A Survey Paper on Detection of Crop Diseases Using Predictive Analysis

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Abstract— *In agriculture detection of leaf disease is important so that loss can be minimized. In this analysis the leaf pixels is checked with the dataset present so that the input value can be checked with the present value from the dataset. If the input data matches with data of healthy plant then the crop is healthy else the crop is infected. The system helps in initial precautionary measures. If proper care is not taken then it will effect on quality, quantity and finally on productivity*.

Keywords— Crop leaf diseases, Disease detection, Classification, Image processing, K-means, K-Nearest Neighbor (KNN), Feature Extraction

I. INTRODUCTION

Agriculture is one of the most important industry in India. Indian economy is highly dependent on agricultural activity. Most of the people depend on agriculture for their livelihood. In crops, leaves are one of the important part because they are the primary source of photosynthesis, which is how plants feed themselves. Detection of crop disease is quite tough for farmers . The only method of detection used by farmers is through their naked eyes Identifying the type of crop leaf disease is difficult and challenging. So use of automatic crop disease detection is beneficial. Detection of crop disease in early stage is very necessary, because loss of crop can lead to loss of income as well as starvation.

Detection and classification of plant leaf diseases have a wide applications in various areas such as agricultural , biological research etc. Though there are many machines and computational methods introduced to help farmers to detect and identify leaf size, stem size etc the cost incurred in these process is huge and time consuming. Hence there is a need to build a system which is cheap, handy and easy to use so that detection becomes easier for the farmers .

Using image processing techniques we can define images over two dimension (feasibly more) by which we can have more precise image pattern in detecting leaf disease of crop.

The crop disease depends upon three things they are:

- Environment
- Pathogens
- Host

If environment is favourable for pathogens the host is prone to the disease.

If environment is not favourable for the pathogens then the hosts are safe.

Table-1: Types of crops and their diseases [6]

SrNo	Diseases Crops are Prone to		
	Crop Name	***Diseases***	***Description***
1	Wheat	i. Yellow rust. ii. Brown rust. iii. Black rust.	These disease happen when weather conditions are cooler i.e. in Himalayas or Nilgiris.
2	Rice	i. Blast Disease ii. Stem Rot iii. Flag Smut iv. Bacterial Leaf Blight	Minimum temperature should be less than 26°C. Relative humidity should be more than 90 per cent.
3	Tomato	i. Bacterial Wilt ii. Leaf Mold iii. Bacterial Spot	Disease development is favoured by high temperatures and high moisture.

Table – 2: From Food and Agriculture Organisation of the United Nations the total crop loss is given below[4]

Country (Year)	Estimated Loss (mt)	Loss as Percentage of Expected Output (%)	Value of Production Loss (US$ Million, 1994)
Thailand (1994)	130	58	650
Philippines (1989)	57	96	285
Ecuador (1992)	34	27	170
Indonesia (1991)	50	34	250
China (1992)	180	84	900
Taiwan (1987)	100	72	500
Mexico (1994)	1	8	5
USA (1993)	12	NA[1]	60
India (1994)	25	36	125
Vietnam (1994)	10	20	50
Bangladesh (1994)	5	14	25
Total	**541**	**74**	**3,019**

[1]NA = not available.

II.PROPOSED METHODODLOGY

These crop disease can be detected using these methods and algorithms:

- KNN: K-Nearest Neighbor where k is number of points or pixels used for putting the specific pixel into proper clusters depending upon its feature. In this the input pixel will be checked and placed in the cluster using distance formula.

- K-means: K-means is used for clustering the points or pixels depending upon their features.

III. LITERATURE SURVEY

An overview of Research papers on Crop Detection using Image Segmentation and soft computing techniques describes detection using genetic algorithm in MATLAB on few plants like banana, beans, jackfruit etc..The paper also suggests use of ANN, Fuzzy Logic can provide better results[1].

Authors in paper[2] suggest that techniques like KNN, Otsu and Color Co-ordination are good for detecting diseases in the crops. After image is segmented by K-means clustering technique, green pixels value is hidden and those hidden green then obtain the threshold value of object by Otsu's method.

In this paper [3] authors have suggested an innovative idea to identify the affected crops and provide remedy measures to the agricultural industry. By the use of k-mean clustering algorithm, the infected region of the leaf is segmented and analyzed. The images are fed to our application for the identification of diseases.

Authors of this paper[4] have suggested following process for detection they are background clipping, binary Image conversation, RGB Image acquisition , K-means clustering, masking green pixel, remove masked cell and highlight fault portion ,masking fault pixel .

In paper[5] authors have surveyed and discussed about machine learning algorithms like KNN,SVM,ANN,SOM,GA and concluded that depending upon the requirement above algorithms can be applied.

In paper[6] author have described about the crop and their each diseases in detail as well as the conditions for which crops can get prone to diseases.

IV. SYSTEM ARCHITECTURE

- Input Image:
  The user(farmer) will give image as an input to check its features.

- Feature Extraction:
  In this the features of leaves are checked based upon green pixels so that how many healthy and infected areas are there. This is also done with the present data in dataset.

- Matching Content:
  In this the contents like features, pixels are compared from the user's image feature and leaf image's features present in dataset.

- Display Disease and Solution:
  Depending upon the output from matching content the system will display whether the crop is healthy or infected. If it is infected then it will provide suitable fertilizers so as to prevent further damage to the crop.

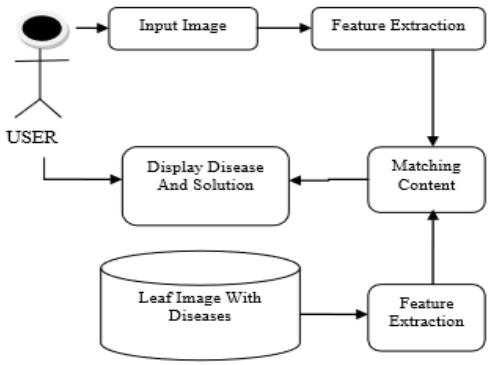

Fig -1: **Architecture**

V. CONCLUSIONS AND FUTURE SCOPE

Though there is a progress in technology, there are no economically viable technologies available which would help the farmers to detect the crop diseases at early stage and hence avoid loss of crops. This technology would help the farmers to detect the disease and get immediate solutions for it at a very affordable price.
The technology would help in increasing productivity, enhance resilience and improve crop varieties for higher yields.

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