

## Survey on Crop Disease Prediction using different techniques For Crop Yield Prediction

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### **Abstract**

*Due to advancement in technology, the research in agriculture is rapidly increased. This is giving opportunity to many researchers to solve upcoming challenges in area of agriculture. In India agriculture being the main part which is responsible for development of countries economy. Sugarcane is one of the paddy crops which is playing important role in crop production. But due to underlying diseases there is large number of financial loss. So climate, soil, type of sugarcane and disease will affect the yield. So, prediction of crop disease is one of the essential which is responsible for crop yield. So, predicting crop disease increase the growth rate of agriculture. Many researchers are proposing different technique to predict crop diseases by using artificial intelligence, image processing, neural network. In this paper, survey has been done on different solution to predict crop disease. This paper introduces machine learning technique which uses Support Vector Machine(SVM) to predict crop disease which will help to select appropriate algorithm for predicting the crop disease and to increase the pace of crop yield.*

**Keywords**— Crop disease, Crop yield Machine learning, prediction, SVM.

### **I. INTRODUCTION**

Agriculture is the backbone of India. Many people living in villages are completely depending on agriculture for the livelihood. Many farmers are not receiving appropriate seasonal attributes, due to which they undergo financial loss. Rainfall plays a crucial role in farming. In previous paper, the method used to predict rainfall by using machine learning technique. The paper uses the algorithm used is Random forest algorithm. But Predicting rainfall does not solve the problem of crop yield.

Sugarcane, belong to grass family that allows lot of production in single sapling. In one sapling there are more than two yields associated with it. It is also called as semi-perennial crop. If the essentials are good enough they grow rapidly and production is also good with more profit. The plant cycle consist of planting, sprouting, affiliating, enlargement and maturation [8]. Crop disease play important role in agriculture. As sugarcane is paddy crop and type of grass there are large number of disease concerned with it. There are many disease caused by the bacteria and viruses which directly effects the crop yield. Previously the farmers used to predict the disease by using conventional method by observing with eye and try to give solution to it. But this method is time consuming and need lot of human intervention. This method is not suitable for big farms

Increasing and introducing the new technologies we can introduce new methods to predict crop disease. Artificial intelligence includes Machine learning which has many algorithms used for prediction. Supervised learning algorithm like SVM, Random forest, KNN can be used.

The paper mainly focuses on crop disease by using rainfall prediction mentioned in paper [12]. The module predicts the crop disease based on locality and amount of rainfall in that particular area. Along with type of crop disease the module also suggest appropriate solution to it.

The main motto of this paper is to increase crop yield prediction that would be discussed and proposed in next paper.

This paper predicts the crop disease using support vector machine algorithm. The algorithm is mainly used for classification on feature extraction is more and compare many dimensions on feature scale.

## II. MOTIVATION

Agriculture is completely dependent on certain parameters from which one can achieve profit. There are many factors by which the crop yield is going to effect .Many environmental factors like climate, rainfall, soil are one of the major issues which are responsible for loss in agriculture. Other than this it is giving introduction to various diseases by which the crop yield is going to effect a lot. Using pesticides and insecticides prior can also affect the birds and animals nearby. If we predict crop disease at prior stage by considering previous dataset we can reduce the loss. Supervised Machine learning approach can be used to predict disease by using algorithm. This can reduce the manual time for detection.

## III. RELATED WORK

The paper includes a literature survey done on many different techniques used in prediction of crop diseases considering many crops. The paper focus on various disease predictions for sugarcane crop for prediction of crop yield for sugarcane. The papers considered for survey mainly focuses on crop disease, each paper proposes new methodology to predict crop disease. Using various papers we have studied and concluded best algorithm to be applied for prediction for our work. Authors are mainly using similar parameters and modification in technique.

The papers studied for survey represents different techniques with algorithm which contributes idea towards the development of prediction for crop disease.

[1]In this paper, sugarcane disease prediction is done using deep learning. It mainly uses Convolutional neural network for prediction. The paper uses leaf images for prediction of prediction of crop disease and predicted infected and non-infected leaf. It also concludes whether leaf is healthy or infected. The proposed model is mixture of computer vision and Machine learning future work includes performance model improvement.[2]In this paper, model uses real time detection of crop disease. It also identifies the rodent by using image analysis. They have used computer aided segmentation and various classification methods. Paper uses k-means algorithm. The proposed model identify disease for pomegranate plant future scope for various disease for different crop.

[3]The paper proposes system which uses about system for farmer to indicate crop disease. The model uses Internet of Things (IOT) and Machine learning algorithm. Future work includes proposed to give information about fertilizer. [4]Paper proposes mobile application for paddy crop and disease associated with it, uses machine learning techniques for identifying disease by using CNN and SVM classifier. Also gives remedy for disease. [5]Paper proposes smart system with internet of things (IOT) and machine learning (ML) for prediction of potato and tomato disease. System generates warning message. The model is used for effective yield prediction. It uses support vector machine (SVM) and Logistic Regression (LR) for prediction.

[6]Paper includes data mining technique to predict sugarcane leaf disease. It includes process that is automated for leaf disease prediction. They have used Weka tool. Algorithms used J48, Multilayer Perceptron, K-means. Future work includes various analyses. [7]This paper proposes model where focus is on grass grab insect which infect the crops. They have used various classification technique and ensemble design for that. Future work includes hybridization of algorithm. [8]The paper includes the model to predict sugarcane disease by using decision tree model (DTM) and Random forest algorithm for prediction. This method is used to increase crop yield. This paper concludes that RF shows best result.

[9]The paper presents prediction of sugarcane disease using Discrete Wavelength transfer algorithm. Image processing is used for detection of disease. [10]The paper presents the mobile application for detecting crop yield, crop, disease prediction and crop recommendation. Future work includes website creation and linguistic features. [11]The author proposes the method which uses Wireless Sensor Network (WSN) with using ML techniques like Naïve Bayes Kernel algorithm to detect the disease. Paper only presents material for work.

Above, All papers are studied in detailed. Each paper has new proposed system which has merits and demerits. This is mentioned in detail in below table.

TABLE I

Sr. No	Proposed model	Merits	Demerits	Future work
[1]	Crop disease prediction using Deep learning by using ML and computer vision.	Identifying sugarcane leaf is healthy or not on the basis of images and classifying them	Very restricted models are used this show less results	Different models can be introduce to determine the performance and improve accuracy.
[2]	Pomegranate crop disease is identified. The model is automated and SVM and KNN algorithm is used.	With identification of disease , Prevention of diseases is also suggested	Restricted to pomegranate plant	Different algorithms can be used to improve the performance.
[3]	Prediction of crop disease by using machine learning and IOT	Shows precision agriculture. Done using support vector regression and Adaboost	System is not cheap and reliable in certain situations.	Suggesting fertilizers to be used for crop disease.
[4]	It is mobile application with sensors by using CNN and SVM for paddy crops.	CNN is used for de-noising and image and SVM is used to classify disease. Accuracy	Only paddy crops area focused	To reduce false classification using other classifier for feature extraction.

		improved as compared to previous algorithm		
[5]	Model has sensor to collect data and apply Machine learning technique.	SVM shows higher accuracy than logistic regression	Restricted to one disease for tomato and potato.	Completely automated model.
[6]	Crop disease identification by using multilayer perceptron and k-means	Detection of disease for the sugarcane leaf	Restricted to sugarcane crop only	Various different algorithm can be analyzed
[7]	By using ensemble model compared different algorithms for crop disease caused by grass grub insect.	Neural network and Random forest show better result	Only single disease is considered.	Hybrid algorithm can be done.
[8]	Sugarcane disease prediction using decision tree and random forest algorithm	Random forest model shows better result.	No specific algorithm show accurate result	Accuracy can be improved .
[9]	Classifying technique and complete image processing DWT algorithm for crop disease is identified.	Shows best result than existing model and by using decision tree algorithm	Restricted to certain disease and crop.	Accuracy can be done .

[10]	Mobile application to predict crop yield and crop disease.	Crop disease and crop yield is calculated using image processing and linear regression	Crops can show different result on accuracy	Website creation with linguistic features
[11]	By using WSN and ML to predict crop disease using Naïve bayes	Plant disease and pest control both are considered	No specified model explained	End to end system to develop

#### IV.METHODOLOGY

Paper presents detailed survey on different methods proposed by different authors for predicting crop disease which is essential for crop yield prediction. Various crop diseases are mentioned in many papers. This paper presents crop disease for sugarcane crop only. Methodology includes algorithms and results worked till now.

##### I. Proposed model

###### a. Algorithms

The section gives idea about algorithm and proposed idea for crop disease prediction by using rainfall as a factor to that particular area. Here we are using machine learning algorithm for crop disease and rainfall prediction. Previous paper shows idea to predict the rainfall according to place and results are also represented [12].The output expected is to predict crop yield on basis of crop disease prediction and rainfall prediction. In this paper we have introduced the crop disease prediction methodology with result.

###### 1. Random forest algorithm

Random forest is used for prediction, which can be used for the regression and classification work. It uses dependent and independent variables for prediction. Multi linear regression can be done by using multiple attributes and find relation among them. Decision trees are one of the important aspect which are used to draw relation and patterns among the dataset.

###### 2. K- nearest neighbour

It belongs to supervised algorithm which is based on proximity. This considers all nearby values which include distance, points and proximity. It mainly takes closer point together to find pattern. Important point is to select value of K by calculating previous distance.

###### 3. Naïve Bayes

This algorithm is based on probability and independent assumptions which practically are not accurate. The feature matrix which includes all dependent variables and response vector includes class variables.

###### 4. Support vector machine

It is the algorithms which give accurate result which uses less computational power. They can be used for both regression and classification. Main objective is to find N- dimensional space in hyper plane which is used to classify points. It maximizes the marginal distance which provides future data to be classify accurately.

## II. Proposed flow

Model consist of various modules

- a. Login for new user
- b. Filling information
- c. Rainfall prediction.
- d. Dataset
- e. Result with rainfall and disease prediction
- f. Crop yield prediction



Fig. V. II. A

## III. Implementation

Work includes:

- a. Home login



Fig. V.III. a

- b. Rainfall prediction



Fig. V. III. b

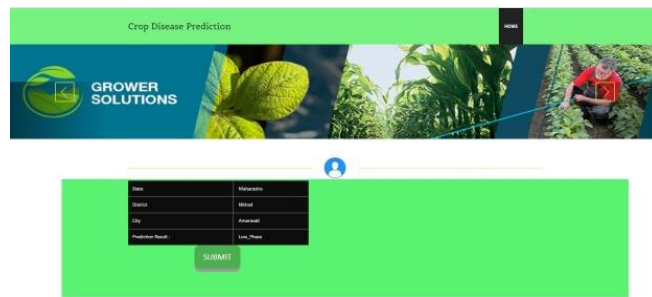


Fig. V. III. c

### c. Crop disease Prediction

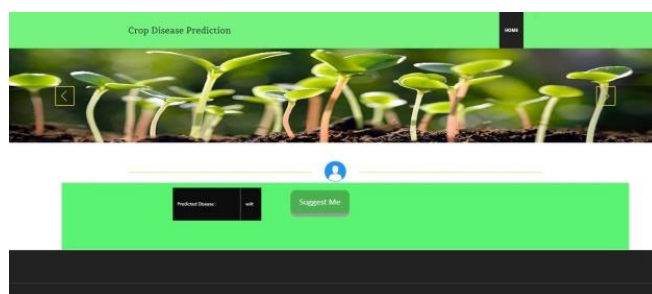


Fig. V.III. d

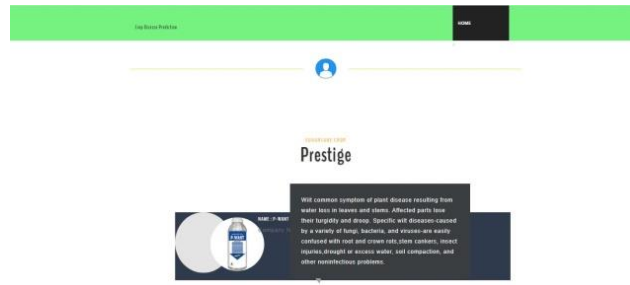


Fig. V.III. e

## V. CONCLUSION

Papers include detailed survey on various methods used for crop disease prediction. Implementation results are shown with the methodology which gives brief idea about modules to predict the crop disease. Support vector machine gives better results applicable to this scenario. Results shows crop disease prediction with its solution according to rainfall attributes and information taken. This results help in prediction of yield for sugarcane crop and help to increase crop yield. Further improvement and enhance in sugarcane yield prediction can be done.

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