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# Design of Agro Expert Using Image Processing

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**ABSTRACT:** Recently, agriculture is that the mainstay of a rising economy in India. Traditionally farmers followed ancestral farming patterns and norms. However, one farmer can't be expected to require under consideration all innumerable factors that contribute to crop growth. One misguided or imprudent decision by the farmer can have undesirable ramifications. With the emergence of new technologies, developing an advanced agriculture system could help farmer from initial stage of farming till the end where it reaches to customer. The recommendation system in collaboration with machine-learning will lead to development of an Intelligent Agriculture System that would help farmer in making cost effective and reliable decision. Activities such as i) Prediction of disease ii) Recommendation of fertilizers as per detected disease iii) Crop Yield Prediction as per reason and season, iv) Investment Prioritizing, v) supply vi) market analysis are major in the field of production. It also helps a farmer to perform the activities like crop management including applications on disease prediction, fertilizers recommendation, crop quality, and growth prediction, etc. This proposed system describes the case study on "Recommendation System for Farmers in Agriculture Field is using IoT & Machine Learning". The following study includes identification of different methodologies agrarian activities such as i) disease detection, ii) prediction about the specific crop, iii) recommendation using machine learning algorithms.

**KEYWORDS:** Agriculture, machine learning, recommender system, disease detection, Classification Rule, K-Nearest Neighbor (kNN), Density based clustering, IOT, etc.

## I. INTRODUCTION

Nowadays, agriculture is the fundamental source of food industry. Besides fishing, mining, entertainment and various others agriculture is one of the oldest and most important economic activity. It is being practiced all over the world since thousands of years ago. It is developing over many years with the upcoming technologies in machineries, tools and techniques. Many people are getting involved in this agriculture sector. There are far more researches going on in this sector so as to increase production and reduce loss. More than 38% of the land in the world is allotted to agriculture. This sector accounts for over 20% GDP of India. Many rural people depend on agriculture for survival. India is largest producer of crops like wheat, rice, sugarcane and lot of other staple food and it is world fifth largest producer. But as it is a developing country lot improvement is yet to be made so as to meet the increasing population demand. Farmers in India are still using traditional ways of farming where in decisions are made using experience of farmer. But as said humans and mistake is quite relative this would not increase production. So, their need arise for technology. Applications in machine learning are emerging. So this technology can be used in farming too. Farming involves crop selection, tools, fertilizers and machineries it depends on various factors as climate, region and many more. Yield can be increased by investigating. This cannot be done by farmer, researchers are working on it. Technology helps to bring researchers work to the farmer.

Yield prediction is art of predicting production before the harvest actually takes place in advance. Data Mining is a process of extracting hidden information in given dataset by finding different patterns in data using various algorithms. Here we focus on classification and prediction techniques.

## II. LITERATURE SURVEY

- Vishnu S, A. Ranjith Ram [1]. this paper discuss various methods used for disease detection and using algorithms such as k-means clustering and neural network for final detection. Also it discuss various phases of disease detection in plants.
- 2. Pawan P. Warne, Dr. S. R. Ganorkar, [2] This paper presents an approach for diseases detection in the cotton plants as cotton cultivation is a critical issue which directly affects on textile industry. This paper focuses on

detecting disease affected portion in cotton plant that is whether to consider whole plant or part of leave for disease detection and different classes of disease which cotton plant may get affected by.

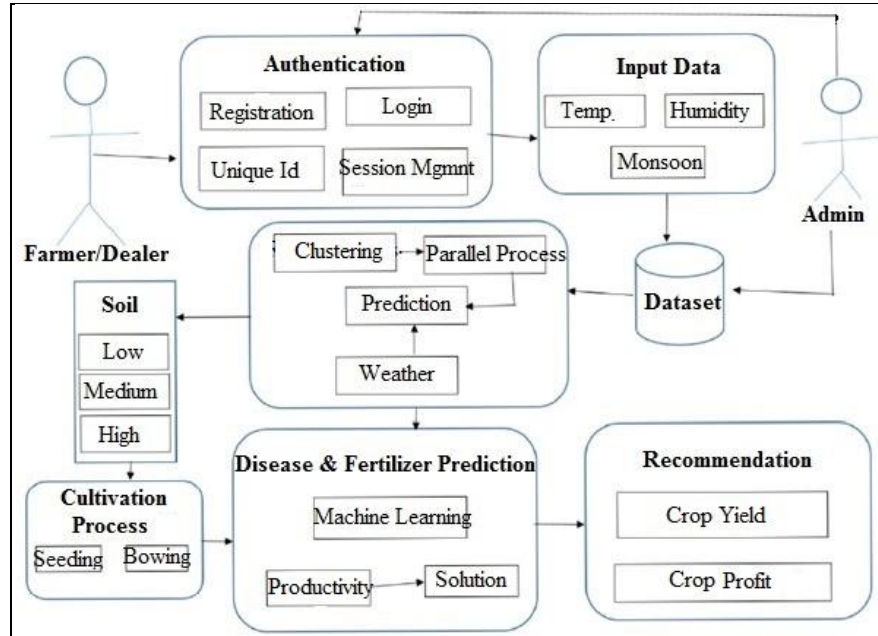
- Dimitri A. Lisin, Marwan A. Mattar, Matthe w B.Blaschko,[3] this paper focus on clearly extracting the useful information and discarding the noise,in short it focuses on object recognition using local features or global features. And finally conclude using both as combination is useful for object detection.
- P.R. Rothe, and R. V. Kshirsagar, [4] Feature extraction can be done with the use of a pattern recognition system. It consists of: converting input vector into the feature vector and reducing dimensionality. For this they used feature extraction algorithm for efficient detection. Here Hu's moment is used for shape information classification.
- P. Revathi, M. Hemalatha, [5] This Proposed work gives us new strategy for disease classification in mobile captured leaf images using HPCCDD algorithm, use of technologies like Sobel filter, Canny filter for precise edge identification is also discussed. Also gave us idea on pesticide recommendation for cotton crop to ensure good production with reduced loss.
- L. Younes, B. Romaniuk, E. Bittar, [6] This paper focuses on new technology in the field of feature selection. SIFT is one algorithm which precisely can find feature in input image which are invariant to scale, rotation and brightness. It uses local descriptor in matching process of object or image.
- Ramesh A. Medar, Vijay. S. Rajpurohit, [7] paper focus ondifferentmethods for crop yield and its predictionusing machine learning. Knowing crop yield is very essential so asto predict profit and manage various farming resources before. Different Mining techniques like Support Vector Machines(SVM),K-Means clustering, K Nearest Neighbor(KNN), Neural Networks are well known for its accuracy.
- MayankChampaneri, [8] The paper focuses on use of data analytics in crop prediction. Crop are selected for cultivation according to various factors like climatic condition, soil type, humidity, temperature and various other factors. This paper focus on selecting particular factor from various factors for crop prediction. Random forest algorithm one of the supervised learning algorithm can be used for precise prediction.
- Bollu Lakshmi Avinash, PinapaSaiVenkat In India,[9] India is developing country. Agrarian sector is one of the major sector which contributes mainly in GDP of our economy.this paper focuses on prediction of crops on bases of area(State, District) and season. The proposed paper uses regression algorithm like ridge and lassoregressor which are used for feature elimination, and scaling also Stacking regressor for better outcome.
- Vishnu vardhanBulusu, [10] the proposed paper bring infront another prediction algorithm that is density based clustering. The knowledge gained from the paper is that SMO classifier provides good accuracy and sensitivity as compared to support vector machine(SVM).

### III.RELATED WORK

To the study of crop disease detection, recommendation of fertilizers, yield prediction as per the weather condition as the main concern in our country. The quick and precise forecasts provide useful input for proper planningin agriculture which has lot of uncertainties. There is lot of work donebefore for disease detection in crops , authors are trying to achieve better precision using various upcoming algorithm in machine learning. There are different separate system present for farmer support but not a whole system as in.



**IV. PROPOSED SYSTEM**



**Fig.1: Proposed System Architecture**

There are various process involved in cultivation of a crop, the farmer needs to loosen soil so that roots of crop would easily penetrate deep in the soil. Then the seeds are sown into soil, after the required time for full growth of the plant harvesting is done, after that the crops are sold to the traders and from their it comes to us . So we are proposing a system where in a small contribution of our system would help reduce the extra work needed to do for the farming purpose.

Our System would consists of 3 modules:

- 1] Crop prediction
- 2]Yield prediction
- 3]Disease detection

In this work the experiments are performed with the help of two important and well known classification algorithms K Nearest Neighbor (kNN)and Density based clustering are applied to the dataset. There accuracy is obtained by evaluating the datasets. Both the algorithms are passing the training dataset and their result is calculated in terms of accuracy, performance and these all are evaluated using the prediction done in the testing dataset. The entire analysis process creates a data flow. For disease detection in leaves first we need to locate disease affected portion of the leaf. Image Processing Module consists of Feature extractionand Image Enhancement. Here in feature extraction a selected or relevant information is extracted and further scaled for this purpose we use Scale Invariant Feature Transform(SIFT) algorithm. This algorithm is used to transform image content into local feature coordinates that are invariant to translation, rotation, scale and brightness as well. The features extracted is then passed to Model Generation Module where in KNN classifier algorithm is used to classify the selected features according to different classes of disease.For the purpose of yield prediction and crop prediction we would be using linear regression algorithm where in we would take area as an input and so we are working on using open weather API for finding the current climatic condition for particular area. Using this information as a parameter we would predict crop and its yield.

**Algorithm for crop disease detection:-**

1. Start
2. Take Image as a Input
3. Convert the image into grayscale
4. Apply KNN to detect the disease
5. END

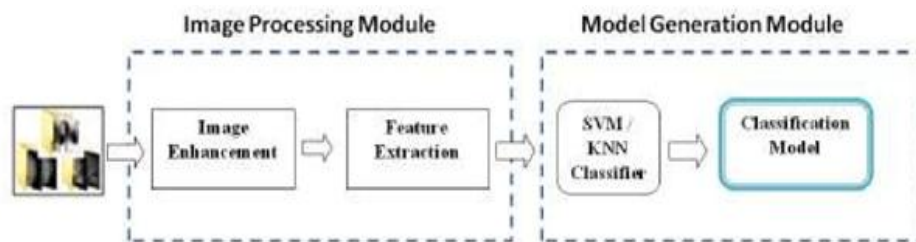


Fig.2: Classification Framework (Training Phase)

### V. RESULTS AND DISCUSSION

The system can provide the below outcomes once successfully executed training as well as testing phase. Our work would help farmers to increase productivity in agriculture, prevent disease degradation in particular crop land, and reduce chemical use in crop production and efficient use of water resources. Our further work is aimed at an improved data set with large number of attributes and also implements yield prediction.

The type of disease	The proposed method		ResNet-101 model	
	The correct number	The correct rate (%)	The correct number	The correct rate (%)
Anthracnose-on-grapes	15	75	8	40
Powdery Mildew	16	80	6	30
Downy Mildew	18	90	9	45
Healthy	18	90	11	55
Total	67	83.75	34	42.5

Fig.3: Artificial Intelligent in Agriculture (Agro Expert) Analysis

According to the above results, it can be found that after no. of iterations, classification algorithm can get better leaf image segmentation results. Although classification algorithm cannot effectively extract the edge contour of the blade compared with the watershed algorithm, it retains the complete structure of the central blade including leaf venation, spot color, and spot shape. The complete central structure of the blade obtained by classification algorithm can be used for disease identification of the crop leaf.

### VII. CONCLUSION

In this proposed system for crop disease detection, yield prediction, crop prediction as per weather condition innovation in Machine learning plays vital role. Many ML techniques are developed for prediction. There are various studies done by multiple researchers for finding most precise or accurate technique. There are millions of varieties of crops and new variant of diseases are emerging which attack on plant, only few are been studied so the exact decision is yet to be made. The selection of crop depends upon various factors such as weather condition, soil type and region. Still recent monitoring techniques does not gather the information on weather conditions properly, affects the precise prediction. Therefore, to overcome this problem, a system has been designed that identified type of crop disease and recommend its fertilizers in different conditions using machine learning techniques. Further for market analysis of crop there is quite inadequate dataset present at the moment so in future it can be added. The main aim was to detect disease and predict maximum production of crop using limited land resource which is achieved. The system can further be enhanced so that it can also recommend nearby shops for pesticides and it can also be integrated into mobile application.

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