

Survey on Crop Suggestion Using Weather Analysis

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Abstract – India is an agriculture-based country where large proportion of people is engaged in agriculture sector. But selection of an unsuitable crop is leading to decrease in crop production and shortage of quality food. Therefore, Crop Scarcity and degradation is becoming a major concern. And all this scenario is also resulting into increasing farmer suicides. To overcome this scenario, we are suggesting a model which would help to predict the most suitable crop in the site considering weather analysis and soil parameters. Here we are going to use a fuzzy logic, Gradient Boosted Decision Tree (GBDT) algorithm and R Neuralnet Package. The input parameters for the system would be the meteorological data and soil parameters.

Key Words: Fuzzy Logic, GBDT, R Neuralnet Package, Meteorological data

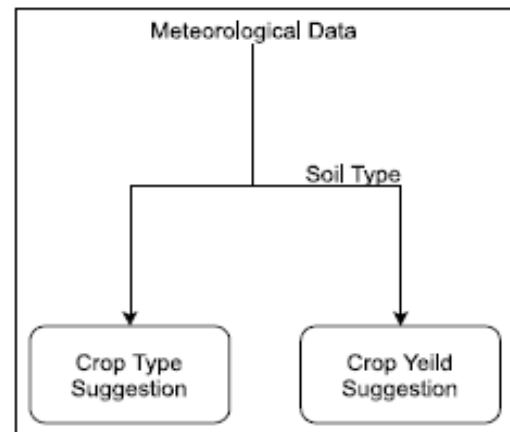


Fig -1: Project Model

1. INTRODUCTION

Agriculture sector plays major role in economic growth of country. It is prominent income source for farmers and workers related to it. Numerous manufacturing industries are dependent on agriculture products for their raw material. But poor crop yield and quality is becoming a major concern. It is resulting into farmer suicides, malnutrition, hiked prices of agriculture products and more. To avoid this situation weather analysis and land analysis must be done to enhance the agriculture system to minimize the losses.

It is observed that many farmers are yielding the same crop in their land for past years irrespective of its yield quality and quantity. Whereas crop must be selected as per the climatic condition, irrigation sources, land quality, etc. But farmers are not getting the proper advice in crop choosing. So here 2 approaches are considered which will suggest crop yield and crop type respectively considering different aspect of input data.

1.1 Crop Yield Suggestion

Crop yield suggestion can be done by undertaking meteorological data along with the help of soil type of particular district. Here yield comparison will be done within predicted yield of certain crops and past available data of crops. Crop yield prediction can be done with the use of R Neuralnet Package. So, with the help of function's output, decision can be taken to select a crop considering productivity of a crop.

1.2 Crop Type Suggestion

Crop type suggestion can be done by undertaking meteorological data. It is suggested to use fuzzy logic and GBDT. In fuzzy logic system past meteorological data is considered with which crops would be suggested for particular district. Meteorological data will contain rainfall and temperature data of respective district.

Along with the use fuzzy logic GBDT will be used in further function. In implementation of GBDT instead of past meteorological data, future meteorological data will be considered. With the help of future data, we can also ensure a survivability of suggested crops. And wise decision would be taken.

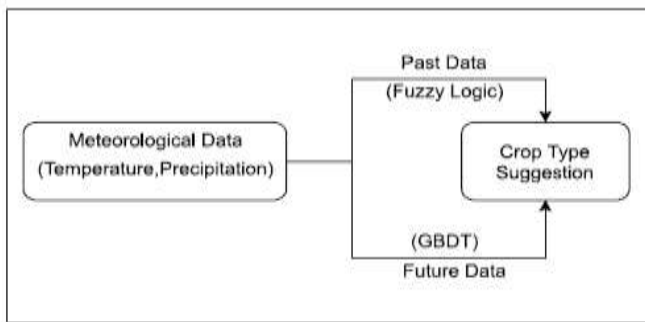


Fig -2: Crop Suggestion Approach

2. LITERATURE SURVEY

Study of various machine learning algorithms is done for the crop suggestion purpose. Also, study of existing techniques and models is done for understanding the current situation. Different types of agriculture parameters can be considered for crop suggestion such as climatic condition, soil, irrigation resources, cost, machinery etc. These parameters can be used to train the model of respective algorithm to suggest a particular crop in project site. Various algorithms are separately used in different models for crop prediction. Out of which fuzzy logic, GBDT, Random Forest algorithm, Feed Back Propagation Algorithm, etc. are widely implemented for their accuracy and ease of use.

Automation is rarely practiced in agriculture system whereas it has wide scope in agriculture system considering its efficiency. IOT can be practiced in farming to enhance the crop yield and quality [1]. Sensors can be installed to analyse the weather and soil situation. With the help of this data farmer would be able to select a correct crop. Along with the use of IOT, GBDT can be used to increase the accuracy [4]. GBDT is implemented to predict the yield rate. Soil parameters and climatic conditions are considered for system. With the help of predicted yield rate farmer can choose a crop with maximum yield.

The most widely used technique for crop suggestion is fuzzy logic. Out of 3 types of fuzzy models, Mamdani fuzzy model is proposed here [3]. Fuzzy model can be used in situation where uncertainty is main concern. It gives output in percentage with the help of which we can easily perform comparison. Here past meteorological data is considered for crop suggestion. Fuzzy model can also be used as hybrid recommender using soil data, weather parameters and cost. [5]. Here fuzzy model is further processed with ANN to get the exact prediction which will satisfy all concerns related to crop.

Environmental factors are the most impacting factors for agriculture system. Crop selection and crop yield are strongly related to it. To consider different environmental factors, R Neuralnet Package and WEKA is used for crop suggestion [2]. Here temperature and precipitation data is used to train a model.

Table -1: Reference paper comparison table

Title of Paper	Year	Seed Idea
A comprehensive review on automation in agriculture using artificial intelligence	2019	This paper talks about use of different automation practices like IOT, Machine learning and Artificial Intelligence in agriculture system
Crop Recommender System for the Farmers using Mamdani Fuzzy Inference Model	2018	It recommends a prior idea regarding a crop which is suitable according to the location of the farmer based on weather condition of the previous months using fuzzy logic.
Crop Recommendation System to Maximize Crop Yield using Machine Learning Technique	2017	Soil data would be collected and Support Vector Machine (SVM) and ANN will be implemented.
Crop Selection Method Based on Various Environmental Factors Using Machine Learning	2017	Proposed method is used to determine the maximum yield by summing up the analysis of all the affecting parameters using feedback propagation algorithm.
Crop Recommendation System for Precision Agriculture	2017	Model uses research data of soil, crop and suggests farmers the right crop based on their site-specific parameter by implementing Random Forest algorithm, Naïve Bayes algorithm, and K Nearest algorithm.
Crop Selection Method to Maximize Crop Yield Rate using Machine Learning Technique	2015	Crop Selection Method is used to solve crop selection problem and maximize net yield rate of crop over season using GBDT.

3. CONCLUSION

The proposed system gives a prior idea regarding the type, sustainability and yield of a particular crop according to the location of the farmer by using the past and future meteorological data, crop yield data & soil parameters.

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