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Crop Yield Prediction Using Machine Learning

C. K. Srinivas[1], Lavanya M[2], Monisha L[3], Sai Kalyan Y[4], Satish Reddy[5]
[1]*Assistant Professor and Research Scholar, VTU Belagavi.*
[2, 4, 5]*Department of Computer Science, BITM, Ballari, India*

***Abstract:** Crop yield prediction is an application that helps farmers to improve crop yield. As selection of every crop is very important in agricultural planning, it mainly depends on market price, climate and production rate. The proposed project predicts the crop yield quantity, based on the following factors Temperature, Humidity, Moisture level of soil and area of field. The rate of yield predicted by our proposed project is displayed as an output to the user that aids the farmer to harvest the crop.*

I. INTRODUCTION

Agriculture is most important sector of Indian Economy. Indian agriculture sectors accounts for 18% of India's GDP and provides employment to 50% of the country's workforce. Most farmers were relied on their long-terms experiences within the field on particular crops to expect a better yield within the next harvesting period but still they don't get worth price of the crops. Due to improper irrigation or inappropriate crops selection or also sometimes the crop yield is a smaller amount then the expected. The outcome of the crop primarily depends on parameters such as sunlight(temperature), soil(ph.), water, rainfall and humidity. By analysing the soil and atmosphere at particular region in order to have more crop yield and net crop yield can be predicted. This prediction can help farmers. To choose appropriate crops for his or her farm consistent with the soil type, temperature, humidity, water level, spacing depth, soil PH, season, fertilizer and months. Crop yield estimation is a difficult task since it is affected by various factors such as genetic potential of crop cultivator, soil, weather, cultivation practices and biotic stress. Several methods of crop yield estimation have been developed such as statistical, agrometeorological, empirical, biophysical, mechanistic.

II. LITERATURE SURVEY

In paper [1], the author proposed an approach to this paper focus on predicting the yield of the crop based on the existing data by using Random Forest algorithm. The prediction will helps to the farmer to predict the yield of the crop before cultivating onto the agriculture field. To predict the crop yield in future accurately Random Forest, a most powerful and popular supervised machine learning algorithm is employed.

In Paper [2], This paper helped us to analyse we can attain an accurate crop yield prediction using the Random Forest algorithm. Random Forest algorithm achieves a largest number of crop yield models with a lowest model. It is suitable for enormous crop yield prediction in agricultural planning. This makes the farmers to require the proper decision for right crop such the agricultural sector are going to be developed by innovative ideas.

In paper [3], This paper helped us to analyse amount of rainfall in the region, soil composition can be determined. All these attributes of knowledge are going to be analysed, train the info with various suitable machine learning algorithms for creating a model. The system comes with a model to be precise and accurate in predicting crop yield and deliver the top user with proper recommendations about required fertilizer ratio supported atmospheric and soil parameters of the land which enhance to extend the crop yield and increase farmer revenue. In paper [4], The output of this work would produce within the system, a set of rules (Knowledge base, which learns with more training from data sets) that helps the farmers pick most reliable crops to be grown for this external factor, with least possible chances of losses. This paper presents survey for various yield prediction methods. Agriculture prediction would help the agricultural bodies so as to support farmers for creating meaningful and profitable decisions regarding crop selection and methods of agriculture.

III. PROBLEM STATEMENT

To Design and Develop a software system to predict the crop yield from dataset by using machine learning techniques.

IV. METHODOLOGY

The outcome of crop yield primarily depends on parameters like sort of crop, seed type and environmental parameters like sunlight (Temperature), soil (ph), water (ph), rainfall and humidity. By analyzing the soil and atmosphere at particular region best crop so as to possess more crop yield and therefore the net crop yield are often predicted.

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This prediction will help the farmers. To choose appropriate crops for his or her farm consistent with the soil type, temperature, humidity, water level, spacing depth, soil PH, season, fertilizer and months. The type of soil plays a major role in the crop yield. Suggesting the use of fertilizers may help the farmers to make the best decision for crop situation. Based on the soil type and soil PH we suggest what kind of fertilizer should be used for particular crop.

A. Randomforest

Random Forest algorithm is a supervised classification algorithm. We can see it from its name, which is to make a forest by how and make it random. There is an immediate relationship between the amount of trees within the forest and therefore the results it can get: the larger the amount of trees, the more accurate the result. But one thing to notice is that creating the forest isn't an equivalent as constructing the choice with information gain or gain index approach.There are two stages in Random Forest algorithm, one is random forest creation, theother is to make a prediction from the random forest classifier created in the first stage. The whole process is shown below, and it's easy to understand using thefigure.firstly, shows the Random Forest creation pseudocode:

1) Randomly select "K" features from total "m" features where k <<m
2) Among the "K" features, calculate the node "d" using the best splitpoint
3) Split the node into daughter nodes using the bestsplit
4) Repeat the a to c steps until "l" number of nodes has beenreached
5) Buildforestbyrepeatingstepsatodfor"n"numbertimestocreate"n"numberoftrees.

In the next stage, with the random forest classifier created, we will make the prediction. Therandom forest prediction pseudocode is shown below:

a) Takesthetestfeaturesandusetherulesofeachrandomlycreateddecisiontreetopredict the outcome and stores the predicted outcome(target)
b) Calculate the votes for each predictedtarget
c) Consider the high voted predicted target as the final prediction from the random forest algorithm

B. System Architecture

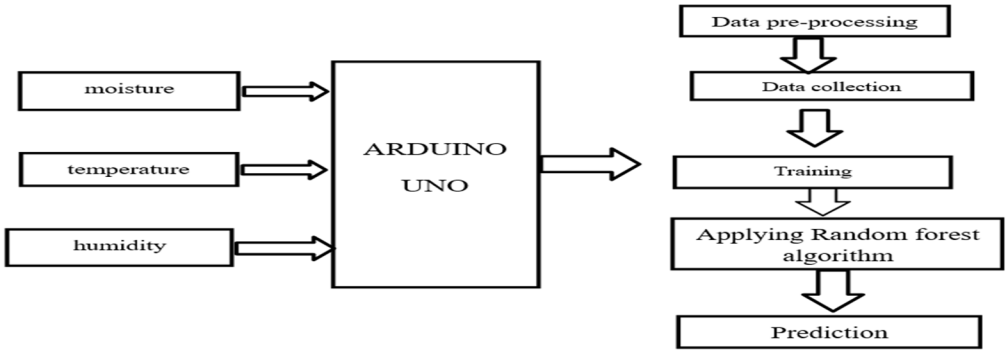


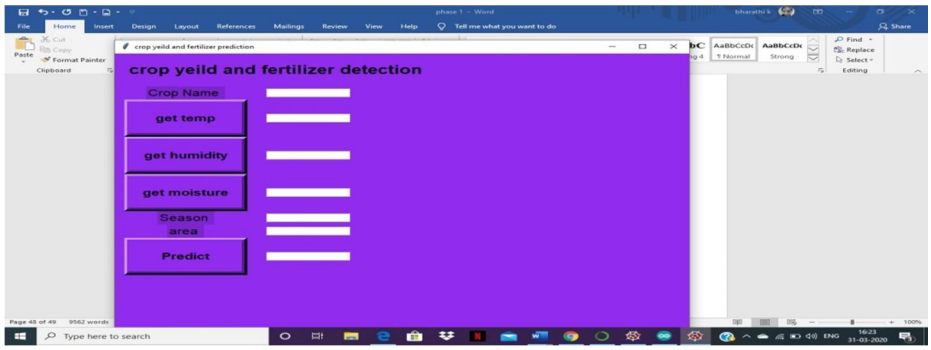
FIG 1. System Architecture

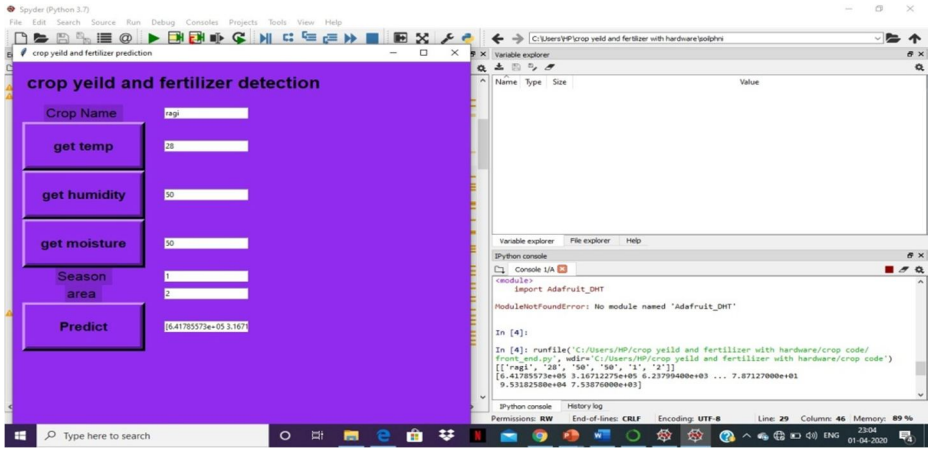
V. RESULT& DISCUSSION

The Proposed system is the prediction of crop yield based on the mechanism of Machine Learning to ensure uninterrupted services for farmers. We used Machine Learning Technology for proposed system which helps farmer to predict the crop yield. The Results are expressed as below lines.

A. The first step to input the state, district, crop, temperature, humidity of soil, moisture level, area.
B. After providing inputs yield of crop is given as output in first module.
C. The second step is to input the input the amount of Nitrogen, Potassium, and Phosphorous in the soil.
D. Later we gain the output of Fertilizers to be used for yield of crop

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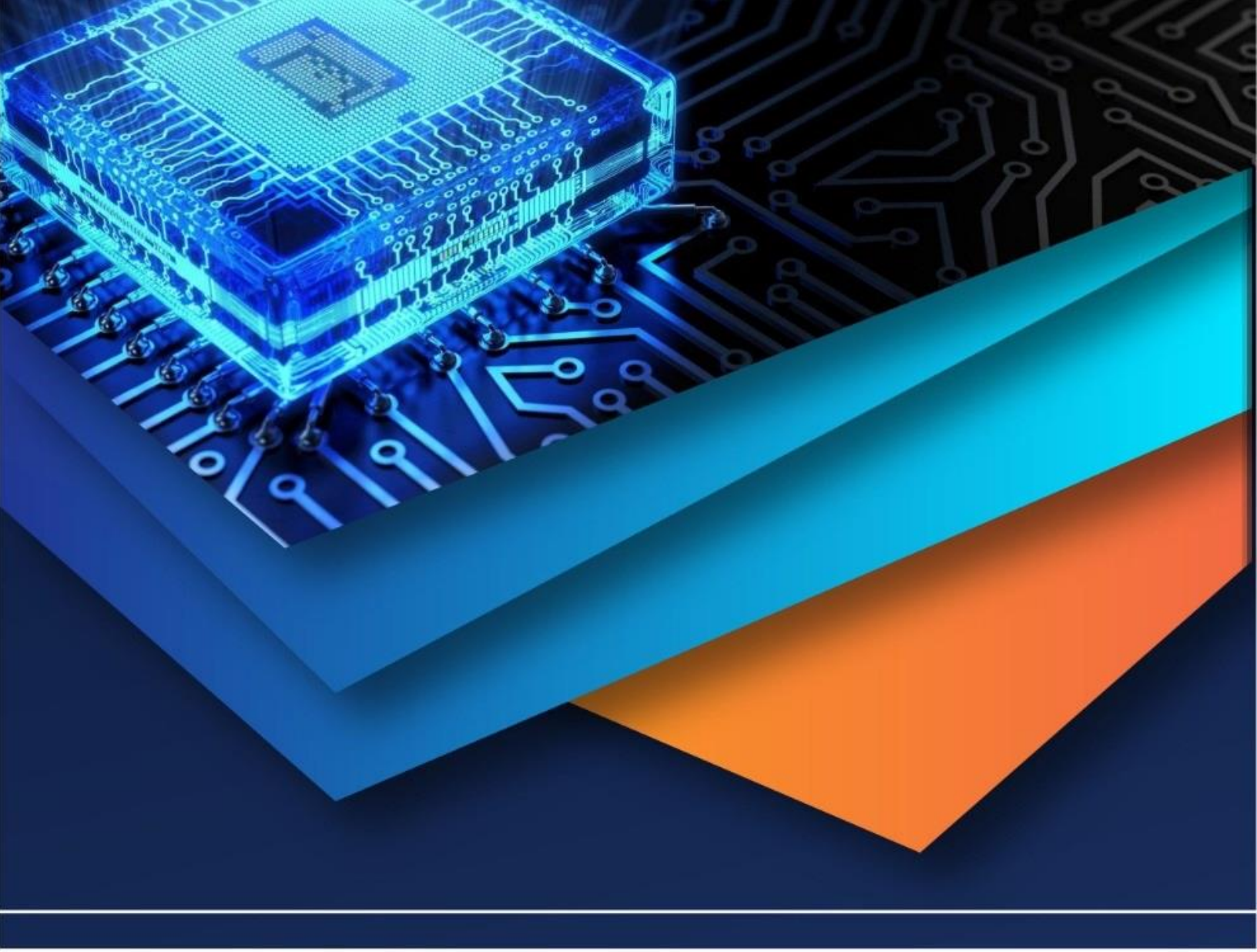
VI. CONCLUSION

Crop yield prediction and efficient use of fertilizer is successfully predicted and also found the efficient algorithms, obtained the most efficient output of the yield. Using this application becomes easier to farmer to understand the yield rate of the crop, he is going to sow in that season.

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