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Crop Prediction Using Machine Learning

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Abstract: *Agricultural industry plays a major role in the process of economic development as well as the Gross Domestic Product of India. The lack of scientific approaches to soil fertility has become a major challenge for the industry. Since most farmers are not familiar with the concepts of soil nutrients, they tend to start their cultivation by assuming myths and assumptions. The project aims at suggesting the best crop based on soil fertility and also recommends a fertilizer plan to minimize the number of fertilizers that are needed. The project developed a cross-platform web application to suggest the best crops according to available soil fertility. Further, a fertilizer plan will be suggested based on the contents of Nitrogen (N), Phosphorus (P), and Potassium (K) values to optimize fertilizer usage to increase profitability and avoid soil degradation.*

Keywords:*Crop Recommendation, Fertilizer Recommendation, Machine Learning, Agriculture.*

• INTRODUCTION

Farming is individual of the important subdivisions that influences a country's financial development. In nations like India, the plurality of the people is contingent on farming for their occupation. Many new electronics, in the way that Machine Learning and Deep Learning, are being executed into farming because it is smooth for ranchers to evolve and be dramatic their yield. In this project, I present a site at which point the following uses are executed; Crop advice and Fertilizer advice individually.

1. In the crop approval use, the consumer can determine the soil dossier from their side and the use will anticipate that crop concede possibility the consumer evolve.
2. For the manure advice request, the consumer can recommendation the soil dossier and the type of crop they are increasing, and the request will foresee what the soil lacks or has extravagance of and will advise bettering.

2. LITERATURE SURVEY

A. Soil classification using machine learning methods and crop suggestion based on soil series we have proposed a model that can predict soil series with land type and according to prediction it can suggest suitable crops. Using Machine learning Algorithms.

Easy to use and Time consuming

B. Soil Classification & Characterization Using Image Processing

In Rajasthan there are various types of soil available: sandy, saline, alkaline, calcareous soil are also present, we can classify the soil by image processing method in which we can see the colour, energy, HSV etc.

Easy to use and Time consuming

3. PROPOSED SYSTEM

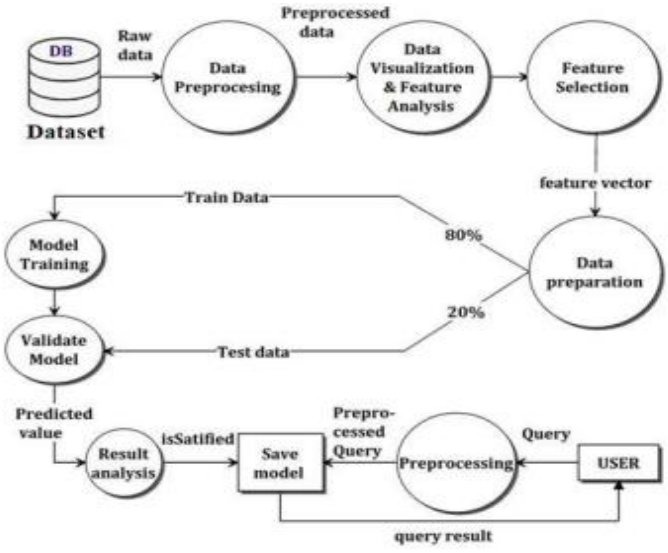
The point of the proposed framework is to assist ranchers with developing harvests for better yield. The harvests chosen in this work depend on significant yields from chosen areas.

The chosen crops are Rice, Jowar, Wheat, Soyabean, and Sunflower, Cotton, Sugarcane, Tobacco, Onion, Dry Chili, and so on.

There is 2 cycle in proposed work:

- Crop Yield Prediction: Crop Yield Prediction should be possible by utilizing crop yield information, supplements, and area information. These data sources are passed to Random Forest and Support Vector Machine calculations. These calculations will foresee crops in view of present sources of info.
- Compost Recommendation: Fertilizer Recommendation should be possible by utilizing manure information, harvest, and area information. In this part, appropriate yields and required compost for each harvest are suggested.

Outsider applications are utilized to get Weather data, Temperature data along with Humidity and precipitation.

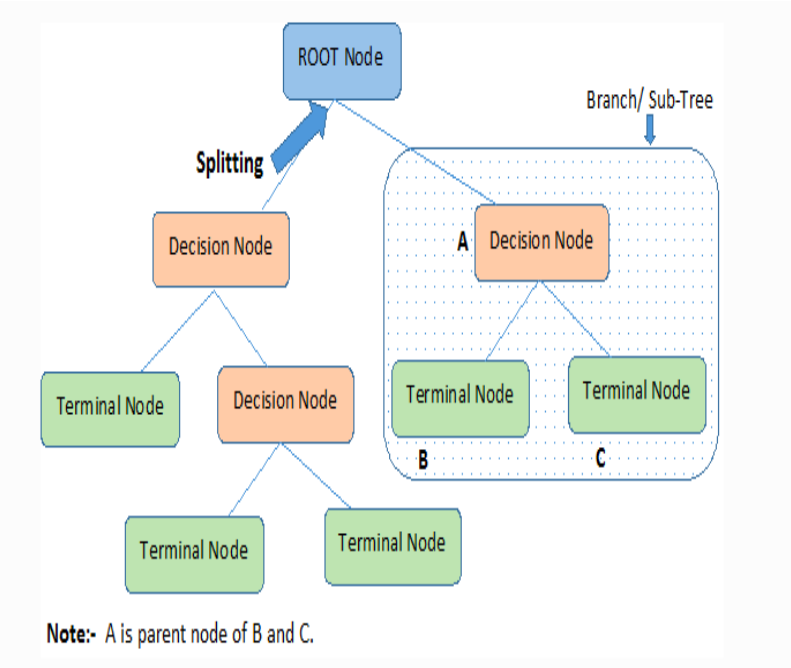


4. METHODOLOGY

1. Decision Tree:

The Decision Tree algorithm belongs to the family of supervised learning algorithms. The objective of utilizing a Decision Tree is to make a preparation model that can be utilized to foresee the class or worth of the objective variable by gaining straightforward choice guidelines surmised from earlier data(training information).

Accuracy is 90.0 %

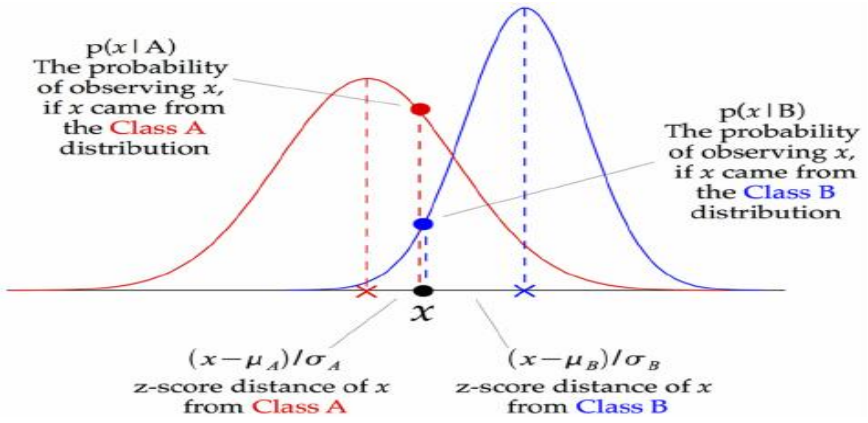


2. Gaussian Naive Bayes

Gaussian Naive Bayes is a variation of Naive Bayes that follows Gaussian normal distribution and supports continuous data.

Naive Bayes is a group of supervised machine learning classification in view of the Bayes hypothesis.

Accuracy is 99.09 %

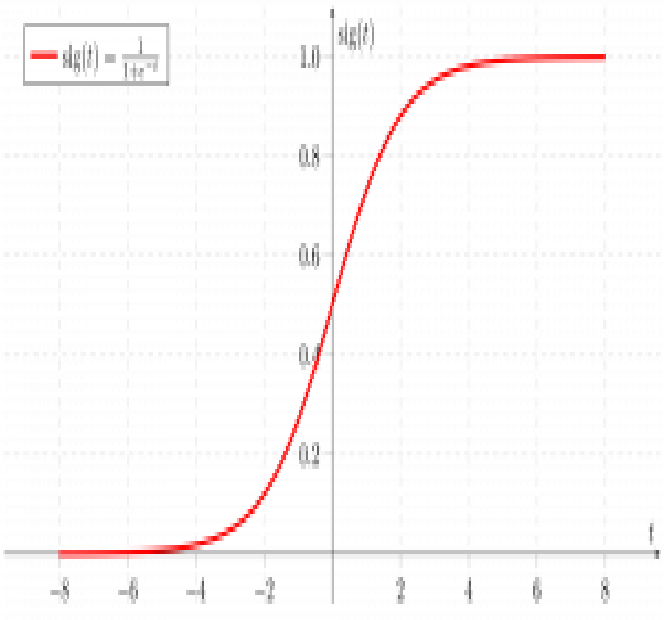


3. Logistic Regression:

Logistic Regression is essentially a supervised characterization calculation. In a characterization issue, the objective variable(or yield), y, can take just discrete qualities for a given arrangement of features(or inputs), X.

Accuracy is 95.22 %

$$g(z) = \frac{1}{1+e^{-z}}$$



5. DATASET

Crop Recommendation Dataset -

This dataset was built by augmenting datasets of rainfall, climate and fertilizer data available for India.

Data fields -

- N - ratio of Nitrogen content in soil
- P - ratio of Phosphorus content in soil
- K - ratio of Potassium content in soil
- temperature - temperature in degree Celsius
- humidity - relative humidity in %

ph - ph value of the soil

6. SYSTEM DESIGN

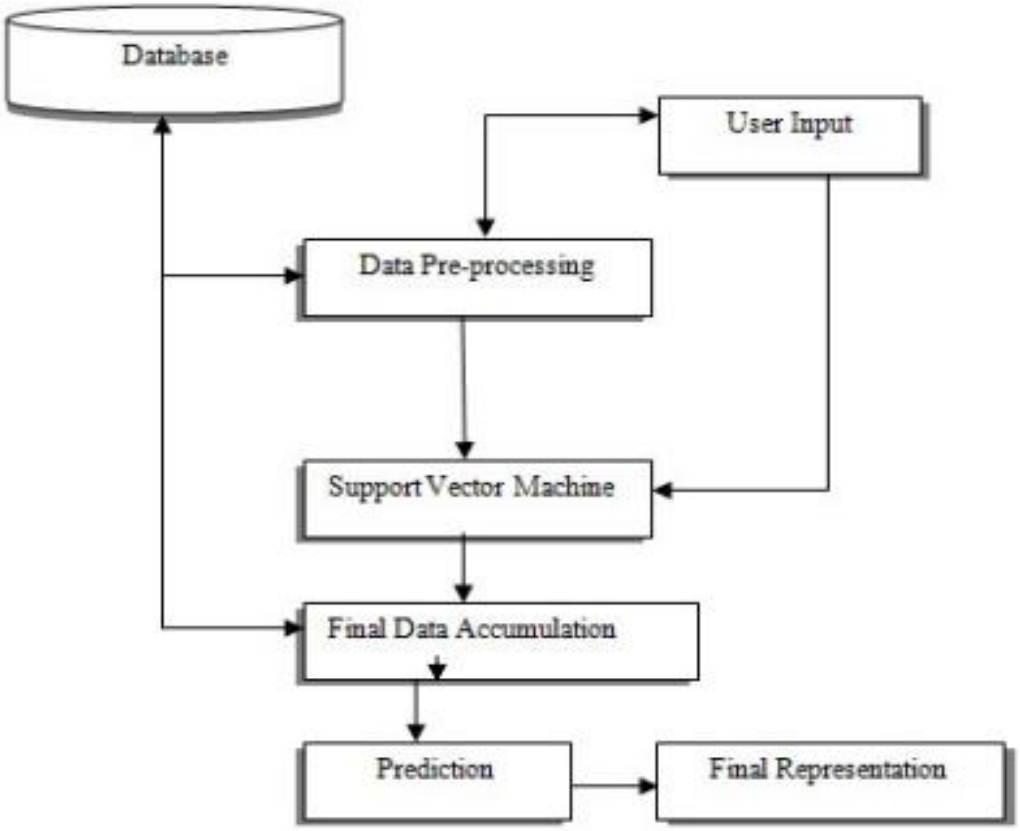


fig. Work – flow diagram

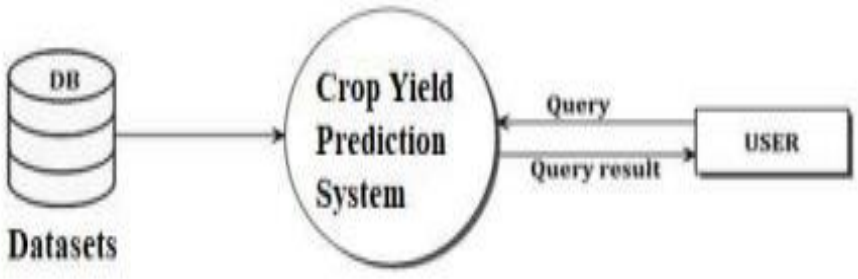


fig. Data flow diagram(level 1)

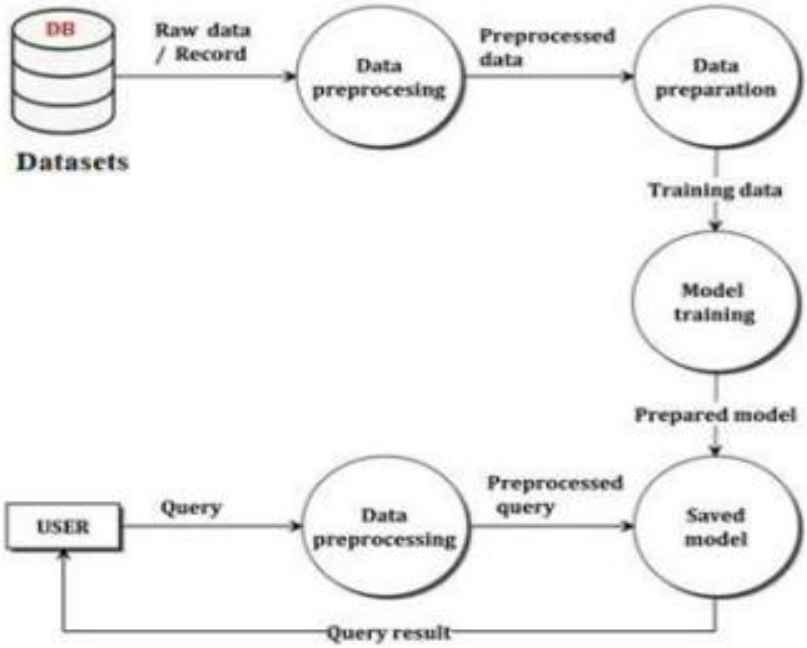


fig. Data flow diagram(level 2)

7. CONCLUSION

This project highlighted the limitations of current systems and their practical usage in yield prediction. Then walks through a viable yield prediction system for the farmers, a proposed system provides connectivity to farmers via a web application. The web application includes multiple features that users can leverage for the selection of a crop. The inbuilt predictor system helps the farmers to predict the yield of a given crop. The inbuilt recommender system allows a user exploration of the possible crops and their yield to make more educated decisions. For yield accuracy, various machine learning algorithms such as Decision Tree, Gaussian Naive Bayes, Logistic Regression, Random Forest, and XGBoost were implemented and tested on the given datasets. Results indicate that XGBoost gives the best result.

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