IMPROVING CROP PRODUCTIVITY THROUGH CROP RECOMMENDATION SYSTEM

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ABSTRACT: *Crop recommendation system or prediction system is the art of predicting crop yields to improve the production and production before the harvest actually takes place, it takes typically a couple of months in advance. Crop prediction depends on the computer programs that describe the plant-environment and the soil features interactions in quantitative terms. The soil testing will start with the collections of a soil sample from the field. The first basic principles of the soil testing is that a field can be sampled in such a way that by getting a chemical analysis of the soil sample and also majorly depend on temperature and rainfall will accurately reflect the field's true nutrient status on a particular area to help out farmers to improve the production.*

Key Words*: *Soil, Naïve Bayesian, Crop prediction, Attributes or constraints.

1. INTRODUCTION

The soil testing program starts with the collection of a soil sample from a field to know about features of that soil like pH values, organic Carbon, iron, zinc etc here we using 10 parameters for improving a productivity of the crops to get a efficient result analysis. The purpose of soil testing in high-yield farming is to determine that relative ability of a soil to supply crop nutrients during a particular growing season, to determine the needs, and for diagnosing problems such as the excessive salinity or alkalinity. Soil testing is used to guide the nutrient management decisions related to manure and sludge applications of the soil with the objective of maximizing economic benefits while minimizing the potential for negative impacts on water quality and also features. The nutrient requirements of soil using agriculture for crop production are examined to determine the need data mining system to detect the crops suits for the soil by analyzing features of that particular soil of that region. This helps in giving information to the farmer about the suitable crop for particular regions.

2. EXISTING SYSTEM:

Traditional soil testing involves taking samples around and sending to labs for testing and based on lab's result, they apply a uniform mixture of nutrients or fertilizer to the entire field. Generally, these lab makes fertilizer and lime recommendation. Hence later on applying fertilizers to fields, we are resulting in damage to crop yield and also possibly to the environment.

3. PROPOSED SYSTEM:

First the farmers will take some soil of the agricultural field and get it tested by the lab. This process is called soil testing. An accurately calibrated soil testing will indicate the degree of the nutrient deficiency in that soil of one particular field and also estimates the nutrient rate which required optimizing the crop productivity. An efficient way to improve accuracy and the efficiency in this process is to create a dataset with the data values collected over the years. By using the other technologies and data mining concepts, we can create an application which has the ability to suggest the best suitable crop to farmer to improve the production for the best result. The main inputs to the system will be the diagnosed nutritional features in soil directly from the lab test reports of the particular area. We are using the data mining concept and Naive Bayes Algorithm which can give the accurate output. The system based on dataset, will suggest the crops which can suit this soil type and can give profits to the farmer. The admin will manage the entire application by adding the different crop types, different soil and features of the soil. The farmer will take his field soil to lab, get the results, feed to the system and can view the results. As farmer will not be aware of this system, we try to feed these information by the help of other person.

4. METHODOLOGY

Step 1 : Raw data and Weather Statistics This is the first step in the crop recommendation process where we collect agriculture data. Agriculture data collected from the region which contains agriculture parameters, crop details, farmers details and yield details. Agriculture parameters includes rainfall, temperature, soil features such as PH, nitrogen, potassium, iron etc…

Step 2: Extract and Segment Data (Data Preprocessing)

Here agriculture data analyzed and only relevant data extracted. The data required for processing extracted and segmented according to the different regions. Required data extraction is done because entire agriculture data not required for processing and if we input all data, it requires too much of time for processing, so data processing is done.

Step 3: Train Data

Once required data extracted and segmented, we need to train the data, train means converting the data into the

required format such as numerical values or binary or string etc.. conversion depends on the algorithm type.

Step 4: Supervised Learning

ML concerns with construction and study of system that can learn from data.

Naive Bayes Algorithm

"Naive Bayes Algorithm" is used for crop recommendation because of the following reasons;

1. efficient classifier
2. Works fine for less number of parameters as well as more number of parameters.
3. Works fine for small data-set as well as big data-set.
4. more accurate results

Step 5: Crop Recommendation (Priority wise) Here suitable crops recommended for the farmers which may yield high profits. Naive Bayes algorithm generates outputs (crop recommendations) based on the priority wise.

Step 6: Location and Year Based The crop recommendation is done based on the region wise as well as year wise.

Step 7: Results

Recommending suitable and high profit crops for the farmers and recommendation is done based on the priority wise. Here high probability crops are extracted and sorted and top 3 crops recommended for the farmers.

Step 8: Visual Representation

Crops recommended for the farmers on GUI. When users gets login to the application system recommends suitable and high profit crops for the farmers on a GUI.

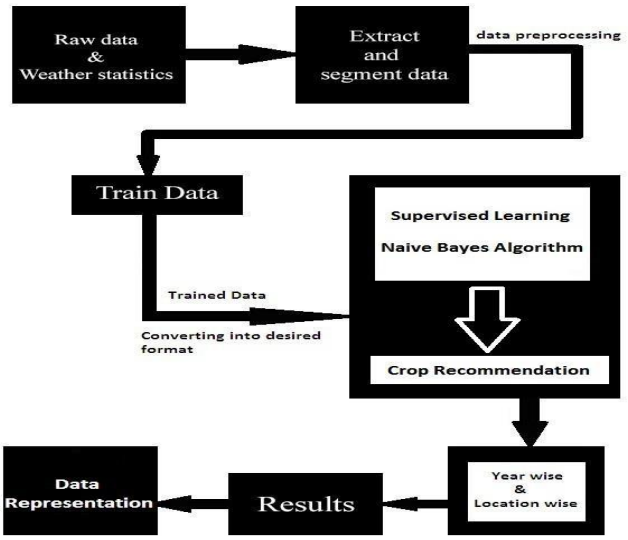

Fig: flow chart

5. SYSTEM IMPLEMENTATION:

Problem Analysis: As fertilizer is composed of chemicals and harmful for the plants and society, this procedure has to be changed to find out the suitable crop for the soil.

The nutrient requirements of soils using in agriculture for crop production are examined to determine the need of a data mining system to detect the crops suite for the soil by analyzing the features of the soil. This helps in giving information to the farmer about suitable crops that regulate the nutrition levels of the soil. Farmer can know which crop is suitable for that area and also he will get 100% yield on that year.

System used by administrator, staffs and farmers. System is a browser based application which predicts crops based on the soil test results. System makes use of data mining technique for crop prediction. System makes use of previous dataset for the crop prediction System makes use of navie bayesian algorithm for crop prediction System generates accurate results based on the size of the dataset. Administrator of the system creates the staffs and sets the unique Id and password for each staff. Naïve Bayesian Algorithm:

Step 1: Scan the data-set (storage servers)

Step 2: Calculate the probability of each attribute value. [n, n_c, m, p]

Step 3: Apply the formula

P(attributevalue(ai)/subjec tvaluevj)=(n_c + mp)/(n+m)
Where:

n = the number of training examples for which v

= vj

nc = number of examples for which v = vj and

a = ai p = a priori estimate for P(aijvj)m = the equivalent sample size

Step 4: Multiply the probabilities by p

Step 5: Compare the values and classify the attribute values to the one of predefined set of class.

6. Dataset Details:

The dataset in which we collect a agriculture data, agriculture data collected from the regions which contains agriculture parameters, crop details, farmer details, yield details. we are using 10 attributes that are of prime importantafter extracting the data, we need train the data. the training dataset is divided into training and testing samples. Out of the 1000 samples with parameters and results,900 samples of training dataset with parameters and 100 samples of testing dataset. using naive bayesian algorithm we input 100 samples testing dataset to implemented using C#. Naive bayesian algorithm does its 100 times get executed and it will predict the output for 100 testing. After these will compare with original data and predicted output result of previous testing dataset samples. For last we will find the accuracy of predicting crop for particular region we get a different accuracy based on parameters of the samples.

Attributes PH organic carbon(oC) nitrogen(n) phosphorus(p) sulphur(s)

zinc(zn)

iron(fe)

temperature rainfall

7. RESULTS:

The agricultural data analysed and only relevant data extracted.

The data required for processing extracted and segmented according to the different regions.

8. CONCLUSIONS:

Nowadays farmers facing lots of problems in the agricultural field due the crop production and they don't know the proper information regarding how to improve crop production for what they invest and also to cultivate. This proposed system helps the farmers to know about what is a right crop to grow in that field. Proposed system predicts the crops using various data mining techniques aspecially using a Naïve Bayesain algorithm to get accurate results. This system also useful to agricultural departments to predict the right crop in right time which gives the efficient results. If we have such kind of an automation, then it will be useful to farmers and agricultural field. The goals that have been achieved by the developed system are, Simplified and reduce the manual work of the agricultural department, Large volumes of data can be stored and It provides Smooth work flow.

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