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Kisan Rakshak: An Android Application for Identifying the Vegetables Diseases

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Abstract

Diseases in vegetables cause catastrophic problem in economic losses and production in agricultural industry worldwide. The main aim of this paper is to provide solution to farmers for identifying and classifying diseases present in vegetable which are experimentally validated. In this paper, we propose a Smart phone based android app that helps farmers for identifying vegetable diseases by uploading vegetable's images to the system. The system has an already trained dataset of images for the different vegetables. Input image given by the user undergoes several processing steps to detect the severity of disease. The server compares input image with the trained dataset images, displays the vegetables diseases and provides necessary precaution to the diseases.

Key Words: Android; identifying and classifying diseases; data set of images; image comparison; vegetables diseases.

Introduction

Farmers normally observe visual symptoms of disease on vegetable. Experts may easily diagnose the disease or may rely on lab diagnostic test. Most of the currently followed practices for vegetable disease detection system in India are naked eye observation by domain expert. The consultation charges of professional experts are high and it is also not possible to get it on time at remote location. Hence, there is a need of automatic vegetable disease detection system in the early stage of the disease.

Defective food products have a common occurrence on the shelves of stores. Even after paying a lump sum amount customers are dissatisfied with the products they buy. One of such product is the vegetables. To a human eye they may appear healthy and fresh but only after cutting or eating it, the customers know its quality. This also affects the profitability for the producers. Thus, there is a need to have applications which identify the quality, defects of vegetables so that the customers get only the best quality product for the money they pay. The quality , defects of vegetables are checked using technologies like MRI ,x- ray imaging etc which are costly for farmers to afford, occupy large space , users need to have scientific knowledge to use and analyze the results , and have harmful effects on the specimen used for research. Thus, they cannot be used by everyone and on each and every product. Some disease also infects other areas of the tree causing diseases of twigs, leaves, and branches.

Every disease occurring in vegetable creates a particular texture or specific colored spot. We can use these features for detection of diseases in the vegetable. For example some common diseases of tomoto vegetables are tomoto scab, tomoto rot, and tomoto blotch. Tomoto scabs are gray or brown corky spots. Tomoto rot is a fungal disease causing a brown or black, spreading rot in vegetable that may be covered by a red halo. Tomoto blotch is a fungal disease and appears on the surface which can vary in size from small, dark spots to large blotches that can cover much of the vegetable surface.

RELATED WORK

In recent years, there has been an attempt to assist the farmers technologically using several computer techniques. Sometimes, the farmers are not able to

connect with experts due to outdoor limitations. The farmers cannot contact the agricultural experts due to their distant availability and unable to recognize the disease symptoms due to complexity of the disease patterns. Captured images from plant leaves surfaces can provide a better solution where the remote agri-scientist can see instantly the image for disease diagnosis to extend tele-health advice to remote areas. 1. Manual Treatment. 2. Telephonic Suggestion 3. System Application for treatment based on symptoms. In the past decade, agricultural applications using image processing and computer vision techniques have been attempted by various researchers.

Recently, a lot of activity in the area of vegetable disease detection can be seen in which defect segmentation of vegetables are performed using simple threshold approach[1],[2]. An adaptive threshold method for defect segmentation on tomotos is presented in [3]. Pixels are classified into different classes using different classification methods. Kleynen et al. [4] is based on Bayesian classification where defected or healthy pixels are classified by comparing them with pre-calculated model.

The author Shiv Ram Dubey [5] suggested an image processing based way for detection and identification of vegetable disease. The vegetable selected is tomoto and diseases considered are namely tomoto rot, tomoto blotch for conducting the experiments. For image segmentation, K-means clustering is used. Color coherence vector, Histogram, Local Binary patterns, complete local binary patterns are used for extracting the features. For vegetable disease detection, multiclass support vector machine is used.

The author Ilaria Pertot [6] suggested multilingual web based tool. The web based tool provided for plant disease detection. Strawberry vegetable is considered as case study. The farmer in the farm will observe symptoms and these symptoms will compare with images provided in the system. The outcome will be identification of vegetable disease. The web based system consist user and super user. Super user has authority to add /modify / delete images and diseases. And user can use disease detection method /tool for disease detection.

The author Monica Jhuria [7] provided an approach for vegetable disease detection based on image processing. The purpose of research work is to detect disease on vegetable. Grapes, Tomoto and mangoes are selected for conducting experiments. Morphology, color and texture feature vectors are chosen for feature extraction. Morphology feature gives 90% accurate results than other feature vectors. For disease detection and weight calculation of vegetable image processing techniques are used. Back propagation is used for weight adjustment of images that are stored in learning database. On the basis of disease spreading, the grading of vegetable has been decided.

The Indian government following the e-pest surveillance approach to control pests and disease through meticulous field observations for major vegetables like carrot, tomoto, and pomegranate but still this process is time consuming [8].

SYSTEM ARCHITECTURE

The system architecture is shown in following fig. 1. An Android -based mobile can be used by user from office/lab, farm (when in front of symptomatic vegetable). The user gives the input of infected vegetable image from mobile. The app will process the images to a local server for further analysis. Then our server makes its internal mechanism to calculate the vegetable disease in real time and finally, displays the result in an output screen of user mobile.

A) Image Acquisition: The first stage of any image processing based approach is the image acquisition stage. It is a process in which image is retrieved from some source, usually a hardware based source. The source can be anything from webcam to a mobile camera. After acquiring the image, various methods of processing can be applied to the image to perform the many different vision tasks required.

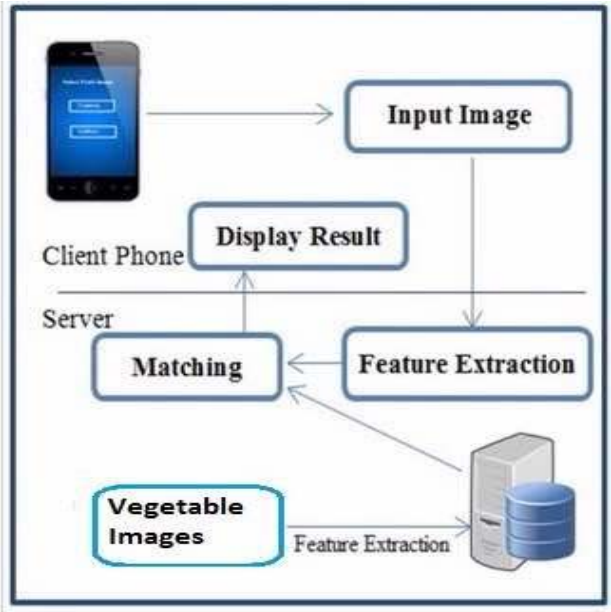

Figure.1. System Architecture

B) Feature Extraction: Feature extraction involves reducing the redundant input data and transforming it into a reduced set of features also called as feature vector. The extracted features contains only relevant information, so that the desired task of disease classification can be performed using limited representation instead of using complete initial data. Here we are using random number generation algorithm for Feature Extraction.

C) Feature Matching: Feature matching methods essentially consist of identifying features in images that can be matched with corresponding features in the other images from which a transformation model can be estimated. Linear Search Algorithm is used for feature matching. In this method the extracted features are correlated with one another and we get a specific training class to which that particular image belongs.

EXPERIMENTAL RESULTS

For developing the application the following are the Software Requirements: Operating System: Windows 7 or higher .Tools: Android Studio, Technologies used: Java, XML.

User End: User can either capture or obtain an image from gallery. User sends the image to the server side for further process which involves Feature Extraction, Feature Matching. Final result is displayed on the user App.

Server End: The image is uploaded from the client side. The Server Search the image in the database using linear search algorithm. Then server send Required response to the client side.

The Vegetable's disease recognized on the client side (mobile device) is shown in figure.2 to 4.

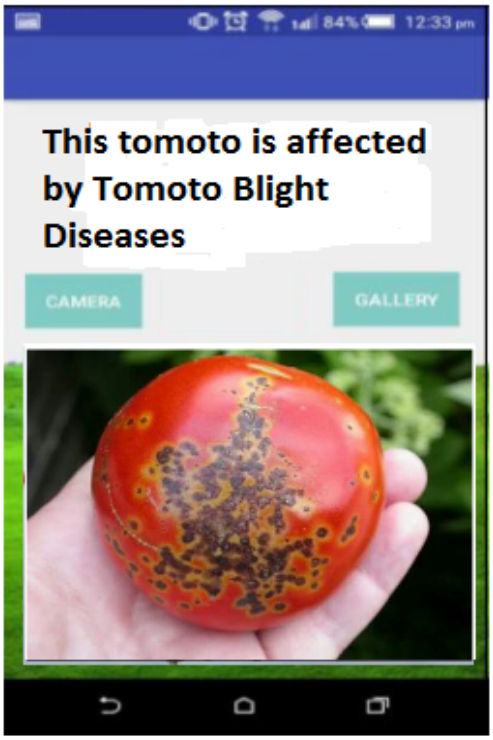

Figure.2. Tomoto

Figure.3. Carrot

The Android application is very handy and easy to use. With the proper data this App can be used to develop application for all the Vegetable's diseases too. This App is of low cost, it relatively easy to integrate into other technologies. The development tools are easy to use.

This App can be used in import and export of vegetables, in vegetable markets and malls, in food Industry, in medical field and also in cosmetic production industry.

CONCLUSION

The problem of identifying the type of vegetable disease in order to find ways and means to reduce its inflection has been identified in this paper. The proposed system detects the type of disease with greater accuracy. After it has identified the type of disease, the system suggests ways and means to prevent the occurrence of the disease by taking into consideration the conducive environmental conditions and other relevant factors.

This system helps farmers a lot by identifying the problem in the vegetable at an earlier stage in cultivation, thus saving them the cost of wasted vegetables. This saves the country from the otherwise huge economic losses incurred during export. This is the best application, the application is dynamically built and thus easy to maintain. It provides a convenient usable user interface but works only in Android phones.

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