Crop Prediction using Machine Learning

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Abstract - There are so many soil series available in India. Every soil series have different chracterics and every soil is suitable for different crop. Sometimes it happens that farmer soil is best for some specific crop but as he don't know. The main goal of the given work is to create a suitable model for classifying various kinds of soil series data along with suitable crops suggestion. Series are recognized by machine learning methods using various chemical features and possible crops for that soil series are suggested using geographical attributes.

Key Words: Soil series, Land type, Chemical feature, Geographical attribute, machine learning, CNN, Regression

1.INTRODUCTION

There are so many soil series available in India. Every soil series have different features and every soil is suitable for different crop. Sometimes , it happens that farmer soil is best for some specific crop but as he don't know. The main goal of the given work is to create a suitable model for classifying various kinds of soil series data along with suitable crops suggestion. Series are recognized by machine learning methods using various chemical features and possible crops for that soil series are suggested using geographical attributes. Prior crop prediction was performed on the basis of farmers previous experience on a particular location.

They will prefer the prior or neighbourhood or more trend crop in the surrounding region only for their land and they do not have enough knowledge about soil nutrients content such as nitrogen, phosphorus, potassium in the land. This as the current situation without the rotation of the crop and apply an insufficient amount of nutrients in soil it leads to decrease in the yield and soil pollution (soil acidification) and damages the top layer. Taking all the problems takes into the account we designed the system using a machine learning for advancement of the farmer. Machine learning (ML) is a game changer for agriculture sector. Machine learning is the part of artificial intelligence and high-performance computing to create new opportunities for data intensive science in the multi-disciplinary agriculture technology domain.

In the Agriculture field machine learning is not a mysterious trick , it is a set of well define model that collect data and apply algorithms to achieve required outcomes.

The system will recommend the most appropriate crop for particular land. Based on weather parameter and soil content such as Temperature They are gathered from V C Farm Mandya, Government website and weather department. The system takes input from the farmers or sensors such as Temperature.. This all inputs data applies to machine learning predictive algorithms like CNN [6] to identify the pattern among data and then process it as per input conditions. The system suggests the crop for the farmer and also suggests the amount of nutrients to be add for the predicted crop. The system has specification like displaying approximated yield in q/acre, required seed for cultivation in kg/acre and the market price of the crop.

2 PROPOSED SYSTEM

Soil is an important ingredient of agriculture. There are several kinds of soil. Each type of soil can have different kinds of characteristics and different kinds of crops grow on different types of soils. We need to know the characteristics of various soil types to understand which crops grow better in certain soil types. Machine learning techniques can be helpful in this case. Here we can use clustering technique to group data, and then classified the data by the order of soil and places with Random Tree algorithm. Then apply aprioirity Mining process to generate an association rule for identifying suitable crops for the specific soil. Soil series and land type together represents the soil class in the database. The machine learning methods are used to find the soil class (i.e. soil series and land type). Three different methods are used: like weighted CNN.

3 MACHINE LEARNING ALGORITHM FOR PREDICTION: -

Machine learning predictive algorithms has highly optimized estimation has to be likely outcome based on trained data. Predictive analytics is the use of data, statistical algorithms and machine learning techniques to identify the possiblities of future results based on historical data. The purpose is to go beyond knowing what has happened to providing a best assessment of what will happen in the future. In our system we used supervised machine learning algorithm

having subcategories as classification and regression. Classification algorithm will be most suitable for our system.
➢ Crop prediction: - CNN algorithms.

3.1 CROP PREDICTION:

Crop prediction process being with the loading the external crop datasets. Once the dataset read then pre-processing will takes place by various steps as discussed in Data Pre-processing section. After the data pre-processing, train the models using CNN classifier into training set. For a prediction of the crop, we consider a various factor such as temperature, humidity, soil PH and predicted rainfall. Those are the input parameter for a system that can be entered by manually or
taken from the sensors.

3.2. CROP RECOMMENDATION:

Based on soil contents and weather parameters the system will recommend the most suitable crop for cultivation. This system also provides details about required fertilizers like Nitrogen(N), Phosphorus (P) and potassium(K) in Kg per hectare and display the required seed for a cultivation in Kg per acre for recommended crop.
This system as contain some other feature such as display the current market price and approximated yield in quintal per acre for recommended crop. Those all details will helps to farmers for choosing the most profitable crop.
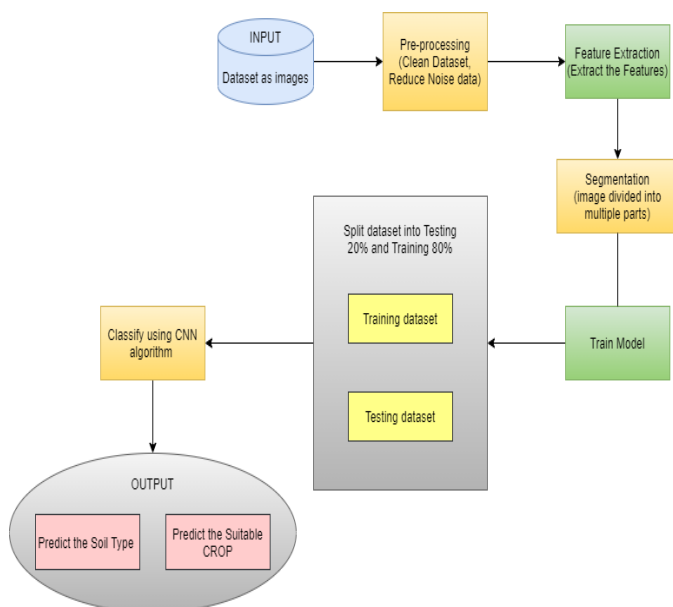
4 SYSTEM ANALYSIS

3.4 DATA COLLECTION: -
Data collection is the most efficient method for collecting and measure the data from different resources like govt websites, VC Form Mandya, APMC website .... etc. To get an approximate dataset for the system. This dataset must contain the following attributes
i)Soil PH ii) Temperature iii) Humidity iv) Rainfall v) Crop data vi) NPK values, those parameters will consider for crop prediction. For the annual rainfall prediction, we collect previous year rainfall data.

3.5. DATA PREPROCESSING: -
After gathering datasets from various resources. Dataset must be preprocessing before training to the model. The data preprocessing can be done at various steps, begins with reading the collected dataset the process continues to data cleaning. In data cleaning the datasets contain some redundant attributes, those attributes are not considering for crop prediction. So, we have to drop unwanted attributes and datasets containing some missing values we need to drop these missing values or fill with unwanted nan values in order to get better accuracy. Then define the target for a model. After data cleaning the dataset will be split into training and test set by using sklearn library.

Explanation:

(a) Soil dataset as an input.
(b) Next step is preprocessing on dataset.
(c) Provide classification of soil and then prediction of crop.
(d) CNN classifier is used to detect and classify the soil. Regression is used to predict the crop.

5 LITERATURE REVIEW

Bhaskar Maheshwari[2] describes crop yield prediction methods and a suggest suitable crop so that it will improve the profit for the farmer and quality of the agriculture sector. In this paper for crop yield prediction they obtain large volume data, it's been called as big data (soil and weather data) using Hadoop platform and agro algorithm. Hence based repository data will predict the suitability crop for particular condition and improvement crop quality.
Arun Mujalge[3] describe the crop yield and rain fall prediction using a machine learning method. In this paper they gone through a different machine learning approaches for the prediction of rainfall and crop yield and also mention the efficiency of a different machine learning algorithm like linear regression, CNN method.
Akash Shinde [4] describes the different machine learning methods used for accelerating crop yield. In this paper they gone through different artificial intelligence techniques such as machine learning algorithm, big data analysis for precision

agriculture. They explain about crop recommender system using KNN, Ensemble-based Models, Neural
networks, ...etc.

Fig. System Architecture
The Architecture of the proposed system consists of various blocks as shown in the fig (1) as follows

6 CONCLUSION

Presently our farmers are not effectively using technology and analysis, so there may be a chance of wrong selection of crop for cultivation that will reduce their earnings. To decrease those type of loses we have developed a farmer friendly system with GUI, that will predict which would be the best suitable crop for particular land and this system will also provide information about required nutrients to add up, required seeds for cultivation, expected yield and market price.

A model is proposed for predicting soil series and providing suitable crop yield suggestion for that specific soil. The model has been tested and verified by applying different kinds of machine learning algorithm. Bagged tree and C-NN shows good accuracy but among all the classifiers, So, this makes the farmers to take right decision in selecting the crop for cultivation such that agriculture sector will be developed by new and innovative idea.

REFERENCES

[1]https://www.techopedia.com/definition/1181/data-mining. [Accessed date:19th August, 2018]

[2]http://www.library.arizona.edu/exhibits/swetc/azso/body.1 _div.6.html . [Accessed date:19th August, 2018

[3] Gholap, J., Ingole, A., Gohil, J., Gargade, S. and Attar, V., 2012. Soil data analysis using classification techniques and soil attribute prediction. arXiv preprint arXiv:1206.1557.

[4] Aruvansh Nigam, Saksham Garg, Archit Agrawal "Crop Yield

Prediction using ML Algorithms ",2019

[5] Leo Brieman, "Random Forests", 2001

[6] Priya, P., Muthaiah, U., Balamurugan, M."Predicting Yield of the

Crop Using Machine Learning Algorithm",2015

[7] Mishra, S., Mishra, D., Santra, G. H.,"use of machine learning techniques in agricultural crop production",2016

[8] Dr.Y Jeevan Kumar,"Supervised Learning Approach for Crop

Production",2020

[9] Ramesh Medar,Vijay S, Shweta, "Crop Yield Prediction using

Machine Learning Techniques", 2019

[10] Ranjini B Guruprasad, Kumar Saurav, Sukanya Randhawa

Estimation in India: A CASE STUDY", 2019

[11] Sangeeta, Shruthi G, "Design And Implementation Of Crop Yield

Prediction Model In Agriculture",2020