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Crop Recommendation System for Precision Agriculture

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Abstract: To develop a recommendation system for modern agriculture Big Data is a vastly evolved technology in computer engineering that can be used in various domains like agriculture, medicines and retails etc. By using this big data more number of previous data can be found and from that a new system can be developed which can act as a predictive system. Agriculture is the important factor of economy in India and till now many of the methods followed by agriculture is outdated ,by using newest rends IOT, data mining and big data which plays an important in developing a new technology to improvise the agriculture field and make the usage simpler and economic
Keywords: Agriculture, Big Data, IOT, Data Mining

I. INTRODUCTION

In current times the agriculture methods has radically improved due to globalization. A range of causes of agriculture strength is still impacted in India. Several advanced equipment consume to improve the regain the strength. The method is Precision Agriculture. Precision Agriculture is growing in India. Precision agriculture is the data of "site-specific" farming. It provides various inputs and suitable output which outcomes in the agriculture. Though precision agriculture has deliver better improvement there exists some issue. Many system exists which helps in farm land systems. System suggest crops, manures and even agricultural methods. Recommendation of crops is one main province in precision agriculture. Recommendation of crops is needful relative on a variety of parameter. Precision agriculture main purposes in identify these limitations in a site-specific way in demand to decide issues concerning crop selection. The "site-specific" method of such system need to be supervise to get better results. Only some of the results in precision agriculture provides particular results. However in farming the situation is vital that the references are made precise and accurate since if any mistakes occurs it might lead to serious measureable and assets damage. Large number of enquiry work is existence done, in order to acquire a precise and also well-organized crop prediction model.

II. CASE REPORT

Paper [1] which makes a relative study of categorization algorithms and their performance which helps to know the yield and predict it in precision agriculture. These algorithms are implemented in the various data set which are collected from various fields and form long back years which helps in yield prediction on ragi crop.

Paper [2] it concludes the requirement for crop yield prediction and its major usage and the role in a nation's planned guiding principle which are made in agriculture development field .A Framework is developed called Extensible Crop Yield Prediction Framework (XCYPF) is developed. It provides facilities to bendable addition of an assortment of techniques and methods towards crop yield prediction tool called XCYPF is developed in order to help people to predict more varieties of crops and their yield prediction by using independent and dependent variables.

Paper [3] it states the procedure of agricultural data through data mining and visual data mining techniques are predicted. It helps to reduce high dimensional agricultural data into smaller size helps to acquire the useful knowledge of the data which are related to the yield, by taking input attributes like fertilizers.

Paper [4] states that the recommendation system to be developed for the different types of soil using big data analytics and other various factors.

Paper [5] acknowledges the significance of crop selection and some of the factors which decides the selection of crop like market price, production rate and policies of the government that are discussed. In this paper it also proposes Crop Selection Method (CSM) that is used to solve the yield of crop and selecting the crop and requires to improve the net yield rate of the crop. It predicts the series of crops which needs to be selected according to the seasons including the factors like soil type, weather crop type, water type which are all used in estimation of crop yield for crops like cereal in some major districts of India.

Paper [7] it focuses to solve the complex problem of choosing the classifiers which are used for assembling learning knowledge. A technique to select an accurate classifiers set which are present in pool of classifiers it has been discovered. This development helps in achieving the aims like performance and high rate of accuracy.

Paper [8] aims in solving the problem related in food problems in the country of Egypt. A framework has been proposed that predicts the production, and it also imports of that meticulous year. Artificial Neural Network and Multi Layer Prescription is proposed for perception WEKA to build the prediction.

Paper [9] yield is analyzed and category are predicted. Crop yield is identified as Classification rule which are taken from prediction which depicts Naïve Byes and k-Nearest Neighbor algorithms that are used in prediction for yield prediction of soil.

A. Problem Definition

To develop a recommendation system using big data analytics for crop growth by taking all the factors like weather, geographical features ,water utility and land and to build a simpler mechanism to predict the types of soil and the crops that are suitable to be grown in that soil.

III. METHODOLOGY

By the details in the laboratory and the results acquired are important sources of data for various types of test and for researchers. The tests which are conducted are water, soil analysis, compost, plant manure, green roof media, biosolids, and green house media testing etc .Information on agriculture is provided by website that provides statics and real time data that are related to agriculture economic entities, some of the expert discussions are provided by particular articles on specific problems. Information on agricultural website aims to provide information to everyone at any place or any time which empowers farmer to accept the recent technology. To download WebPages from information agricultural website flume are used which helps to download the pages and save them on Hadoop distributed file system. This framework is used to fulfill the needs and help agriculture officers and agricultural researchers to analysis and come up with recommendation solution for the growth of crop by taking the evidences from historic data.

Table 1 types of soil and crop growth

	TYPE OF SOIL	CROPS GROWN
1	Alluvial Soil	Tobacco, Cotton ,Rice
2	Black Soil	Rice, Sugarcane, Wheat
3	Red and Yellow Soil	Ragi, Potato, Pulses
4	Late rite Soil	Rubber , Coffee
5	Arid Soil	Corn, Millers, Barley
6	Forest and Mountain Soil	Tea, Coffee, Tropical Fruits

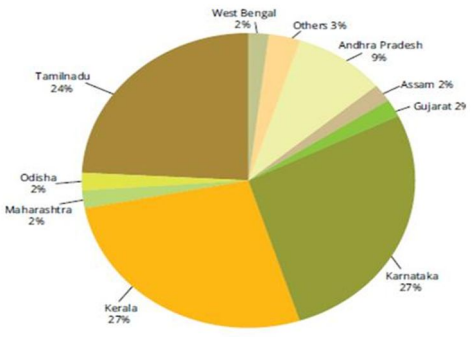

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Figure 1Estimation of agriculture in 2016.

For conjecture taking the effects of high temperature on the paddy and their measures to be taken in how to control the problem in the particular district. Feature selection is defined has the process o f selecting features and relevant information in the form of subset. The selection process of feature selection takes place at the data preprocessing on model learning. Feature extraction is the process that needs to be done to normalization of data for removal of technical variation through replacing the missing values since these missing values they distracts the process of decision making.

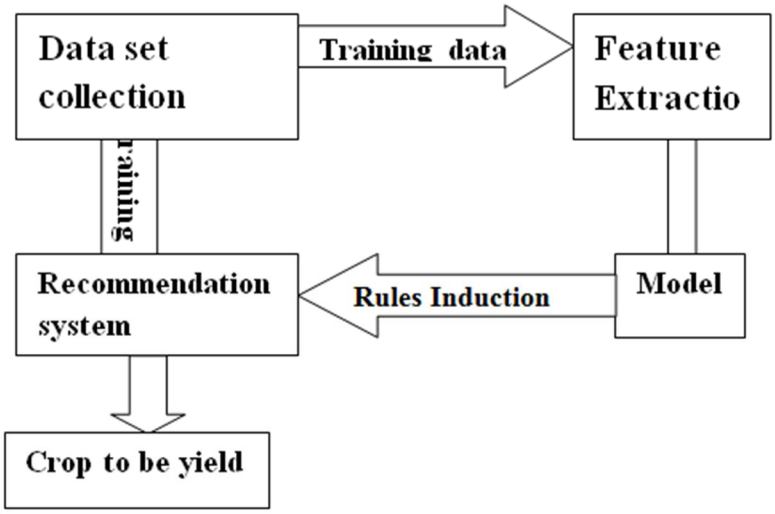

Figure1.1.Methodology of system.

A. Data Preparation

In this paper, weather data are used to collect in Agriculture Meteorological Department (AMD) from 2016 up to now there are 28 weather stations, contain various agro atmospheric index, control and pass strict feature examination for example, the statistical values are especially the extreme parts are verified and proved. AMD are also proved to be time consistent data. The related indexes has an accuracy more than 99.99% and other absolute humidity have an accuracy of 99.4%. From the figure 1.3 the distribution weather station can be found.

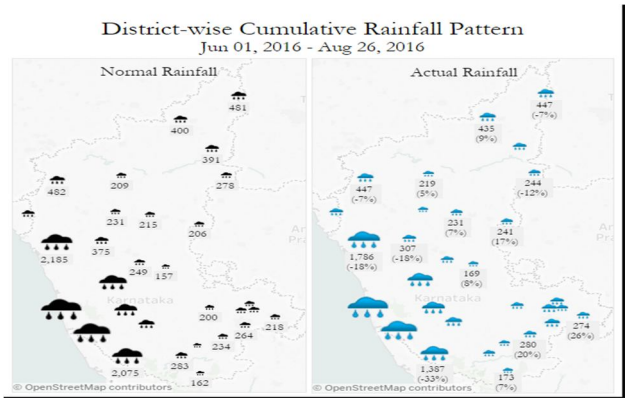

Figure 1.3 District wise rainfall pattern data

B. Map Reduce Weather Data Processing Structure

Weather data have been depending on static technique established on several traditional resources. The examples for weather processing structure are usually form the model from mean values were absolute if 2years have comparable weather patterns.

Though, the results of the actual weather patterns cannot replicate the growth of the little changes in the weather conditions. Hence, the big data brings us to figure the models for all micro difference which is used to figure the whole datasets that were not using before. The new weather data processing structure divide the computing process into 2 phase, which can be define as Map and Reduce In the Map phase the function succeeds all the input values/key and produces the median key/value. in the Reduce phase the function combines all the values which contains same value of median key and finally produces the result. Firstly weather data subdivided into multiple fragments. Moreover, the Map function is executed and the data is categorized according to the certain instructions and then written in local hard drive. After the Map phase is performed, the Reduce phase is executed where the values will be consolidation and shuffled the intermediate data having the same year and the output is written to distributed file systems. The final result can be obtained by merging all the Reduce phase output at last.

C. Dataset Collection

In India the dataset which are collected from the soil specific attributes from particular part of Karnataka. In accumulation, the general crop data is used in the similar online source. Some of the crops that are used as a sample in the model are groundnut, paddy, pulses, coriander, millet, sugarcane, cotton, banana and different types of vegetables. The training data set the number of instances of each crop is depicted. Some of the main attributes of the soil which are taken from the sample are texture, color, drainage, depth, ph, water holding, erosion and permeability.

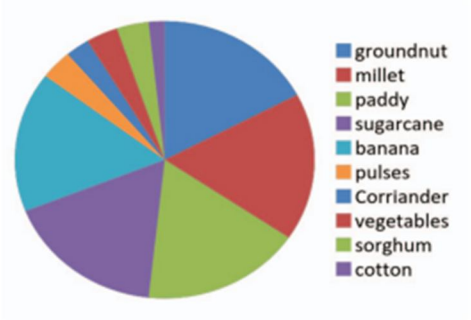

Fig 1.4 Pie chart of dataset

D. Similarity of the weather – Nearest Neighbors

Similarity of weather is defined by distances between the weather, which is the multivariable analysis and usage varied weather indexes. Each climatic index is treated as one dimensional space. So for m number of indexes, m dimensional spaces are found. The distance between two years can be calculated through the valuation of similarity between the two years and the system that can be seen as the spot in m dimensional space. The specify two years can be similar if the distances is small. Hence the nearest neighbor of the particular year can be found through the similarity between any two years.

A P A1 A2 ... An P1 P2 ... Pm 11 12 1 21 22 2 1 2 ... ... n n m m mn XX X XX X XX X

One specific year having different properties is described as A and P stands for each year. The measurement between the distance of any two points like Ps and Pt basically uses Euclidean distance that is shown as:

$$D_{(P_s-P_t)} = \sqrt{\sum_1^n (X_{si} - X_{ti})}$$

IV. CONCLUSION AND FUTURE SCOPE

Big data has transformed agriculture into an intellectual world which provides more detail information. Decision making is achieved through a variety of technique in big data analytics. Agriculture plays a primary role in India. Improvement in agriculture helps the prosperity of nation and the farmers. Through this technique we can help farmers to sow the right seed based on the requirements which helps in the increase productivity and profit will be acquired from the technique. Overall productivity of the nation can be increased by planting the right crop and increasing the yield. This can be further improved by improving the data set with more number of attributes in yield prediction. The current framework is essential for officers and researchers and recommending the desire solution based on historical data and evidence. Since massive data set already exist we can take its advantage by using it in the proper way. Our system contains two major parts. Map reduce weather is the first part used in data

processing structure which calculate huge data set on a group of computer. Nearest neighbour technique is used between similar years which help to calculate the weather distances. Taking an example of the forecast from the year 2016 the yield can be calculated by using the data from March 2015 to February 2016, from that we can acquire the result from five to six months in advance. Food security can be improved since the accuracy is beyond the average and methods can be use for decision making.

To conclude the topic, from fast accumulation of the data the data processing from the weather can be qualified enough to support these data . Mainly if any complex comparative of the data is required the similarity of the weather can be indulged in the data processing sector to control the computation time.

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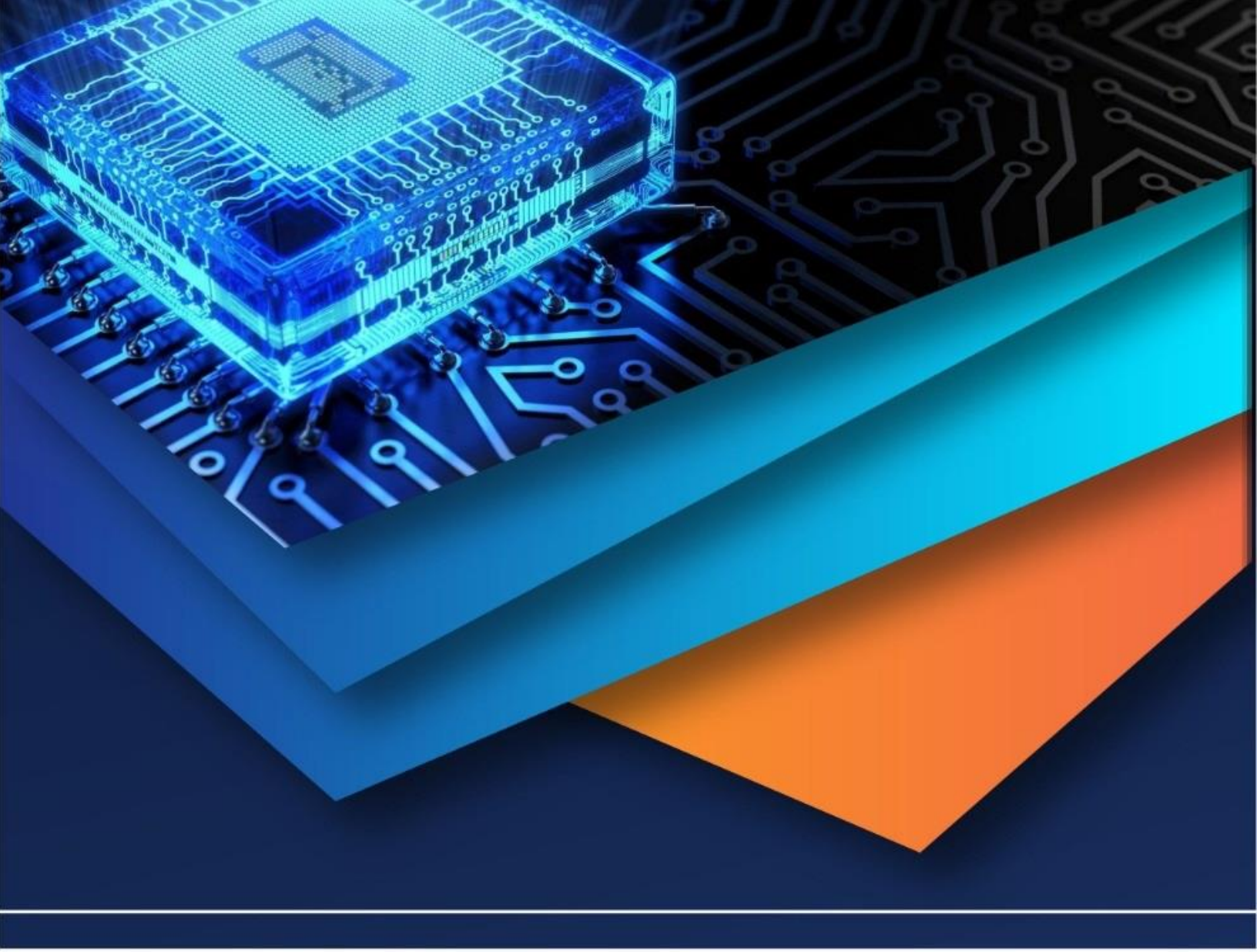

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