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KrishakMitra ((कृ षक मि) - Crop Prediction

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Abstract -- Nowadays, Nation's Pride, Farmers are suffering a tremendous amount of losses due to the reduced yield of their crops. This paper concentrates on helping the farmers by predicting the yield of the crop they want to grow by considering climatic conditions like temperature and rainfall. Also, the module additionally takes into consideration the soil factors like potassium, sodium and phosphorus content of the soil to more accurately predict the crop yield.

Keywords -- K-Means, Google API, RANSAC

INTRODUCTION

Krishak Mitra, the name itself suggests Farmer's Friend. Mobile apps and their services have made our life simpler by fulfilling our daily needs for information, communication or entertainment. Mobile Applications have brought a new revolution. We would provide one such mobile application "KrishakMitra", which can lead to a healthy life. KrishakMitra is a mobile application proposed keeping the farmers in mind and also a common man who wants to grow vegetables for his daily needs. Besides the attention paid to the agricultural field and over the past decades, there are still millions undernourished and a billion malnourished people in the world. There are more than 1.4 billion adults who are overweight and one-third of all food produced is wasted. The global population is expected to grow up to more than 9.7 billion people. It is also observed that global food consumption trends are changing drastically. If the current trends in consumption patterns and food waste are going to continue, it is estimated that the world will require 60% more food production by 2050 (Alexandratos and Bruinsma 2012). KrishakMitra helps to improve crop production for the ever-growing population of the world.

LITERATURE SURVEY

[1] A novel approach for efficient crop yield prediction by P.S. Maya Gopal, R.Bhargavi. It compares various algorithms for their accuracy in crop yield prediction and concludes that hybrid MLR-ANN model has the best accuracy of all the algorithms

[2] "Machine Learning Approaches for CropYield Prediction and Nitrogen Status Estimation In Precision Agriculture: A Review." Computers and electronics in agriculture, v. 151, pp. 61-69. Chlingaryan, Anna, Salah Sukkarieh, and Brett Whelan. Due to the direct relation between crop yield and nitrogen levels in soil, nitrogen estimation is an important factor for predicting crop yield. Some ML techniques, such as Gaussian Processes (GPs) (Bishop, 2006; Rasmussen and Williams, 2005), Dirichlet Processes (DP) (Ferguson, 1973) and Indian. Buffet Process (IBP) (Griffiths and Ghahramani, 2011) are probabilistic and enable consideration of sensor noise while conducting probabilistic fusion of information from different sensors using fertilizers

[4] Prediction of Crop Yield Using Machine Learning by Rushika Ghadge, Juilee Kulkarni, Pooja More, Sachee Nene, Priya RL. It focuses on predicting crop yield and recommending fertilizer for optimizing the yield of the crop. This can be achieved by algorithms like Kohonen Self Organizing Map (Kohenon's SOM) and BPN (Back Propagation Network).

[5] Efficient crop yield prediction using machine learning algorithms by Arun Kumar, Naveen Kumar, Vishal Vats This particular paper focuses on predicting the yield of sugarcane-based on a combined dataset of soil, rainfall and yield by applying supervised machine learning algorithms like Support Vector Machine, K-Nearest Neighbor and Least Square Support Vector Machine

Implementation

There are two modules in the proposed system :

1. The first module gives the output based on temperature and precipitation for which the RANSAC algorithm is used. The output of this module is then fed to the second module.
2. The second module gives the output based on N, P, K values of soil using K-Means algorithm.

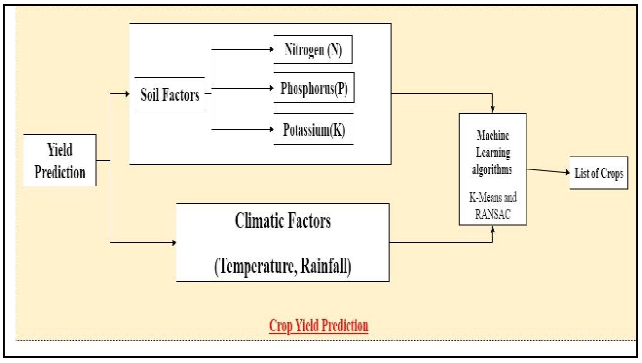

Fig 1: Block Diagram

```
G:\BE PROJECT(GROUP NO 16)>python Main12.py
Training module - 1
Training module - 2
['Available-N(kg/ha)', 'Available-P(kg/ha)', 'Available-K(kg/ha)', 'clusters']
Enter test data
Enter precipitaion : 193
Enter temperature : 26
Enter N value : 100
Enter P value : 6
Enter K value : 200
CROP NAME        VARIETY
Sugarcane       Adsali
Sugarcane       Co 86032
Sugarcane       CO01307
Groundnut       Phule Pragati
Groundnut       SB0IX
Rice    IR08
Wheat   Narmada04
Maize   JCM0323
```

Fig 2: ScreenShot of Predicted crops

I. EXPLANATION

After taking the values of temperature, precipitation and chemical constitution of the soil, the machine learning algorithm will first find the crops which are best suited for that type of soil (Module 1 : RANSAC algorithm). After getting the shortlisted crop names another Machine Learning algorithm (Module 2 : K-Means Clustering) is applied to particularly predict the varieties of the crop which will give maximum yield according to the climate and soil nutrient values.

II. RANSAC ALGORITHM

This module deals with the effect of climatic conditions and takes the input parameters like **Location, temperature and precipitation**. For this, the Random sample consensus (RANSAC) regression model is used. Random sample consensus (RANSAC) uses iterations to approximate parameters of a mathematical model from a set of data that contains outliers when outliers are to be accorded there is no influence on the values of the estimates. Therefore, it also can be performed as an outlier detection method. It is a probabilistic, non-deterministic algorithm which produces a reasonable result only with a specific probability, which increases as more iterations are allowed. It is assumed that data mostly consists of inliers i.e., data whose distribution can be explained by some set of model parameters, though may be subject to noise, and "outliers" which will not be fitted in the model. The outliers can come from high values of the noise or from incorrect assumptions about the representation of data. RANSAC also assumes that, given a (usually small) set of inliers, there exists a procedure which can estimate the parameters of a model that optimally explains or fits this data.

RANSAC fits *N* models using different random sample *S* of the whole available data each time. Then, for each model, it estimates its performance *P* (inliers/outliers) and selects the best one. RANSAC doesn't determine what method should be used to find model parameters. We use the least-squares method. We create the RANSAC model on each crop. Then for each input, we predict the yield of each crop and return the list of crops sorted by their corresponding predicted yield.

K-means clustering algorithm

The second module which consists of selecting crop seeds and finding the required amount of more nutrients needed to achieve a target yield. The K-means clustering algorithm is used in this module. **k-means** is one of the simplest unsupervised learning algorithms which helps to solve the clustering problems. This algorithm follows a **simplest** and easy way to classify a given data set through a specific number of clusters (assume **k** clusters). The main concept is to define **k** centers, one for each cluster. This clustering algorithm is used to find groups that are not explicitly labeled in the data and to find patterns and make better decisions. After the algorithm is executed and the groups are defined, any new data can be easily assigned to the most relevant group. Our algorithm works as follows, assuming we have inputs x1,x2,x3,...,xn x_1, x_2, x_3, ..., x_n x1,x2,x3,...,xn and value of **K**

Step 1 - Select K random points as centers for clusters called centroids.

Step 2 - Assign each xix_ixi to the nearest cluster by calculating its distance to each centroid.

Step 3 - Find a new cluster center by taking the average of the assigned points.

Step 4 - Repeat Steps 2 and 3 until new centroid centers are calculated.

The nutrients values suitable for various crops are clustered. K-means algorithm initializes k random points as centroids. Then, the euclidean distance between **NPK values of a crop** and each centroid is calculated. The crop is then put to a cluster from which its distance is minimum. After clustering each crop once, the centroids are now shifted to a point which is the average of all the points which belong in that cluster. This step is repeated until the difference between the new centroid position and its previous position is greater than the given threshold. The sum of distances of all points to its cluster is called the score of the K-means model. The score is calculated for values of k from 2 till the number of crops in the dataset. The optimal k value is found to be 196 as at this point, the score is found to be minimum. The input NPK values taken from the soil health card are then clustered. This model then returns the target yield and required NPK nutrients to achieve that target.

FUTURE SCOPE

- Grading of the crop can be introduced based on various factors of the produced crop.
- The proposed system can be expanded by introducing a module which will help the farmers to sell their crops without the involvement of middlemen.
- To increase the reliability of the system we can use the sensor to capture N, P, K of the soil.
- An expert-farmer chat facility can be provided which will be of great help to the farmers in case if the crops are suffering from any disease.

CONCLUSION

Farming remains an important field in the nation and plays a significant role in driving the economy of the nation. The conventional process of selection and decision making taken by farmers is majorly driven by a lack of knowledge of the clear idea of various parameters and how they affect the crop yield. There is also increasing in suicidal rates of farmers and by developing such an app, we hope to reduce the suicidal rate of farmers as they can learn (predict) which crop will give them maximum profit keeping in mind the future seasonal conditions and thus avoid debts over them. The Machine Learning algorithms will be implemented in order to predict the yield of crops. KrishakMitra aims to assist a farmer in taking accurate decisions that lead to a higher yield of the crop.

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