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Soil and Crop Recommendation Using Machine Learning

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Abstract:- In the current scenario the major that is played in every life of human is food which could only be brought through agriculture. In this economic world the development of agriculture has been reduced in day by day. The growth of every vegetables, rice etc are depends upon the soil and also the weather changes. If the soil condition is appropriate to grow the crop then there must be correct condition of weather to the better growth of crop. In this paper we are recommending the growth of crop which will be best suitable for the appropriate soil. For this we are using the technology that is known to be IoT for the analysis of soil. By using this the major issue might be resolved in yielding the crop with better production.

Keywords:- *Agriculture, Crop Yielding, Prediction, IOT.*

I. INTRODUCTION

The vital role played in this economic world is the challenges that appear in the agriculture sector. By the changes that are made in the agriculture that is the yield of crop according to the soil sector is most important to develop agriculture. There are few crops that could be grown only with the certain conditions in that case only the specified crop could be grown. There are many farming techniques used by farmers for maintaining the crops in order to increase the rate of production. By using the certain condition only the crops could be yielded by meeting few disadvantages. The disadvantages could be overcome by using IoT and through this the major problems could be solved. The information that are collected through IoT will be collected and stored in the data set. By using these data set only the production of crop will be suggested for the farmers to yield in the proper soil. This information might be collected using the sensors that will be enclosed within the soil to predict the nature of soil. Here this lecture we need used little machine learning algorithms to predict the soil nature and which crop will yield the best.

II. RELATED WORKS

There research based on smart prediction using IoT which helps to monitor the data and collect every data. The data set will be trained for the further prediction that is which crop will be better suited for yielding the crop. This is done with the service of wireless sensor network. The records that is collected by using sensor will be stored in the cloud. This shares the information through as SMS for the crop rotation about the soikl condition and crop condition.

They done the research about using the sensing technology in which the data conquers with the information of PH, sensor, temperature etc. Hence these data set are collected only by using the sensors within the soil to calculate the better growth of crop in the appropriate soil along with the weather conditions. Thus they did the research for calculating the soil moisture condition in order to yield the crop. This also helps to detect the soil condition to know the better growth of crop.

III. METHODOLOGY

The technologies that are used here is IoT which helps to predict every soil will most accurate range. Along with IoT we have used machine learning algorithms with the real time for performing the field area for prediction of soil. The data that are used for prediction is collected by using IoT system. Later then the data will be trained for the calculations.

- *Implementation*

Here in this paper, we have managed Machine learning for designing and IoT for collecting the data. The collected data is trained and pre-processed to reducte the error rate and increase the accuracy.

- *Architecture*

This methodology conquers with the data that are collected in the real time. Later these data will be predicted and built a user interface that assists the user to provide the input information. As the initial stage the records will be pre-processed using Machine learning algorithm for prediction. The data is trained to generate the appropriate prediction. As the result this produces the random input values which has the capability of accurate rate. This reduces the error rate and improves the process by using IoT.

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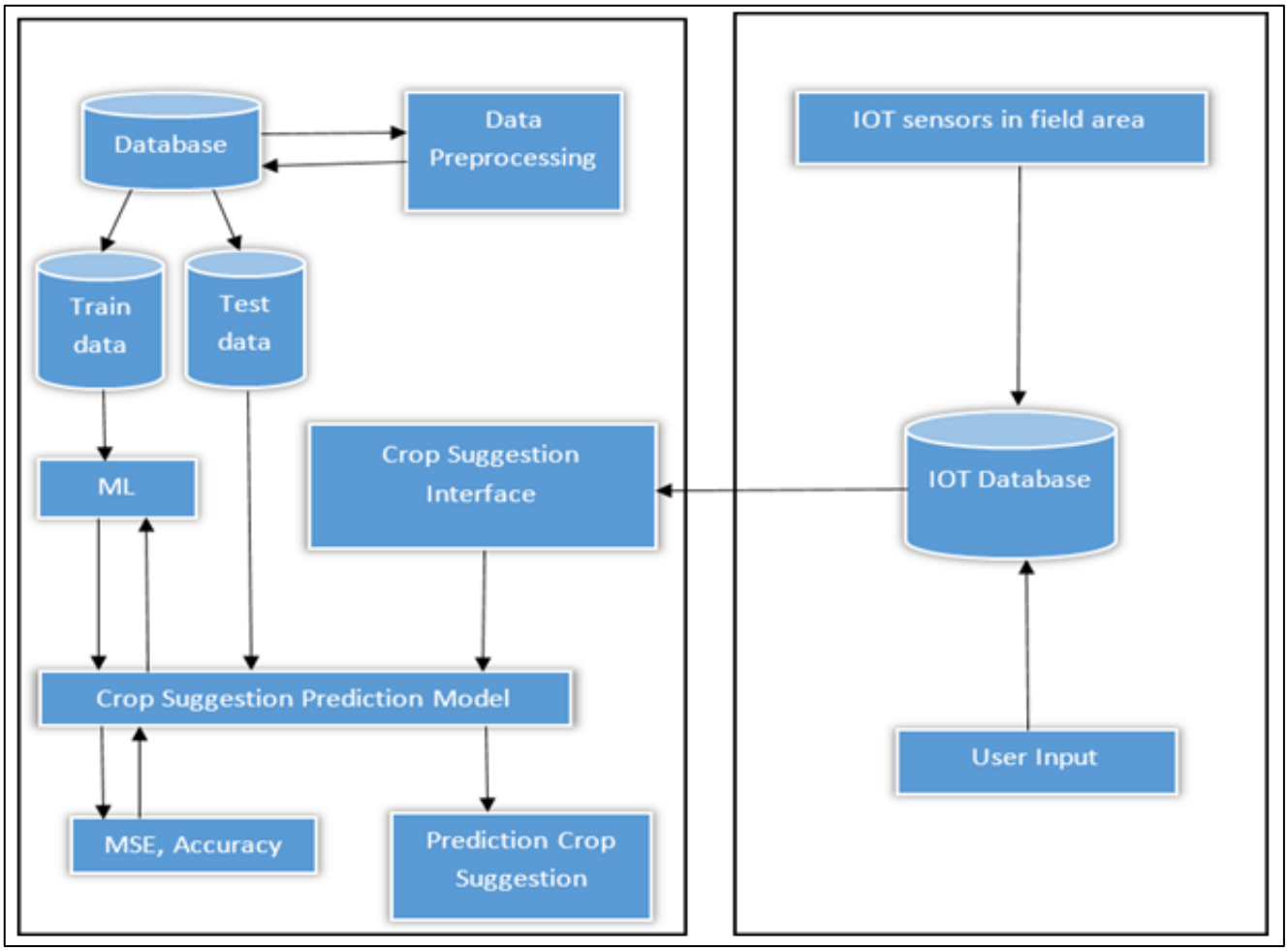

Fig 1: Block Diagram of Crop Idea Method

➢ *IOT for Records Collected Works*

As the initial step we need to collect the data from the IoT. For this data set the attributes that are included here are Moisture, Humidity, Temperature etc. All the data that are collected will be directly stored in the data set and processed for further information. The data that are collected will be provided as the input using GUI. Through this the data might be used for calculating the crop yield along with the weather forecasting.

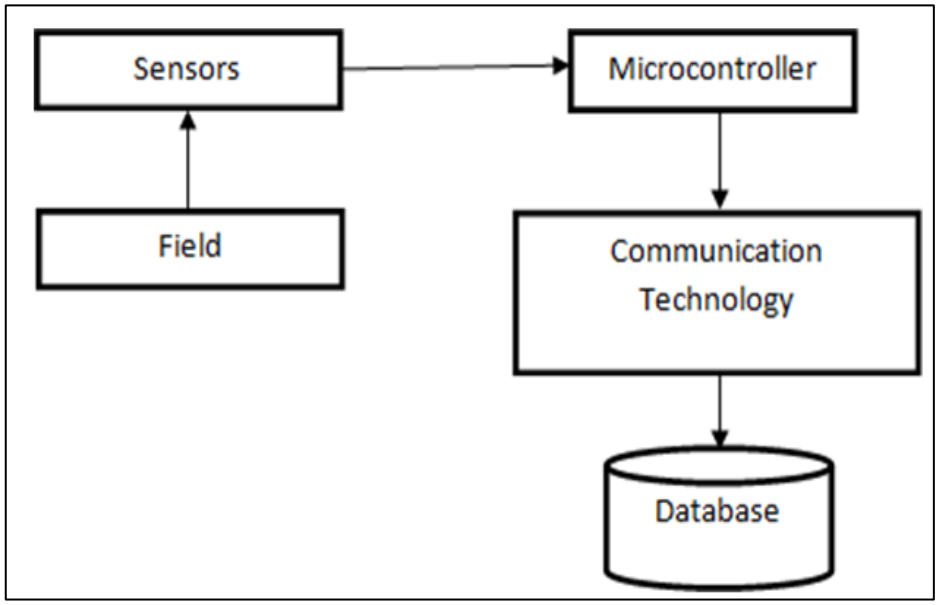

Fig 2: IOT System Design

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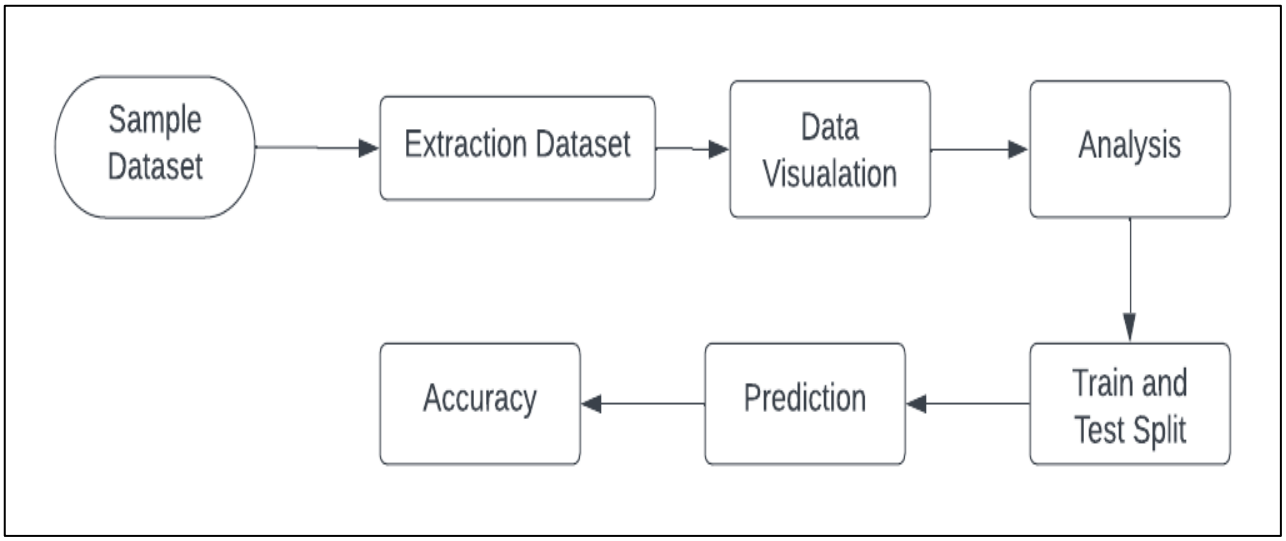

Fig 3: Proposed system

IV. FEATURE DESCRIPTION

The major and foremost key factor in this research is the growth of crop. By this the farmers could able to know the growth of crop in the appropriate soil. There are many kinds of soil in which the crop could be yielded. Even though the crop yielding may vary the retaining of water also required. By using the sensor, this helps to collect the data.

V. DATA PREPROCESSING

The information that are collected through IoT sensor will be open source. The data need to be cleared after completion of every statistics because the algorithm that is used for prediction is machine learning algorithm which could not handle noisy data.[10] By doing so we might able to reduce the error rate and the lack of data could be cleared.

➢ *Encode Categorical Data Using Tag Coding*

Numerical and categorical data are considered to be two categories in the data set. The data set which holds the numerical values is known to be numerical data and the data which holds the string value is known to be categorical data. Every categorical data need to be converted to numerical value for prediction.

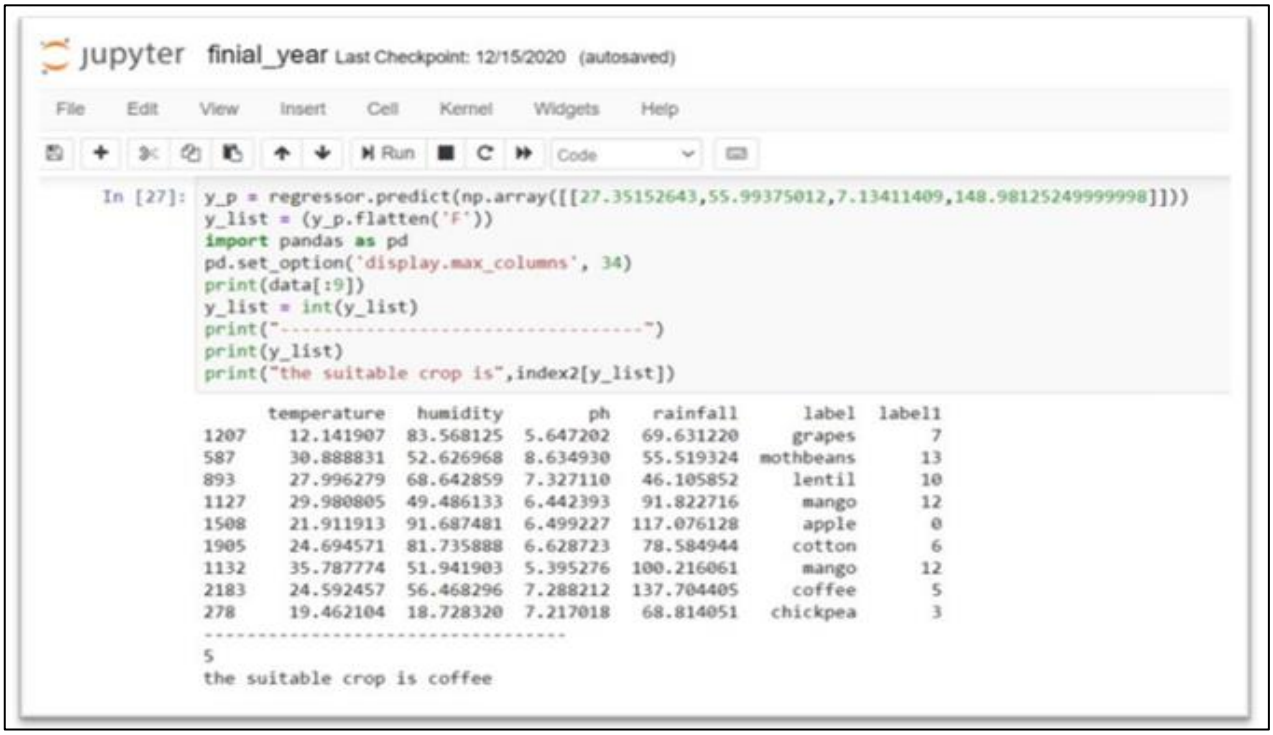

Fig 4: Output Suggesting Suitable Crop

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➢ *Support Vector Machine*

Support Vector Machine or SVM is one of the most popular learning systems used in classification and regression. However, in machine learning it is used only in classification problems.

The point of the SVM algorithm is to create an optimal line or decision boundary that can divide the n-dimensional space into clusters so that we can easily place new data into the correct cluster in the future. This well-defined edge is called a hyperplane.

SVM pick out high points/vectors that help create an complete plane. These conditions are called support vectors, so the algorithm is called a vector machine. There are two different groups divided into decision boundaries or general planes.

$$z=x^2+y^2$$

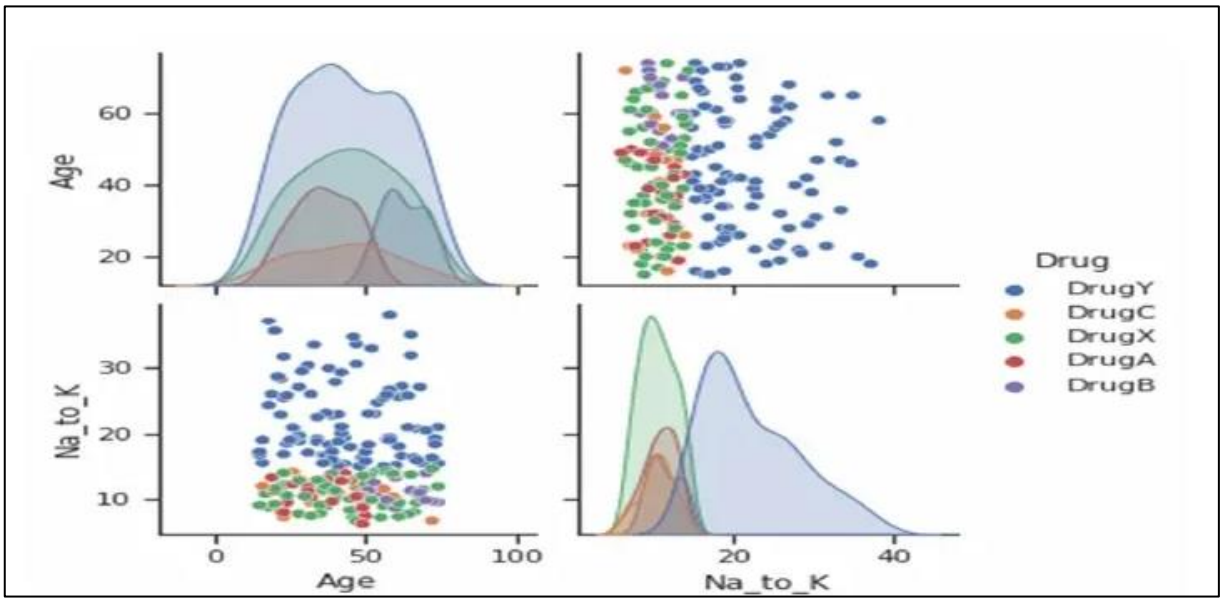

Fig 5: Soil and Crop Detection

➢ *Data Exploration*

Data mining is a data mining process that users use to create accurate analyzes based on the data they collect. Data analysis is used to analyze the data and information in the data to make an actual analysis. After viewing the data set, some information about the data was searched. While the data set is written here, the data set is not singular. In this module you can create a unique dataset.

➢ *Data Cleaning*

It is used to check and correct data errors in the data maintenance element. It is used to eliminate repetition of behaviour. Data cleaning is used to clean dirty files containing missing or outdated data and to detect erroneous data from various systems. It plays an important role in design.

VI. RESULT AND DISCUSSION

In our daily life without food no one could able to sustain in this world. As per that situation the data is collected from various sensors which tends to be open source and it could be classified for training and testing. All the data that has been collected by using the sensor will be calculated using machine learning algorithm for the accurate prediction of harvesting. By doing so we may able to calculate the better crop yielding in the appropriate soil. As we provide various inputs that are collected by sensors and later we own to collect the prediction rate to about 96% of accuracy.

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