

# Crop Suggesting System Using Unsupervised Machine Learning Algorithm

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**Abstract**—At this state of affairs several issues are faced by farmers in India, we have discovered that there is rise in suicide rate over the years. The reasons behind this includes weather conditions, debt, family issues and frequent change in Indian government norms. Sometimes farmers are not aware about the crop which suits their soil quality, soil nutrients and soil composition. Yield forecast is essential to agriculture stakeholders and can be obtained with the use of machine learning models and data coming from multiple sources.

**Keywords**— Climate, Sensors ,machine learning, agricultural productivity, crop production, prediction.

## I. INTRODUCTION

The impact of environmental change in India, majority of the agricultural crops square measure are being badly affected in terms of their performance over an amount of last twenty years. Predicting the crop yield well sooner than its harvest would facilitate the policy makers and farmers for taking acceptable measures for selling and storage. Such predictions will facilitate the associated industries for designing the supply of their business. Many strategies of predicting and modeling crop yields have been developed within the past with varied rate of success, as these don't take into consideration characteristics of the weather, and are mostly empirical. It is synonymous with farming—the production of food, fodder and different industrial materials. India is the larger producer and consumer of crops within the world, constituting 75% of world production and consuming 90 % of the world production. Different square major asian countries are Myanmar, Kenya, Uganda and Malawi. Crops accounts for regarding twenty p.c of the entire pulse production of the country. India annually imports 2-3 lakh tones of which 95% is from Myanmar. India annually produces about 2.0-2.5 million tonnes and the production has been stagnant in the past 10 years. The shift in cultivation from pulses to commercial crops and lack of technological innovations to increase yields has hindered the rise in output. The major producing states are Maharashtra, Uttar Pradesh, Orissa and Karnataka. Among these, Maharashtra is largest producer of crops which constitutes about 34% and these four states contribute nearly 70% of total output in the country. The work proposes to help farmers check the soil

quality depending on the analysis done based on data mining approach. Thus the system focuses on checking the soil quality to predict the crop suitable for cultivation according to their soil type and maximize the crop yield with recommending appropriate fertilizer.

The paper is structured as follows, Section I contains introduction of paper, Section II contains related work and different papers for literature survey, Section III contains methodology used to implement the proposed system along with system architecture, Section IV contains results and discussion about the outcome of proposed model , Section V contains conclusion and future scope ,

## II. RELATED WORK

**Paper 1:** Crop Selection Method Based on Various Environmental Factors Using Machine Learning

**Author:** Nishit Jain, Amit Kumar, Sahil Garud, Vishal Pradhan, Prajakta Kulkarni

**Year and conference:** Feb 2017-International Research Journal of Engineering and Technology

**Abstract:** we suggest a method which would help suggest the most suitable crop(s) which will maximize yield by summing up the analysis of all the affecting parameters. These affecting parameters can be economical, environmental as well as related to yield in nature. Economic factors such as market prices, demand etc. play a very significant role in deciding a crop(s) as does the environmental factors such as rainfall, temperature, soil type

and its chemical composition and total produce. Therefore, it's necessary to design a system taking into consideration all the affecting parameters for the better selection of crop(s) which can be grown over the season.

**Paper 2:** A Scalable Machine Learning System for Pre-Season Agriculture Yield Forecast

**Author :** Gor Oliveira, Renato L. F. Cunha, Bruno Silva, Marco A. S. Netto

**Year and conference:** 2018 14th IEEE eScience.

**Abstract:** Yield forecast is essential to agriculture stakeholders and can be obtained with the use of machine learning models and data coming from multiple sources. Most solutions for yield forecast rely on NDVI (Normalized Difference Vegetation Index) data, which is time-consuming to be acquired and processed. This system provides significantly useful results by the exempting the need for high-resolution remote-sensing data and allowing farmers to prepare for adverse climate influence on the crop cycle. In our studies, we forecast the soybean and maize yields for Brazil and USA, which corresponded to 44% of the world's grain production in 2016. Results show the error metrics for soybean and maize yield forecasts are comparable to similar systems that only provide yield forecast information in the first weeks to months of the crop cycle.

**Paper 3:** Prediction of crop yield using machine learning

**Author :** Rushika Ghadge, Juilee Kulkarni, Pooja More, Sachee Nene, Priya R L

**Year and Conference:** 2018 - International Research Journal of Engineering and Technology

**Abstract :** Looking at the current situation faced by farmers in Maharashtra, we have observed that there is increased in suicide rate over the years. The reason behind this includes weather conditions, family issues and frequent change in Indian government norms. Sometimes farmers are not aware about the crops which suits their soil quality, soil nutrients and soil composition. The work proposes to help farmers check the soil quality depending on analysis done based on data mining approach. Thus the system focuses on checking the soil quality to predict the crop suitable for cultivation according to their soil type and maximize the crop yield with recommending appropriate fertilizers.

**Paper 4:** Machine learning approach for forecasting crop yield based on climatic parameters

**Author:** S. Veenadhari, Dr. Bharat Misra, Dr. CD Singh

**Year and conference:** January 2014 - International Conference on Computer Communication and Informatics (ICCI-2014)

**Abstract:** In the present study a software tool named 'Crop Advisor' has been developed as an user friendly webpage for predicting the influence of climatic parameters on the crop yields. C4.5 algorithm is used to find out the most influencing climatic parameter on the crop yields of selected crops in

selected districts of Madhya Pradesh. This software provides an indication of relative influence of different climatic parameters on the crop yield; other agro-input parameters responsible for crop yield are not considered in this tool, application of these input parameters varies with individual fields in space and time.

**Paper 5:** Rice crop yield prediction in India using SVM (Support Vector Machine).

**Author:** Niketa Gandhi, Leisa J. Armstrong, Owaiz Petkar, Amiya Kumar Tripathi

**Year and conference:** 2016 - 13<sup>th</sup> International Joint Conference on Computer Science and Software Engineering

**Abstract:** This paper discusses the experimental results obtained by applying SMO classifier using WEKA tool on dataset of 27 districts of Maharashtra. The dataset is available on Indian Government Records different parameters like precipitation minimum temperature, temperature, maximum temperature, reference crop evapotranspiration area, production, yield for kharif season is considered. The experimental result showed that the performance of other techniques like SMO.

**Paper 6:** Agricultural Production Output Prediction Using Supervised Machine Learning Techniques

**Author:** Md. Tahmid Shakoor, Karishma Rahman, Sumaiya Nasrin Rayta, Amitabha Chakrabarty

**Year and conference:** IEEE 2017

**Abstract:** The research suggests area based beneficial crop rank before the cultivation process. It indicates the crops that are cost effective for cultivation for a particular area of land. To achieve these results, we are considering six major crops which are Aus rice, Aman rice, Boro rice, Potato, Jute and Wheat. The prediction is based on analyzing a static set of data using Supervised Machine Learning techniques. This static dataset contains previous years' data taken from the Yearbook of Agricultural Statistics and Bangladesh Agricultural Research Council of those crops according to the area. The research has an intent to use Decision Tree Learning- ID3 (Iterative Dichotomizer 3) and K-Nearest Neighbors Regression algorithms.

### III. METHODOLOGY

In this proposed system we are using K means algorithms which is a type of unsupervised learning. Essentially unsupervised learning may be a category of machine learning techniques to find out the patterns in the given dataset. These algorithms are specifically designed to draw inferences from the set of data which contains input data without responses. Cluster analysis is the most common method of unsupervised learning algorithm which groups the data depending on the similarities.

**K-Means clustering** - K-Means clustering is a type of unsupervised learning algorithm which is specially used when we have labelled information i.e. data without categories specified. Aim of K-Means algorithm is to group the data, which is represented by K. Based on the features provided the algorithm iteratively assigns each data point with a particular cluster. Generally feature similarity criteria is used for deciding the cluster

The proposed system focuses on three major parts namely- fetching values from hardware ,k-means algorithm on trained data and then suggest the crop for the sensed data. The architecture of proposed system is as shown in figure below:

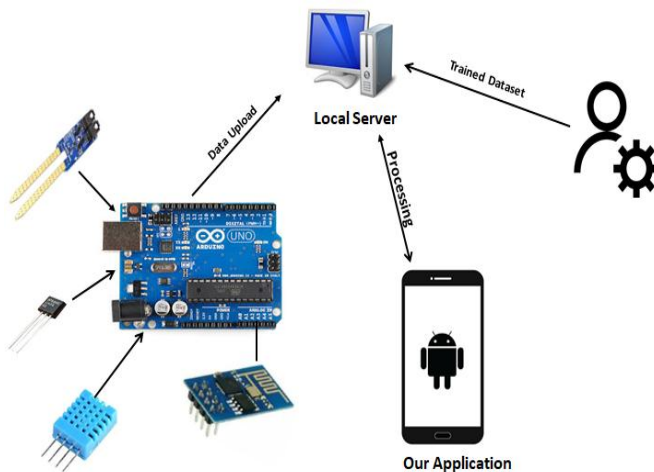


Figure1: System Architecture

The system proceeds as follows:

Step 1: Fetch the data values of temperature, moisture, humidity of the soil provided by the user.

Step 2: Store these values into the table.

Step 3: The trained data i.e. the data about the temperature, humidity, moisture requirement by different crops is already stored in one of the table.

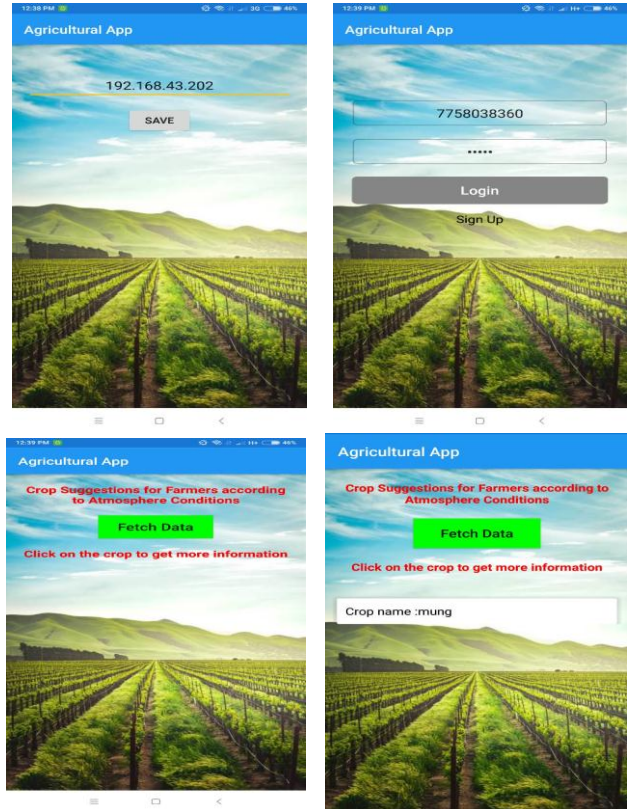
Step 4: The fetched data will be compared with the clusters which are formed by applying k-means algorithm.

Step 5: Based on the clusters, the crop whose temperature, moisture and humidity requirement is matched with the sensed data sample values , is given as output.

Step 6: When the user will click on the crop suggested by the algorithm , he will be able to see more information about that particular crop.

#### IV. RESULTS AND DISCUSSION

User after registration and login select the crop.



#### V. CONCLUSION AND FUTURE SCOPE

Since the yield of farm extremely depends on the crop selected for cultivation and environmental parameters therefore correct selection of crop before cultivation is vital in farming. This system will facilitate farmers in deciding the proper crop as per the given climatic conditions which will help to maximize yield rate.

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