

CROP PREDICTION USING MACHINE LEARNING

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ABSTRACT

Recent developments in Information Technology in the field of agriculture has become an interesting research area to predict the crop yield. The proposed project provides an efficient solution for smart agriculture by monitoring the various aspects of agriculture which can assist the farmers in increasing productivity and optimizing profit to a great extent. The parameters included in the dataset are soil type and pH, weather, previous three harvests, fertilizers, season and market demand. This system, which is presented as an android based application uses data analytics techniques in order to predict the most profitable crop in the current weather and soil conditions. Thus, the project develops a system by integrating data from various sources and using various technologies such as data analytics and prediction analysis which can improve crop yield productivity and increase the profit margins of farmers helping them in the long run.

KEYWORDS: Crop, weather forecast, prediction, demand, soil.

I. INTRODUCTION

Agriculture sector in India is facing huge problem to maximize the crop productivity using natural methods. Approximately 60 percent of the crops, still depends on monsoon rainfall. The growth of crops also depends on diverse soil parameters. Chemicals such as Nitrogen, Phosphorus and Potassium, other factors like crop rotation, soil moisture, surface temperature and also weather aspects which include temperature, rainfall, etc. play a vital role in healthy production of crops. India is rapidly progressing in the field of technology. Technology will be beneficial to agriculture as it helps in increasing the crop productivity resulting in better yields to the farmer. Yield prediction is a major problem that remains to be solved based on the available data.

Crop yield is a complex trait determined by multiple factors such as genetic constitution of each individual crop, environment and their interactions. To accurately predict the crop yield, fundamental understanding of the functional relationship between these factors and the yield is required. To understand and implement this relationship technically, comprehensive datasets and powerful algorithms are required.

Machine learning techniques like multiple linear regression have been applied for crop yield prediction. A remarkable feature of machine learning models is that it considers the output (crop yield) as an implicit function of the input variables (soil condition, weather, temperature etc), which could be a highly non-linear and complex function.

The right crop is suggested to the farmer based on the predictions of the machine learning model thereby helping them to optimize their profit and also preserving the fertility of the soil.

II. LITERATURE SURVEY

A. Machine Learning Approach for Crop Selection based on Agro-Climatic Conditions

This project aims at suggesting the crop based on weather parameters (such as temperature, humidity, moisture) and comparing with the trained dataset provided. Then user will select crop from suggestions to get its information like pesticide, fertilizer to be used, harvesting time, amount of water required etc. After selecting any crop from suggestion user can see information of crops which can be cultivated.

B. Rice Crop Yield Prediction in India using Support Vector Machines

This paper discusses the experimental results obtained by applying SMO classifier using the WEKA tool on the dataset of 27 districts of Maharashtra state, India. The dataset considered for the rice crop yield prediction was sourced from publicly available Indian Government records. The parameters considered for the study were precipitation, minimum temperature, average temperature, maximum temperature and reference crop evapotranspiration, area, production and yield for the Kharif season (June to November) for the years 1998 to 2002. For the present study the mean absolute error (MAE), root mean squared error (RMSE), relative absolute error (RAE) and root relative squared error (RRSE) were calculated. The experimental results showed that the performance of other techniques on the same dataset was much better compared to SMO.

C. Soil Classification using Machine Learning Methods and Crop Suggestion Based on Soil Series

This project aims at classifying various kinds of soil series data and suggesting the suitable crop for the specific soil. The data is classified by the order of soil and Random Tree algorithm is used. The dataset collected from Indian Meteorological Department, Statistical Institution, and Agriculture department has four input variables and they are Year, Rainfall, Area of Sowing and Production. The results of the dataset of sowing and average production are compared by applying kmeans clustering and Multiple Linear Regression (MLR) techniques.

D. Crop Prediction System using Machine Learning

The proposed project provides a solution for Smart Agriculture by monitoring the agricultural field which can assist the farmers in increasing productivity to a great extent. Using the nutrients of the soil (Nitrogen, Phosphorous, Potassium), weather forecasting data and the crop production and data related to demands of various crops obtained from various government websites, machine learning and prediction algorithm like Multiple Linear Regression is used to identify the pattern among data and then process it as per input conditions which will propose the best feasible crops according to given environmental conditions.

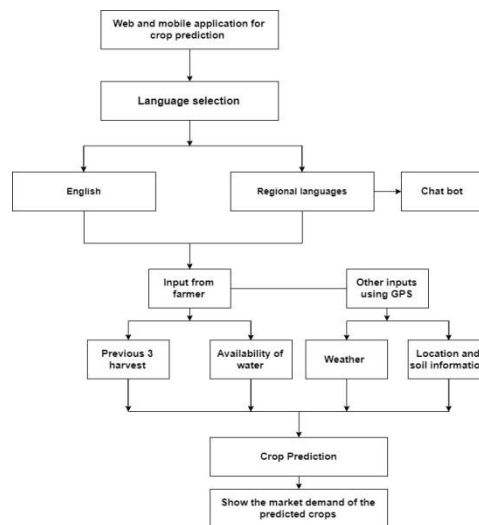


Fig 1: Design and Development Of Crop Yield Prediction Application

The project is presented in the form of a mobile application which is user friendly and has an interactive platform. This mobile application is adaptable to both English and some regional languages. Initially the language is selected and then some of the required inputs are taken from the farmer such as the details of the previous three harvests and the availability of the water. The other essential inputs are taken based on the location of the user such as the weather conditions, temperature and soil condition.

Based on all these inputs and with the help of the datasets available, machine learning algorithms are applied to make correct predictions of the suitable crop to be cultivated so that maximum profit can be obtained at the time of harvest. Also, the appropriate sowing date of suitable crops are predicted to obtain maximum yield. This application predicts the right crop that increases the profit by focusing on price-based sowing methodology which predicts a suitable time frame, in which if the farmer sows the crop, optimum profit is obtained at the time of harvest. In addition to this, farmers can view the demand of various crops at nearest market available.

III. CONCLUSION

Being dependent on agriculture for a long time, our country has not seen much collaboration between technology and agriculture so far. Although there are few websites and mobile applications already in use, they don't provide accurate results or don't consider all the necessary factors. Our application is mainly developed for the farmers' convenience and focuses on implementation of technology in agriculture.

IV. REFERENCES

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