

A Review : Improving the Village wise Soil Parameter and Predict the Crop Suggestion

Dr. K. A. Waghmare, Sheetal A. Jhare

Department of CSE, Government College of Engineering, Amravati, India

ABSTRACT

India economy majorly depend on agriculture that play important role in the survival of the people. It's remain the major provider for farmers and source of revenue of our country. The main focus of this survey is on how to improve the soil quality and predict the Crop selection. We are going to study the Edaphic factor, Classification problem and prediction of village wise soil parameters. That is done by collecting number of soil testing samples for finding soil fertility indices and pH values which represent a detail overview on application of machine learning in agriculture base . Mostly above problem are solved using two advance classifier Xgboost and Logistical regression which also achieve better accuracy in these area. By applying machine learning in real time data which enabled program to present high testimonial and deep perceptivity for experts and farmers to make correct decision and take proper action

Keywords : Machine Learning techniques, Soil parameters, Xgboost, logistical regression Classification problem, Crop prediction.

I. INTRODUCTION

India is still practicing agriculture, But the tendency of agriculture has effectively developed due to globalization. Number of factors that have affected on Soil quality and Crop production. Fig 1.1 explained the main reasons arise during soil erosion is that excess use of chemical fertility that may reduce soil quality and also damage the crops. Most of the time redundant use of improper amount of soil nutrient added during cultivation which causes many problems. The major focus in classifying soil nutrient that develop crop productivity, reduce experts analyze efforts and save time for maintenance and improving in energetic soil quality and there important mechanism. About 60% of lands in the country used for agriculture in order to survival of billion of people. In past year yield prognostication was executed by considering the

farmer's experience in particular lands and focus on profit ascends in crop production. In India, agriculture are highly influenced by geological attributes such as rain water, flood, dryness which are highly unpredictable. So, India is now rapidly progressive towards different technology and highly focuses on development. Thus technology will prove to be beneficial which will increase soil quality and crop productivity resulting in better yield to the farmer. Organic matter and pH value are important soil parameters that indicates various soil fertility indices which are essential components in soil quality evaluation as all farmers depends on these mechanism and the latter to food security.



Fig.1.1 Describe the soil erosion problem

Timely detection and proper controlling toward agriculture problem connected with crop yield enable the agriculture expert and farmer to take correct decision on pertinent soil resources and crop production management.

Mostly crop prediction, clustering and classification problem are efficiently managed by different algorithms which are based on Machine learning techniques. ML is the huge growing technology in agriculture sector which emphatically minimize the problems lookout by expert which finally gave the best optimal solution. Dhivya B H1 et al.[1] work on soil parameters such as soil fertility indices, soil moisture and selection of suitable crops depends on relevant soil using different machine learning algorithms such as Random forest, Naïve biases which entirely considering soil quality and micro nutrients for selecting the suitable crop required for relevant soil. Juhi Reashma et al.[2] In past few year Machine learning techniques such as Artificial neuron network was used to predict soil fertility. Classification are really effective in many field of science technology to developed some fundamental terminology and also help for finding the connection between the objects and concept. Jacob Kaingo et al.[8] Classification of soil philosophies follows some deep understanding over agriculture and there functional objectives.

Here, we are going to study three section: Section I gave brief introduction based on present agriculture. Section II describes the related work in Soil classification and Crop production.

Finally, in Section III present the conclusion.

II. RELATED WORK

In recent year Machine learning become a popular research area. There has been some work in the area of Agriculture. The most relevant published papers that are analyzed are listed below:

Dhivya B H1 et al. discuss about Knowledge Discovery process and various data mining algorithm such as association, precision agriculture, Majority voting techniques such techniques are used for crop prediction. With the help of Data mining, Crop yield can be predicted by considering useful insight from these agriculture sector that enable the farmers to decide suitable crop for relevant soil[1].

According to Juhi Reashma S R K, et al presented a work mainly focused on Edaphic factor which is abiotic factor relating to the chemical composition of the soil found in the particular areas. ML techniques are applied on different algorithm for predicting the suitable crop for related soil types, soil nutrient and soil fertility indices [2].

M.S.Sirsata et al. have applied different algorithms such neuron network, random forest, naïve biased, SVM which provide high performance and better accuracy using which ten classification problem are solved [3].

A study was carried out by G. Vishwal et al. various factor affected to Agriculture such as seasonal,

economy and biological factors which influence the crop production and if in case changes occurred that lead to great loss to farmer and this will directly affected to our economy [5].

Subhadra Mishra et al. was used chemical soil measurement for analyzing soil moisture, pH values and soil quality based on soil parameters like available phosphorus(P), Organic carbon(OC), Nitrogen oxide(N₂O), Magnesium(Mg) to prefer a correct soil fertility and suggestion relevant crops. This model work on RF algorithm to achieve the best performance from overall problem and get up to 90% of accurate result[7].

S.R.Rajeswari et al. explained numerous studied which are applied on ML techniques for finding various agriculture problem related to soil quality and land types. These model work with different algorithm to overcome the above problem such algorithm are RF, Regular RF, Generalized boosting regression model which can achieve acceptable prediction accuracy and also explain below fig 2.1 which describe overall criteria of farmer in country[9].

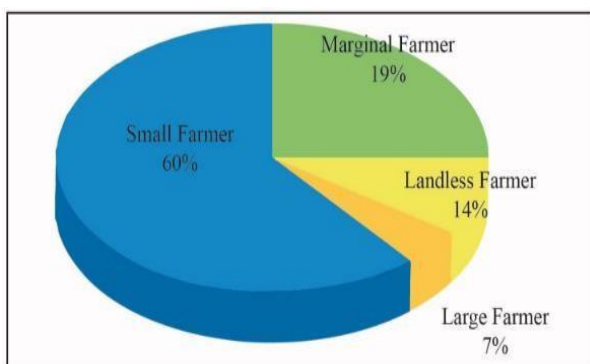


Fig 2.1 Show overall scenario of farmers

According to Mo Zhang et al. which focused on Digital soil mapping using ML technique for predicting more quantitative output than traditional soil mapping . Here five ML algorithms with three log ratio

approaches are used for achieving highest accuracy among them[10].

Kodimalar Palanivel et al. this approach work on crop yielding process for selecting and predicting suitable crop using ML techniques in big data which reduce expert time and increase profitability for overcomes the current challenges faced by farmer such as water shortages, uncontrolled cost and weather uncertain[11].

EI-Sayed Ewis Omran et al. have applied various interpolation(kriging) techniques for Geostatistics which provides tools to characterize the spatial pattern and classify soil.

Method Analysis: This method present a new approach toward crop production in which prediction of suitable crop analyze through some Method analysis process to select correct crops for related soil due to which huge amount of profit will gain in production and it is effectively depend on various policies which is explained in this paper [12].

According to S.Kodur describe that Evaporation of soil is crucial factor that may arise due to heavy loss in water during dryland farming for overcoming these problems. The impact of above mechanism will reduce the moisture effects and achieve better accuracy and various factors in these model that apply identical algorithms for achieving better output. When two dynamical real-time dataset are used for unique factors and the modeling error are greater in many region so it will provide high soil moisture capacity and sandy soil [14].

S.Pudumalar et al. describe a model that are applied in data mining techniques for precision agriculture. This technique was used only to select right crops based on their soil requirements which minimize the incorrect selection of crops, maximize crop production. Here, author proposed different Suggested model through

which different Ensemble model are used as learner to suggest a correct Crop for relevant land types with high accuracy and efficiency[15].

Meihua Yang these model was undertaken to develop Machine learning algorithm with some activation function such as sinesquared, hyperbolic tangent and Extreme learning machine were used to distinguish the accuracy and select the best one from them [18].

Vrushal Milan Dolas et al. this model applied on data mining approaches in which different algorithm is used. The model is tested with data set of soil samples which we collected from soil testing laboratory. The tested model proven that the modified decision tree algorithm has higher classification accuracy than C4.5 and CART algorithms. Classification of soil is the separation of soil into classes or small groups each classes or groups having similar behavior and characteristics. Classification of soil is very essential for farmer that provide the knowledge to know the soil types and they can plough the crops depending on soil types and behavior [19]. Sk Ai Zaminur RahmanSk et al. these model was focused on Agriculture is major revenue producing sector in India. Different factor may affected on the related area such as market, season, Bio-logical pattern influence the crop production. Weather and crop type can be predicted using useful data collected from farmer by suggesting maximize profitable crop to grow. This paper focus on the algorithms which predict crop yield, crop production cost. All this can be achieved e by considering smart farming [20]

III. PROCESS FLOW

The System architecture of the proposed model is shown in figure 3.1.

The main purpose of the proposed work is to create a suitable model for classifying various kinds of soil

series data along with suitable crops suggestion for certain areas. Soil series are recognized by machine learning methods using various chemical features and possible crops for that soil series are suggested using geographical attributes.

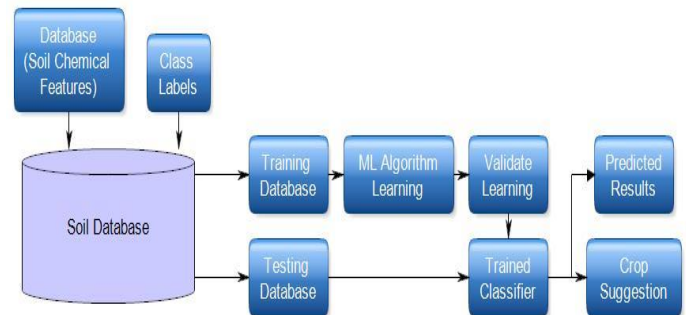


Fig 3.1: process flow of proposed model

The main purpose of the proposed work is to create a suitable model for classifying various kinds of soil series data along with suitable crops suggestion for certain areas. Soil series are recognized by machine learning methods using various chemical features and possible crops for that soil series are suggested using geographical attributes. The method involves two phases: training phase and testing phase. Two dataset are used: Soil dataset and crop dataset. Soil dataset contains class labeled chemical features of soil like pH, salinity, Organic Matter, Potassium, Sulphur, Zinc, Boron, Calcium, Magnesium, Copper, Iron and Manganese. Soil series and land type combinely represents the soil class in the database. The machine learning methods are used to find the soil class (i.e. soil fertility class and respective crop suggestion for soil measured by farmer). Two different methods are used: XgBoosting Algorithm and Logistic Regression Algorithm. The samples of each classification problem are arbitrarily rearranged and 80% of them are used for training and cross-validation and the remaining 20% for testing. Hence the tenfold cross-validation strategy is used here for training and validation, 90% of training data is devoted for training and 10% of the same for validation. Each ML Algorithm classifier is trained on the training set using a different combination of parameters i.e., training function and

the number of parameters for classifier, and then it is verified on the validation sets. The best parameters are calculated and selected from the training set and are then used for testing the data. The final test result obtained is considered as the output of the corresponding classifier for the analysis.

IV. CONCLUSION

According to various author stated that agriculture is the backbone of our country. Now a days a growing number of applications of machine learning techniques in agriculture are required for which large amount of data that is currently available from many resources can be analyzed for predication or for gaining important knowledge. This is an advanced technology and will be accepted to grow in future. Number of authors presented the way to improve soil fertility indices and suggested a suitable crop yield for relevant soil using different ML algorithms and data mining techniques for soil image rcognition . These model are applied in many region for analyzing Soil quality and crop production. Also, any districts region wise research will be essential. These models will be applied in any agriculture area to overcome the problem and added some better features to make these models more reliable and accurate. The result of these survey useful for Indian government for recommendation of soil fertility degradation, and provide high profit in productivity and maintain the soil management strategies.

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