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ANDROID APPLICATION FOR CROP YIELD PREDICTION AND CROP DISEASE DETECTION

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Abstract: **As we know, India's economy primarily depends on agriculture. For successful production of crops we must ensure whether a particular crop will yield in particular soil and weather condition. And also if crop is not yielding properly, that means it must have some disease. So our paper primarily focuses on two parts. One part will take input factors such as weather condition, soil properties, etc. and will use Bee Hive clustering approach to give output as crop name which will be suitable in that particular condition. In second part application will take diseased crop image as an input and with the help of image processing technique it will detect which might be the possible disease that have caused to the crop. The prime focus is on improving the usability of agricultural services by providing a better tool.**

Keywords: - *Image Processing; Bee Hive approach; SIFT; Usability; Recommendation of best crop; Crop disease Detection.*

I INTRODUCTION

India is an agricultural country with second highest land area of more than 1.6 million square-kilometer under cultivation. Various important industries in India find their raw material from agriculture sector -cotton and jute textile industries, sugar, Vanaspati, etc. are directly dependent on agriculture. There is no such universal system to assist farmers in agriculture. India is an agriculture based developing country. In spite of having lot of digital data, they are not able to access real time to the factual information such as the crop yield data in particular soil and crop disease detection techniques, pesticides to be used, weather conditions, pest management etc. So as a solution to improvement in usability tool, this paper explores to develop solution that aims to be scalable, easy to access, community oriented design, efficient that aims to reduce digital gap among rural farmers towards technology. This paper highlights two major crop related parts:

A. **Crop Yield Prediction:**

From very long time agriculture has been main culture practiced in India. Many people don't have awareness about the cultivation of crops in a right time and at right place. By analyzing the parameters such as weather, temperature and several soil related parameters such as soil ph value, water availability in the region, etc., this paper proposes an idea to identify the suitability of crops for a particular soil which is based on the parameters mentioned above. Due to this, quality and yield of the crop will enhance. In this paper, we will use Bee Hive clustering approach in which accuracy can be maintained. Bee Hive approach works better in many ways compared to other data mining classifiers.

B. **Crop Disease Detection:**

Crop disease detection is one of two parts of our android application after Crop yield prediction. This part will be useful in detecting from which disease crop is suffering from. In early days, monitoring and analysis were done manually, thus it used to take lot of time and work. Detection of disease can be done effectively with the help of image processing techniques and algorithms. So it reduces the lot of work from farmer side. Detection of disease in the early stage is very much essential, because if disease persists then it might destroy whole agricultural field. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in farms of crops.

II LITERATURE SURVEY

Kalavathi K, Nimitha Safar P.V. [3],the author has compared three classification algorithms which are naïve Bayes, Decision tree and k-Nearest Neighbor using Neural network Toolbox.

M.Gunasundari, Dr. T. Arunkumar, Ms. R. Hemavathy [11], the authors have used Bee Hive clustering approach for Crop Yield Prediction. Bee Hive approach uses Euclidean distance method to get predictive result.

Suraksha, Sushmita, Sushma, Sushmita Keshav [5], in this paper author implemented identification of disease affected in paddy crops and provides mobile phone like android or iOS. These images are then fed to application for identifying paddy disease and suggest remedies.

K. Jagan Mohan, M. Balasubramanian, S. Palanivel [7], the author developed computer vision system which can identify and various paddy plant diseases. Diseases affecting the cultivation of paddy are brown spot, bacterial blight and leaf blast diseases. Using Haar-like features and Ada Boost classifier disease is affected is detected. The detection accuracy rate is found to be 83.33%. For disease recognition, using Scale Invariant Feature Transform (SIFT) feature provides paddy plant disease type.

Dhanashri Nemishte, Rupali Patil, Supriya More, Sayali Udgave, Monika Kasture [8], author presents survey on various classification techniques for leaf disease classification. The classification method is to classify each pattern in one of the distinct classes. It is done using different morphological features. Different classification techniques are k-mean clustering, Support Vector Machine, etc.

Ms. P.R. Patil, Prof. N.B. Bhawarkar [9], in this paper, various techniques of crop detection method using image processing are discussed. The basic steps of image pre-processing, image enhancement and feature extraction methods are same. For recognition of leaf pattern various neural networks are available.

III EXISTING AND IMPLEMENTED SYSTEM

A. *Existing System*:

In Existing system farmers not connected with any technology and analysis. In traditional system farmer uses "trial and error" method. Farmer experiments on land with different crops, water availability, etc. and after many such "tries", farmer probably gets the best crop suitable in particular land.

Disadvantages of existing system:

- High chance of time and money loss.
- Particularly when growing new crops, farmers may face the risks of either market failure or production problems.

B. *Implemented System:*

In our implemented system we have built a system which can help farmers to get best crops. System gives output after analyzing all necessary attribute like rain, soil condition, temperature, cost, market value, etc. proposes the use of technology to provide result to farmers for recommendation of best crops. The recommendations here will be based primarily on user location and on multiple factors like humidity, water availability, weather status, soil condition, acidity of soil, etc.

It also focuses on farmers should be able to identify crop diagnosis by sending image through app. Also the farmer by using our project will get information easily even though he is an amateur at using technology. Thus the farmer gets maximum profit and knowledge which in turn reduces digital divide.

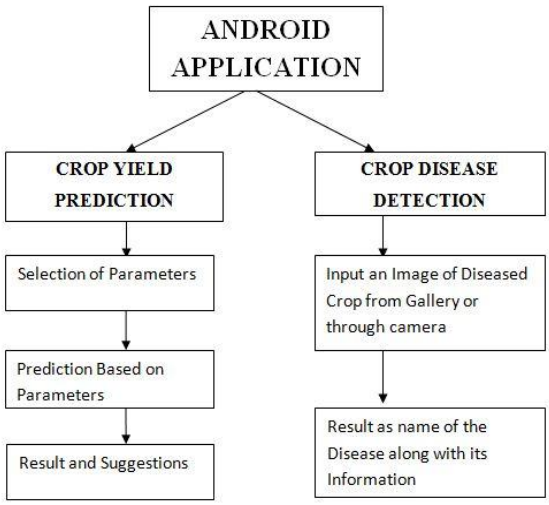

Figure 1: - Implemented System

Implemented system	Existing System
In the system security is one of the prime concerns. A login system has been designed for the security reasons.	In existing system security is always at stake.
In implemented system both modules as Crop Yield Prediction and Crop Disease Detection are present.	Existing system does not consist of such activity.
In implemented system, disease of crop can be detected with the help of photo of the crop. Photo can be clicked with the help of default mobile camera.	Existing system does not have such facility.

IV ALGORITHMS USED IN IMPLEMETED SYSTEM

A. Bee Hive Clustering Algorithm:

Bee Hive clustering approach is used in crop yield prediction module. Compared to Naïve Bayes classification or support vector machines or even neural networks, Bee Hive works better.

Steps in Bee Hive approach:

1. The first step starts with population of 'n' scout bees. Each scout bee shows possible cluster solutions as set of zones 'z'.
2. Starting positions are assigned to bee list 'n'. Then Euclidean distance is calculated between data objects and center to determine where data should reside.
3. Then Fi, fitness process is calculated for site bee victims using clustering matrix.
4. Then sites having more values of Fi are selected as "selected sites" and will next in line up for search.
5. Then neighborhood search finds the best solution by recruiting more and more sites.
6. The site that finds the highest fitness Fi, will be designated to make next population bees.
7. Then loop ends with colony having two parts to it.

B. SIFT Algorithm

Scale-invariant feature transform (or SIFT) is an algorithm in computer vision. It is used to detect and also describe local features in images. These features include various distinctive, scale invariant image feature points, which can be matched between query image and the image in database to perform tasks. It is used for detecting features in crop images.

Input image's features will be compared with the features of images from dataset, and with the maximum numbers of features that matches with the dataset image that image's disease will be shown in result along with its information.

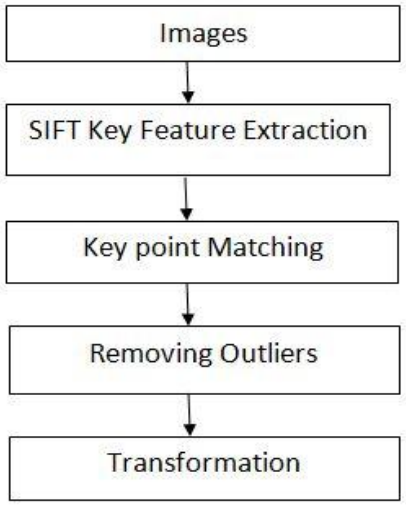

Figure 2: - SIFT Steps

V METHODOLOGY AND RESULTS

Phase 1:

The work here starts during the first time installation of our application. It gathers the basic user information like Username, Password, Email, Phone number as shown in Figure. It will be stored into server's database, SQLyog database. So every time when the user tries to log in data username and password gets verified from server side.

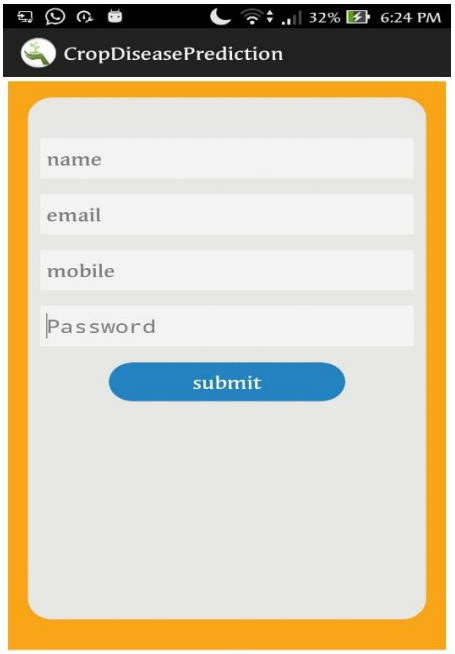

Figure 3: - – Registration of the user

Registration of the user

Phase 2:

The user has to select whether he wants to use application for Crop Yield Prediction or Crop Disease Detection as shown in figure 4 –

Figure 4: - Menu

Phase 3 - A:

1. User has selected 'Crop Yield Prediction' as his option. User needs to fill information regarding soil and weather such as Temperature, Acidity, etc. – as shown in Figure.
2. Then this information goes to server side, server then processes the data. And with the help of Bee Hive

algorithm it will display the results in probabilities as success rate and failure rate as shown in Figure 5.

3. More the success rate better the crop in given conditions.

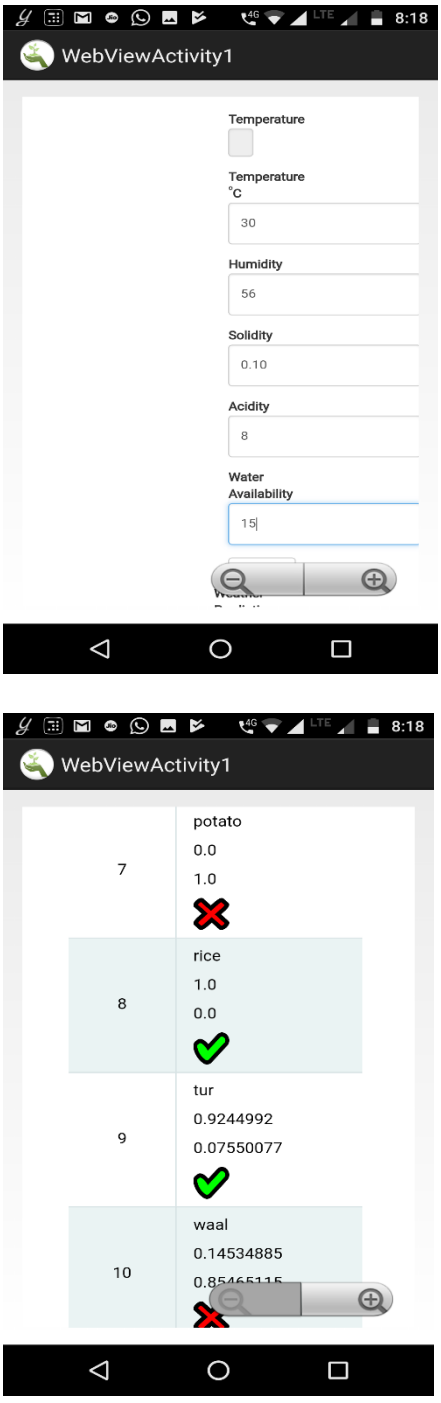

Figure 5: – Crop Yield Prediction

Phase 3 - B:

1. Crop Disease detection has been selected by user. User needs to select the name of the crop. Then User will have two options, he can upload image through gallery of his mobile or he can click picture through his mobile camera and can upload image as shown in Fig.-
2. Uploaded image will be compared with all the images in database. For comparison, features from uploaded image will be extracted and matched with image from database with the help of SIFT image processing algorithm.
3. In result, the name and information of the disease will be displayed whose maximum numbers of features matched with the uploaded image. Result is shown in Figure – 6

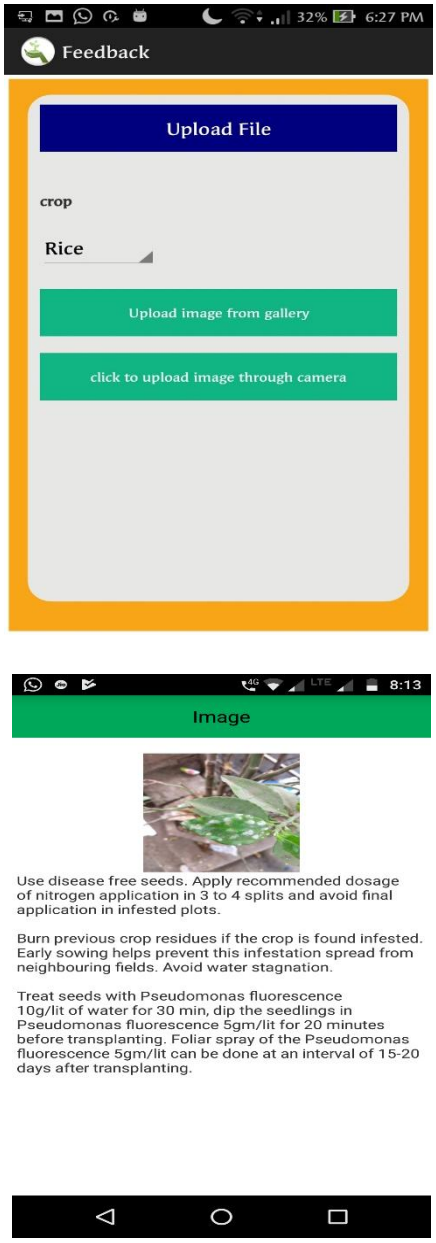

Figure 6: – Crop Disease Detection

VI RESULT ANALYSIS

The accuracy of the results can be maintained and improved by loading more number of images in database of same crop disease from different angles. Since image processing is being used the need of better camera is required for matching most number of features. We have tried with three different cameras, mobile devices having camera more

than 8 megapixel were able to identify the correct disease name 9 out of 10 times, while less than 8 megapixel cameras could do it 7 out of 10 times. Image comparison features can be increased to get more and more accurate result. For yield prediction we have tried with different input parameters and system was able to give the desired output by analyzing database and with the help of calculation involved in Bee Hive approach.

VII CONCLUSION

In current system farmers not connected with any technology and analysis. So there are many chances of loss. Sometime wrong selection of crop will effect on their income. To reduce these we have developed an android application, which will predict which would be the suitable crop in particular region and this application will also detect disease from image of the crop, if crop is suffering from any with the help of image processing technique.

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