IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, July 2022
Impact Factor: 6.252

Crop Yield Prediction based on Indian Agriculture using Machine Learning

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Abstract: *In India, we all know that Agriculture is the backbone of the country. This paper predicts the yield of almost all kinds of crops that are planted in India. This script makes novel by the usage of simple parameters like State, district, season, area and the user can predict the yield of the crop in which year he or she wants to. The paper uses advanced regression techniques like Kernel Ridge, Lasso and ENet algorithms to predict the yield and uses the concept of Stacking Regression for enhancing the algorithms to give a better prediction. To be precise and accurate in predicting crop yield and deliver the end user with proper recommendations about required fertilizer ratio based on soil parameters.*

Keywords: Crop Prediction

I. INTRODUCTION

India is the land of agriculture and it is the major source of economy.70% of Indian population directly relies on agriculture. The common problem existing among the young Indian farmers is to choose the right crop based on the soil requirements. Due to this, they face a serious setback in productivity. Our work proposes to help farmers determine the soil quality by doing analysis on its various parameters and to suggest crops based on the results obtained using data mining approach. The system uses the Classification algorithm of Support Vector Machine to improve the efficiency of Crop Recommendation System. The system maps the soil and crop data to predict the list of suitable crops for the soil and it also provides the information about nutrients which are deficient in soil for the particular crop. Hence it leaves upon the user to decide on the crop to be sown. Thus, the system helps to provide knowledge to the dilettante farmers.

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Agriculture is an important application in India. The modern technologies can change the situation of farmers and decisions making in agricultural field in a better way. Python is used as a front end for analyzing the agricultural data set. Jupyter Notebook is the data mining tool used to predict the crop production.

The parameter includes in the dataset are precipitation, temperature, reference crop, evapotranspiration, area, production and yield for the season from January to December for the years 2000 to 2018. The data mining techniques like K-Means Clustering, KNN, SVM, and Bayesian network algorithm where high accuracy can be achieved. Formers predicting manually the demand of grains and vegetable so its effect to formers economically to overcome this problem we are proposed machine learning auto demand and yield prediction process.

II. LITERATURE REVIEW

Machine learning in Agriculture is a Novel field, a great deal of work has been done in field of Agriculture utilizing Machine learning. There are diverse guaging philosophies created and assessed by the specialists everywhere throughout the world in the field of farming or related sciences. Agricultural scientists in Pakistan have demonstrated

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that endeavors of harvest yield amplification through expert pesticide state strategies have prompted a hazardously high pesticide use. These examinations have revealed negative relationship between's pesticide use and harvest yield . In their investigation they have explained that how data mining incorporated farming information including irritation exploring, pesticide utilization and meteorological information are helpful for streamlining of pesticide use.

Topical data identified with agribusiness which has spatial properties was accounted for in one of the study. Their research went for perceiving patterns in farming creation with references to the accessibility of information assets. K-means method turned into applied to carry out gauges of the contamination in the air, the k- nearest neighbor become connected for mimicking day by day precipitations and other climate elements ,and numerous ability changes of the weather situations are dissected utilizing SVM. Statistics mining techniques are often used to have a look at soil qualities. As example, the k- means method is used for segmenting soils in mixture with GPS-based technology. A decision tree classifier for agriculture information turned into proposed .This new classifier uses new facts expression and can address each entire records and in entire records. Inside the test,10-fold cross validation technique is used to check the data set, horse-colic data set and soybean data set. Their results showed the proposed selection tree is capable of classifying all styles of agriculture records. A yield prediction version turned into proposed in one of the take a look at which makes use of data mining techniques for category and prediction. This model worked on enter parameters crop name, land location, soil type, soil ph, pest information, climate, water stage, seed type and this model anticipated the plant boom and plant diseases and therefore enabled to select the nice crop based on climate information and required parameters.

III. ARCHITECTURE DIAGRAM

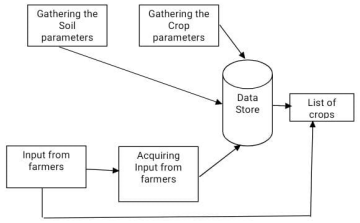

Figure:Architecture Diagram

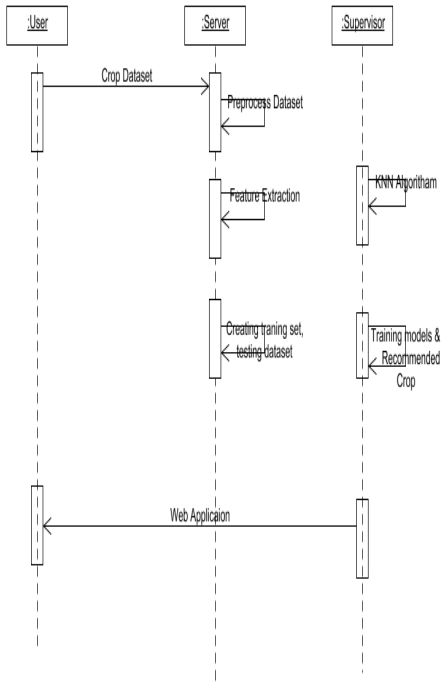

Figure: Sequence Diagram

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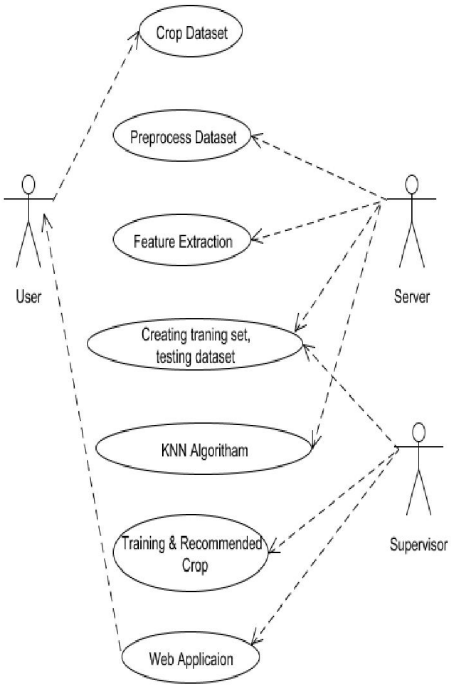

Figure: UseCase Diagram

IV. METHODOLOGY

The system predicts the crop yield accordingly alongside it provide fertiliser recommendation if needed depending upon the standard of soil. The functionality of the architecture (Fig.4.) is as follows: The system takes inputs pH value (based on percentage of nutrient) and site from the user. Result processing is done by two controllers. Location is employed as an input to controller 1, alongside the utilization of third party applications like APIs for weather and temperature, sort of soil, nutrient value of the soil therein region, amount of rainfall within the region, soil composition are often determined. pH value is given as an input to controller 2, from which alkalinity of the soil is decided. Along with it, percentage of nutrients like Nitrogen(N), Phosphorous(P), Potassium(K), Sulphur (S), Magnesium (Mg), Calcium (Ca), Iron (Fe), Manganese, Boron and Zinc and Organic matter can be obtained. The results of the controller 1 and controller 2 are compared with a predefined “nutrients” data store. These compared results are supplied to controller 3 wherein the mixture of the above results and therefore the predefined data set present within the crop data store is compared.

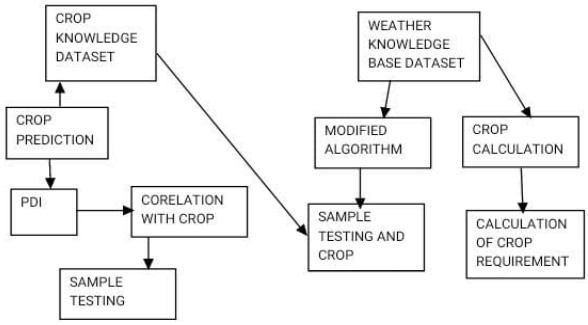

Figure: Methodology

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V. CROP PREDICTION

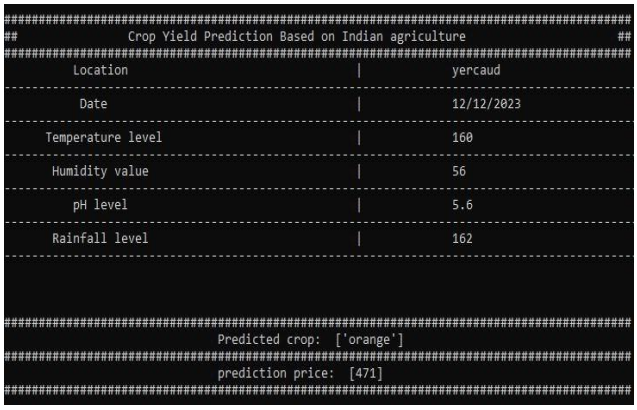

Figure 5: Crop Prediction

VI. CONCLUSION

Agriculture being an important part of our economy, it is essential to ensure that the even the smallest investment done in agriculture sector should be taken care of and when it comes to investment, crop seeds are one of them. So it is essential to check if the correct crop has been chosen for a land holding with matches its requirements to benefit the nation in general and farmer in particular. Our future work aims at developing this model with more soil attributes and with larger data set.

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