

Survey on Crop Suggestion based on Regional Soil Quality

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ABSTRACT

Agriculture is the major source for living for the people of India and also plays a major role in economy and employment. Soil is an important key factor for agriculture. There are several soil varieties in India. In order to predict the type of crop that can be cultivated in that particular soil type we need to understand the features and characteristics of the soil type. The common difficulty present among the Indian farmers are they don't opt for the proper crop based on their soil necessities. Because of this productivity is affected. This problem of the farmers has been solved through precision agriculture. Machine learning techniques provide a flexible way in this case. Classifying the soil according to the soil nutrients is much beneficial for the farmers to predict which crop can be cultivated in a particular soil type. Data mining and machine learning are still an emerging technique in the field of agriculture and horticulture.

KEYWORDS: Agriculture, Machine learning, Soil, Classification

I. INTRODUCTION

India is one of the biggest producers of agricultural products and still has very less farm productivity. Productivity needs to be increased so that farmers can get more pay from the same piece of land with less labor. Many researches are being carried out, in order to attain an accurate and efficient model for crop prediction.

Data mining is a challenging technology in the field of agriculture. Nowadays data mining has been used in the field of agriculture for soil classification, wasteland management, and crop and pest management [1]. In assessed the association rules of

affiliation methods in DM and applied into the soil science to anticipate the significant connections and gave association rules to different soil types in agriculture. The agriculture factors such as rain, weather, soil type, pesticides and fertilizers are the main responsible to increase the production. Crop cultivation depends on the nature and the nutrients of the soil increasing the cultivation of land which brings a loss of supplements present in the soil.

Machine learning is a field of computer science where new developments evolve at recent times, and also helps in automating the evaluation and processing done by mankind, thus by reducing the burden on human power. In simple terms, machine learning

provides basic algorithms that can provide information about a dataset without writing code to solve a program manually. Instead of writing code you provide data or the basic algorithm and it forms its own conclusions based on this data. In machine learning, the methods are derived from the learning process. Those methodologies need to learn through experiences to perform a particular task.

Classification is a data mining technique based on machine learning which is used to categorize the data item in a dataset into a set of predefined classes. It helps in finding the diversity between the objects and concepts. Among these various machine learning techniques that are being used in this field; this system builds an efficient and accurate model to classify the soil type according to nutrients of soil and predict the type of crop that can be yielded in that particular soil. Also this information can further be used by the Minister of Agriculture, Food & Marketing Industrialist, etc. to grow the business and economy of the country.

II. LITERATURE SURVEY

The requirements and planning is needed for developing software model. The author's [2] start from the basics of precision farming and move towards developing a model that would support it. It deeply studies the basics of precision farming. A model that applies Precision Agriculture (PA) principles to small, open farms at the individual farmer and crop level, to affect a degree of control over variability. This model has been designed for the scenario in Kerala State where the average holding size is much lower than most of India. Hence this model can be positioned elsewhere in India only with some modifications. The comprehensive objective of the model is to deliver direct advisory services to even the smallest farmer at the level of his/her smallest plot

of crop, using the most accessible technologies such as SMS and email.

The algorithms [3] used for yield prediction in this system are Support Vector Machine and K-nearest neighbour algorithm. The importance of crop selection and the factors deciding the crop selection like production rate, market price and government policies are discussed. This system will propose a Crop Selection Method (CSM) [4] which solves the crop selection problem and improves net yield rate of the crop. It suggests a series of crop to be selected over a season considering factors like weather, soil type, water density, crop type. The predicted value of influential parameters determines the accuracy of CSM. Hence there is a need to include a prediction method with improved accuracy and performance.

The system [5] aims to solve the crucial problem of selecting the classifiers for the ensemble learning. The proposal aims to achieve higher accuracy and performance. This project emphasizes the need for accuracy because it depends on the dataset and the learning algorithm. The performance of the models was compared with accuracy and computational time. It proposes a framework which would predict the production, and import for that particular year. At the end of the process we would be able to visualize the amount of production import, need and availability. Therefore it would help to make decisions on whether food has to be further imported or not. The soil dataset are analyzed and category predicted.

The future work stated is to create efficient models using various classification techniques such as support vector machine, principal component analysis soil. For crop growth to their possible, the soil must provide acceptable environment for it. Soil is the anchor of the roots. Texture determines how porous the soil is and the comfort of air and water movement

which is essential to prevent the plants from becoming waterlogged. The water holding capacity determines the crop's ability to absorb nutrients and other nutrients that are changed into ions, which is the form that the plant can use. The activity of microorganisms present in the soil and also the level

of exchangeable aluminum can be affected by PH. The water holding and drainage determine the infiltration of roots. Hence for the following reasons the above stated parameters are considered for choosing a crop.

III. CRITICAL REVIEW OF RESEARCH PAPERS

Sr. No.	Title	Author	Methodology Used	Result
1.	Crop Recommendation System for Precision Agriculture	S.Pudumalar, E.Ramanujam, 2016	1. Random tree 2. CHAID 3. KNN 4. Naïve Bayes 5. WEKA tool	1. Pre-processing of data 2. Handling missing and out-of-range values 3. Feature extraction 4. Ensemble model to get higher accuracy 5. Rule generation
2.	Agriculture decision support system using data mining	Prof. Rakesh Shirsath, 2017	1.Subscription based system 2. ANN 3. Android application 4. Personalized content	1. Android app with a login module 2. Previously planted crops known to system 3. User feedback mechanism 4. Maintenance of crops.
3.	A Study on Various Data Mining Techniques for Crop Yield Prediction	Yogesh Gandge, Sandhya, 2017	1. Attribute selection 2. Multiple Linear Regression 3. Decision Tree using ID3 4. SVM 5. Neural Networks 6. C4.5 8. K-means and KNN	1. Selection of agricultural field 2. Selection of crop previously planted 3. Input from user 4. Preprocess 5. Attribute Selection
4.	RSF: A Recommendation System for Farmers	Miftahul Jannat Mukarrama, 2017	1.Location Detection 2.Data analysis and storage 3.Similar location detection 4. Recommendation generation module.	1. Physiographic, thermal, crop growing period, crop cropion rate 2. Seasonal crop database 3. Similar location detection 4. Generating the set of crops 5.Similarity between the crops planted in a region

IV. TAXONOMY CHART

Parameters → Systems ↓	K-nearest neighbour	Support Vector Machine	Internet Connection Required	Precision Agriculture	Agro-Consultant
Crop Prediction System using ML	Yes	No	Yes	No	No
Crop Recommendation System for Precision Agriculture	Yes	Yes	Yes	Yes	No
Proposed System	Yes	Yes	Yes	Yes	Yes

V. CONCLUSION

Our work would help farmers to increase productivity in agriculture, prevent soil degradation in cultivated land, and reduce the chemical use in crop production and efficient use of water resources. A model is proposed for predicting the soil type and suggests a suitable crop that can be cultivated in the soil. Our future work is aimed at an improved data set with a large number of attributes and also suitable fertilizers are suggested for the well growth of the crop cultivated.

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