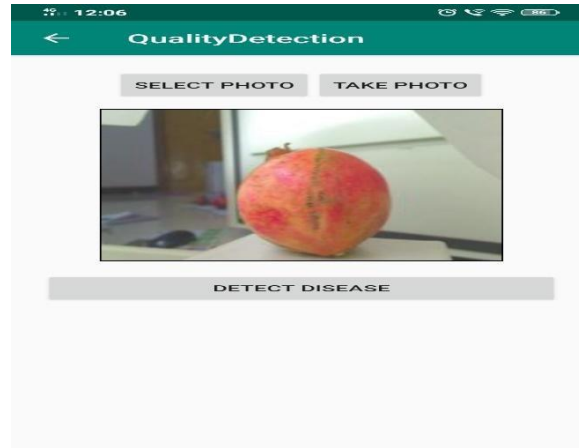


Fig. Outcome3

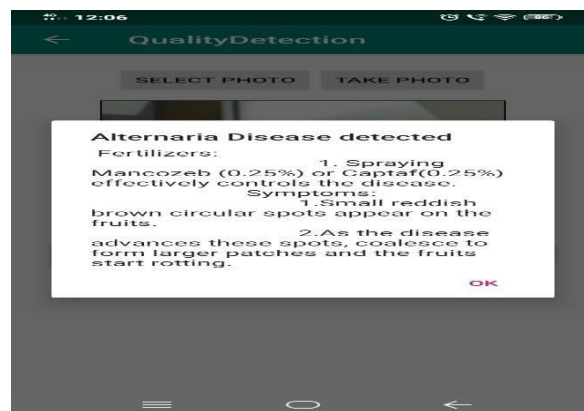


Fig. Outcome4

IV. PROPOSED METHODOLOGY

A. Overview

The framework of proposed approach are shown in fig. For detection of fruit disease, two image databases are required, one for training purpose and other for testing.

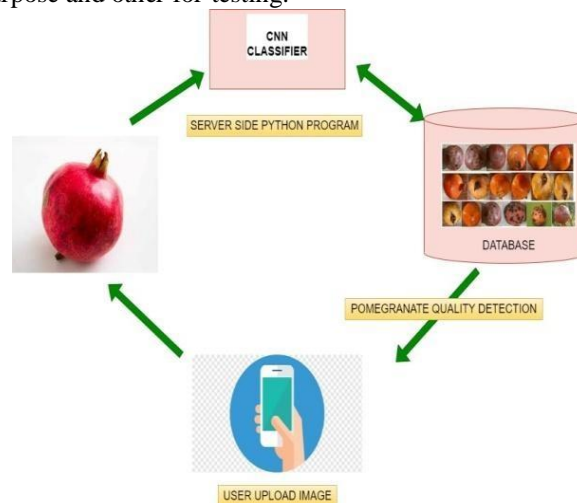


Fig: Proposed System Architecture

For fruit quality detection, Image preprocessing is required for enhancing images. The next step is image segmentation is required; otherwise the feature of non-infected region will dominate over the feature of infected region. After segmentation, feature extraction is done from segmented image and finally the training and classification are performed.

B. Proposed System

The proposed system, consist of image pre-processing, segmentation, extraction of feature and classification. In image pre-processing, images are resized. In segmentation, color segmentation is carried out. Color, morphology and texture features (Gabor filter) are used for the feature extraction. Minimum distance classifier is used for classification purpose.

proposed system is deep learning based system using CNN algorithm where we will create a training model with the help of existing dataset for pomegranate where quality and Disease can be detected accurately.

Algorithm:

CNN Encoder

- Step 1: Dataset containing images along with reference caption is fed into the system
- Step 2: The convolutional neural network is used a encoder which extracts image features 'f' pixel by pixel.
- Step 3: Matrix factorization is performed on the extracted pixels. The matrix is of m x n.
- Step 4: Max pooling is performed on this matrix where maximum value is selected and again fixed into matrix.
- Step 5: Normalization is performed where the every negative value is converted to zero.
- Step 6: To convert values to zero rectified linear units are used where each value is filtered and negative value is set to zero.
- Step 7: The hidden layers take the input values from the visible layers and assign the weights after calculating maximum probability.

C. Mathematical Model

- Let S is the closed system where
- $S = I, P, O$
- I = Input images from dataset
- $P = P1, P2, P3$ Where,
- P1 = Pre processing
- P2 = Features extraction
- P3 = Classification
- O = Quality of the fruit.
- F is the set of functions used for remote sensing image caption generation.
- $F = F1; F2$ where,
- F1 is a function for CNN Encoder.
- F2 is a function for LSTM Decoder

V. CONCLUSION AND FUTURE SCOPE

Thus we are going to implement a system for pomegranate quality detection using android application. We have studied about Deep Learning Mechanisms, image processing and CNN that will gives us a better accuracy compare to other technologies and android framework in this project. This project will be helpful for farmers for early detection of quality of pomegranate and thus in turn it will save further efforts. Deep Learning Mechanisms, image processing and CNN that will gives us a better accuracy compare to other technologies. Future scope may modifications to apply in real life scenarios to tackle the real world problems.

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