International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 07 | July 2020 www.irjet.net p-ISSN: 2395-0072

Crop Yield Prediction and Efficient use of Fertilizers

Chaithra M Rao [1], Sanjay Kumar C K[2]

[1]PG Student

[2]Assistant Professor

[1,2]Department of Master of Computer Application, NIE, Mysuru, India

***

Abstract: India presence an agriculture country, its economy largely depends on agriculture yield growth and agroindustry products. Data Mining is an developing research field in crop yield analysis. Yield prediction is a very important issue in agricultural. Any farmer is interested in knowing how much yield he is about to expect. Analyzing the various related attributes like location, pH value from which alkalinity of the soil is determined. Along with it, percentage of nutrients like Nitrogen (N), Phosphorous (P), and Potassium (K) Location is used along with the use of third-party applications like APIs for weather and temperature, type of soil, nutrient value of the soil in that region, amount of rainfall in the region, soil composition can be determined. All these attributes of data will be analyzed, train the data with various suitable machine learning algorithms for creating a model. The structure comes with a model to be precise and accurate in predicting crop yield and deliver the end user with proper recommendations about required fertilizer ratio based on atmospheric and soil parameters of the land which enhance to increase the crop yield and increase farmer revenue.

I. INTRODUCTION

The information of agriculture in India dates once more to the Indus Valley Civilization Era. India ranks second on this location. Agriculture and allied sectors like forestry and fisheries account for 15 percentage of the GDP (gross home product) with approximately 31 percent of the frame of humans. India ranks first globally with the very awesome net cropped region decided via US and China. Agriculture is demographically the broadest financial place and performs a big feature inside the not unusual socio- economic fabric of India. Due to the revolution in industrialization, the economic contribution of agriculture to India's GDP is frequently declining with the united states of the USA's huge-based simply in reality economic growth. The hassle that the Indian Agriculture location is going through the aggregate of technology to keep the well-known outputs. With the appearance of new era and overuse of non-renewable power belongings sorts of rainfall and temperature are disturbed. The inconsistent developments advanced from the detail outcomes of world warming make it bulky for the farmers to in fact are looking ahead to the temperature and rainfall patterns consequently affecting their crop yield productivity. In order to carry out correct prediction and cope with inconsistent tendencies in temperature and rainfall

numerous device studying algorithms like KNN, LSTM, and so forth may be completed to get a sample. It will supplement the rural increase in India and all together increase the gain of dwelling for farmers.

Suggesting the use of fertilizers may help the farmers to make the best decision for their cropping situation. The number of studies Information and Communication Technology (ICT) can be applied for prediction of crop yield. By the use of Data Mining, we can also predict the crop yield. By fully analyzing the previous data we can suggest the farmer for a better crop for the healthier yield. For the better yield we need to consider soil type and soil fertility things and also one of the major factors rainfall and groundwater availability if it is dry land it is better to go for cash crops and if is wetland it is better to go for wheat and sugarcane. There are15 agro-climatic regions in India these regions are divided on the bases of a type of the land. Each agro-climatic region can grow some specific crops. Based on that we are suggesting the farmer that which crop is best among those crops which belong to those climatic regions.

II. RELATED WORK

Primary investigation is carried out under the following stages, such as Understanding the existing approaches, Understanding the requirements, developing an abstract for the system.

In this paper the authors proposed crop recommendation based on data mining concepts such as crop and recommendation and prediction of soil and climate condition. Here they have used the ensembling technique and a comparative study of soil classification. The proposed framework will coordinate the information got from archive, climate office and by applying machine learning calculation, Multiple Linear Regression, an expectation of most reasonable yields as indicated by current natural conditions is made. This furnishes an agriculturist with assortment of alternatives of harvests that can be developed. This exploration goes for examination of soil dataset utilizing information mining procedures. It centres around characterization of soil utilizing different calculations accessible. Another essential design is to foresee untested traits utilizing relapse procedure, and usage of computerized soil test grouping [1].

Agriculture plays a crucial role in the life of an economy. It is the backbone for developing countries like India as more than 70% of population depends on agriculture. To increase crop production many factors are responsible like soil, weather, rain, fertilizers and pesticides. They have used soil parameters to increase crop production because it is an essential key factor of agriculture. To maintain nutrient levels in the soil in case of deficiency, fertilizers are added to soil. The common problem existing among the Indian farmers is that they choose approximate amount of fertilizers and add them manually. Excess or insufficient addition of fertilizer can harm the plant life and reduce the yield. The paper provides review of various data mining techniques used on agriculture soil dataset for fertilizer recommendation. Mainly focused on various soil parameters like Fe, S, Zn, Cu, N and Ph value etc. In this survey, authors also describe some Agriculture problems that can be solved by using data mining techniques such as Agriculture, Soil Fertility, Fertilizer Recommendation, Data Mining, Clustering, Classification, Neural Network. Algorithms used here are K-mean in Agriculture, K-nearest neighbor in Agriculture, SVMs in Agriculture, Decision Tree in Agriculture [2].

Data mining is the practice of examining and deriving purposeful information from the data. Data mining finds its application in various fields like finance, retail, medicine, agriculture etc. Data mining in agriculture is used for analyzing the various biotic and abiotic factors. Agriculture in India plays a predominant role in economy and employment. The common problem existing among the Indian farmers are they don't choose the right crop based on their soil requirements. Due to this they face a serious setback in productivity. This problem of the farmers has been addressed through precision agriculture. Precision agriculture is a modern farming technique that uses research data of soil characteristics, soil types, crop yield data collection and suggests the farmers the right crop based on their site specific parameters. This reduces the wrong choice on a crop and increase in productivity. In this paper, the problem has been solved by proposing a recommendation system through an ensemble model with majority voting technique using Random tree, CHAID, K-Nearest Neighbor and Naive Bayes as learners to recommend a crop for the site specific parameters with high accuracy and efficiency [3].

III. PROPOSED METHODOLOGY

In the prevailing device climatic conditions range very frequently. So, it's miles tough to extend flora with the useful aid of the use of facts weather situations. We need to use some era to locate o recognize the crop facts and guide the farmers to increase vegetation because of this and moreover fertilizer furthermore one of the important factors to boom flora as a forestall end result. If fertilizer is use more or less in the issue the soil might also moreover furthermore lose it fertility and crop may not supply the anticipated yield. So, fertilizer moreover becomes the number one element in it. Broadly talking statistics, the temperature situations are a lot important for India due to the truth we are able to enhance the Indian economic tool with the help of the crop prediction as it plays a first rate function within the Indian economic tool. This device would possibly in all likelihood help farmers to make vital alternatives which have been in advance taken through way of using inefficient trivial strategies or through way of guessing. The prediction tool might be finished with the beneficial resource of the use of facts mining techniques. Previous researches depict the software program software of facts mining techniques within the agricultural area.

Architecture

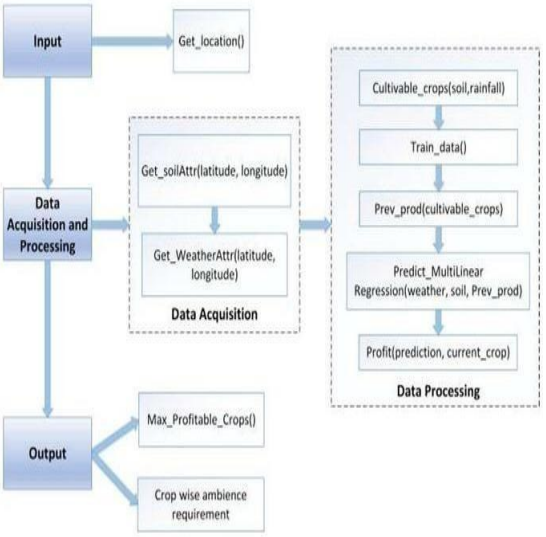

Fig 3.1 System Architecture

The architecture diagram represents the overall design of the project. After taking the location as input from the user, the data get processed using soil attributes and weather attributes that includes crop details and all other trained data and finally the output that has maximum yield will be given to the user.

IV. DESIGN

A. FLOW CHART

The below flowchart represents the overall flow of the project. The user has to register to the application and he is able to login if he is a registered user and if the user fails to login then it will do not allow the user to use the application, user got aborted. Once he logins user should provide crop information and after getting user details the application checks for dataset. If data is available, then the user gets crop prediction if not then user is able to check for other locations and he gets result for the same. At last user logs out and the application stops.

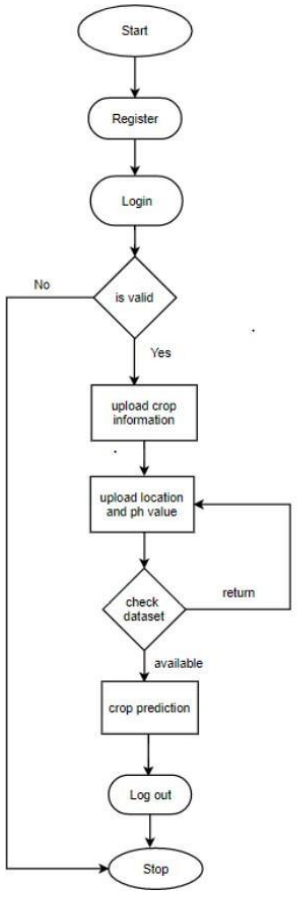

Fig 4.1 Flow Chart

V. IMPLEMENTATION

A. KNN ALGORITHM

K-nearest neighbors (KNN) algorithm is a type of supervised ML algorithm which can be used for both classification as well as regression predictive problems. However, it is mainly used for classification predictive problems in industry. The following two properties would define KNN well.

K-nearest neighbors (KNN) algorithm uses 'feature similarity' to predict the values of crop data points which further means that the crop data point will be assigned a value based on how closely it matches the locations based on the training set.

Working Stages:

Step 1 − For implementing any algorithm, we need dataset. So, during the first step of KNN, we must load the crop Dataset(training) as well as test data.

Test data set – Entering the location and PH value.

Train data set – Trained crop details.

Step 2 − Next, we need to choose the value of K i.e. the nearest crop points. K can be any integer. Here k value can be based on crop, rain fall, location, ph value.

Here k is taken from test data set, which acts like a centroid point.

Step 3 − For each point in the test data do the following –

- **3.1** − Calculate the distance between test data and each row of training data with the help of any of the method namely: Euclidean, Manhattan or Hamming distance. The most commonly used method to calculate distance is Euclidean.
- **3.2** − Now, based on the distance value, sort them in ascending order.
- **3.3** − Next, it will choose the top K rows from the sorted array.

- **3.4** − Now, it will assign a class to the test point based on most frequent class of these rows.

Step 4 – End

In our project we compare k value with train data set using KNN methodology like Euclidean, Manhattan, where we cluster the values based on the nearest distance. Here we get nearest matches of crop, rain fall, location and ph to test data from train data set in turn we predict the crops from it.

VI. RESULT

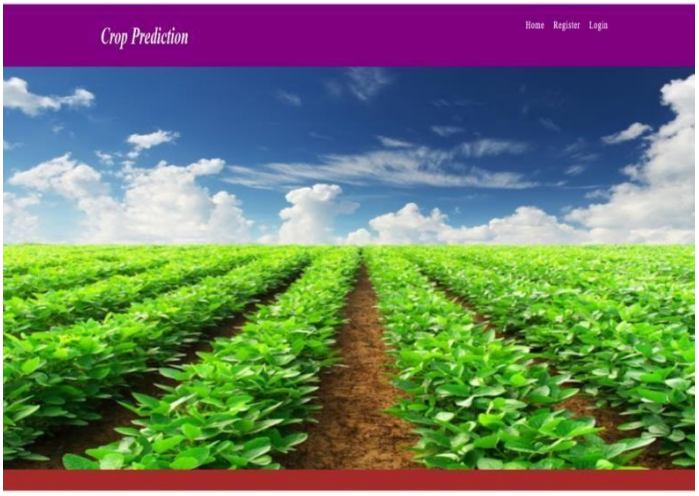

Fig 6.1 Home page

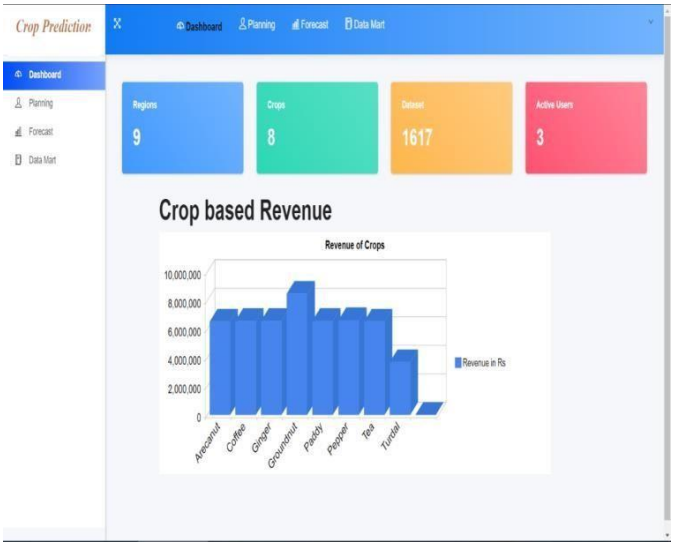

Fig 6.2 Dashboard

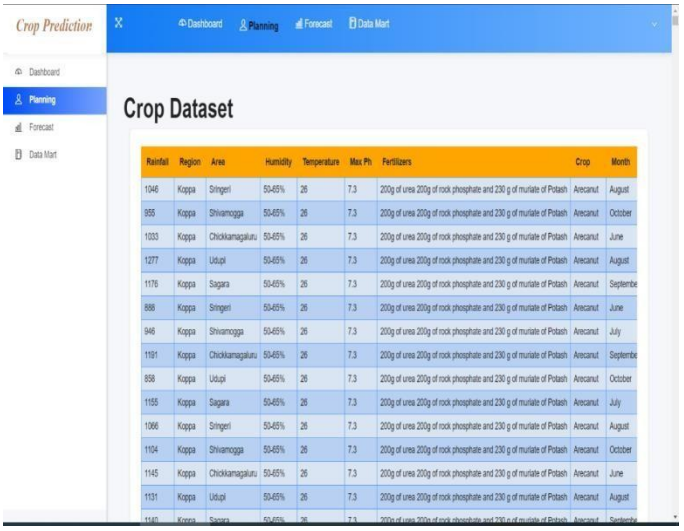

Fig 6.3 Crop Dataset

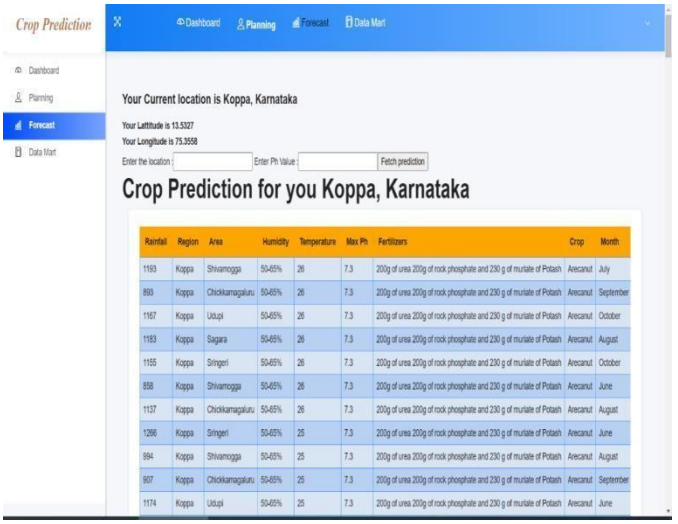

Fig 6.4 Prediction

CONCLUSION

The project furnished the several gadget mastering algorithms for predicting the yield of the crop on the basis of location based information and crop based information. Experiments have been accomplished on Indian government dataset and it has been set up that Random Forest Regression gives the maximum yield prediction accuracy. Sequential version this is Simple Recurrent Neural

Network performs higher on rainfall prediction at the identical time as LSTM is proper for temperature prediction. By combining rainfall, temperature on the hassle of different parameters like season and area, yield prediction for a nice district may be made. This will no longer best assist farmers in choosing the right crop to boom within the subsequent season but moreover bridge the distance amongst generation and the agriculture region to have more yield on their predicted crop.

REFERENCES

[1] A Survey on Crop Recommendation Using Machine Learning by M.V.R. Vivek, D.V.V.S.S. Sri Harsha, P. Sardar Maran.

[2] A Review on Data Mining Techniques for Fertilizer Recommendation by Jignasha M. Jethva1, Nikhil Gondaliya, Vinita Shah.

[3] Crop Recommendation System for Precesion agriculture by S.Pudumalar, E.Ramanujam, R.Harine Rajashreen, C.Kavyan, T.Kiruthikan, J.Nishan.

[4] Crop Yield Prediction Using Deep Neural Networks by Saeed Khaki and Lizhi Wang.