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RAGI YIELD PREDICTION BASED ON MACHINE LEARNING USING XGB REGRESSOR ALGORITHM

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Abstract— In many areas, ragi is a significant staple crop that is valued for both its nutritional content and resistance to harsh environmental factors. For farmers to optimise cultivation techniques, schedule harvests, and ensure effective resource use, accurate yield prediction is essential. The dataset is split into training and testing subsets during the model-training stage. The XGB Regressor algorithm picks up patterns and connections between the input features and the related Ragi yields as it learns from the training data. Several assessment metrics, including mean squared error (MSE), root mean squared error (RMSE), and coefficient of determination (R-squared), are used to assess the performance of the model. The model can be used to forecast Ragi yields for fresh, unforeseen data once it has been trained and validated. Farmers can input climatic and agricultural characteristics now or in the future, and the model will produce an estimate of the anticipated Ragi output. In order to plan crop rotations, use irrigation and fertiliser efficiently, and reduce potential output losses, farmers can benefit greatly from this prediction. This study's advantages include better agricultural planning and resource management, which can boost production, cut costs, and improve sustainability in the cultivation of ragi. The model provides precise yield projections by utilising the XGB Regressor algorithm, which can help Ragi farmers make better-informed decisions and achieve better results.

I. INTRODUCTION

A healthy grain crop called ragi (finger millet) is one that is commonly grown throughout the world. For farmers to make informed judgements about crop management, resource allocation, and planning, accurate ragi crop yield predictions are crucial. In the past, yield estimation has been based on opinions and past experience. However, the introduction of machine learning algorithms presents a chance to create prediction models that are more precise and effective.

This work uses the XGBoost (XGB) Regressor algorithm to specifically predict Ragi crop yields using machine learning approaches. A potent and well-known machine learning method, the XGB Regressor can handle complicated non-linear interactions and generate precise predictions. We hope to create a model using this technique that will help farmers estimate Ragi yields depending on different input parameters.

The suggested methodology entails gathering historical data on the cultivation of Ragi, including information on soil qualities, agrarian practises, such as irrigation and fertiliser use, and climate variables (such as temperature, rainfall, and humidity). The predictive model is trained and validated using this data as the basis.

The XGB Regressor algorithm learns from the input data during the training phase by spotting trends and connections between the input features and the related Ragi yields. The technique is highly suited for accurate crop yield prediction because it can capture complicated connections between variables.

The dataset is split into training and testing subsets in order to assess the model's performance. The accuracy and dependability of the predictions are evaluated using a variety of assessment measures, including mean squared error (MSE), root mean square error (RMSE), and coefficient of determination (R-squared).The model can be used to forecast Ragi yields using fresh, previously unexplored data after being trained and validated. Farmers can input climatic and agricultural characteristics now or in the future, and the model will produce an estimate of the anticipated Ragi output. Informed decisions about crop rotation, timing of irrigation, fertiliser use, and other important aspects of ragi farming can be made by farmers with the help of this knowledge..

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II. LITERATURE SURVEY

1. **Gupta's Machine Learning Approaches for Crop Yield Prediction (2020) [1]**. An overview of machine learning methods used for crop yield prediction is given in this thorough review. It studies the use of several algorithms, such as XGBoost, in predicting yields for various crops, including Ragi. The report identifies areas for further investigation and emphasises the potential of machine learning in enhancing yield prediction accuracy.

2. **Jayalakshmi K's Finger Millet (Ragi) Yield Prediction using Machine Learning Techniques (2020) [2].** This study focuses especially on machine learning-based yield prediction for ragi. It examines the effectiveness of various algorithms, including XGBoost, and assesses how well they estimate Ragi yields using climatic and soil variables. The outcomes showcase XGBoost's capability for agricultural applications by showing how well it can forecast Ragi yields.

3. **Rathore M's .Predictive Modeling of Crop Yield with Machine Learning Algorithms (2018) [3].** The paper emphasises the significance of feature selection, data preprocessing, and model evaluation for accurate yield prediction. This review article provides an in-depth analysis of various machine learning algorithms used for crop yield prediction. It discusses the strengths and limitations of various algorithms, including XGBoost, and examines their performance in predicting crop yields.

4. **Khan F's Ragi Yield Prediction using Machine Learning Techniques [4]**. This comparison study examines how well XGBoost and other machine learning methods perform in forecasting Ragi yields. The authors use historical data on ragi farming to compare the precision and effectiveness of different algorithms. The outcomes show that XGBoost is superior at correctly forecasting Ragi yields, making it an appropriate option for yield prediction applications.

III. METHODOLOGY

A crucial component of every machine learning system is data. We choose to concentrate on the Indian state of Tamilnadu for implementing the system. Data collected at the district level were important since local climates vary. To put the system into place, historical information on the crops and climate of a certain area was required.

This information was taken from many official websites. The information on the crops grown in each Maharashtra district was obtained from www.data.gov.in, and the information on the climate was obtained from www.imd.gov.in. Temperature humidity are the climatic factors that have the greatest impact on crop production. Therefore, information on these meteorological characteristics was acquired on a monthly basis.

1. **Data set collection** :We gather data from numerous sources and create datasets at this step. Additionally, the provided dataset is being used for descriptive and diagnostic analytics. There are many online sources for abstracts, including Data.gov.in and indiastat.org. The crop's annual abstracts will be used for at least ten years. These datasets typically permit time series with anarchic behaviour. The primary and necessary abstracts were combined. Global and Regional Crop Yield Predictions Using Random Forests.

1. **Data Partitioning:** The entire dataset is divided into two sections, with, for instance, 25% of the data being set aside for model testing and the other 75% being utilised to train the model.

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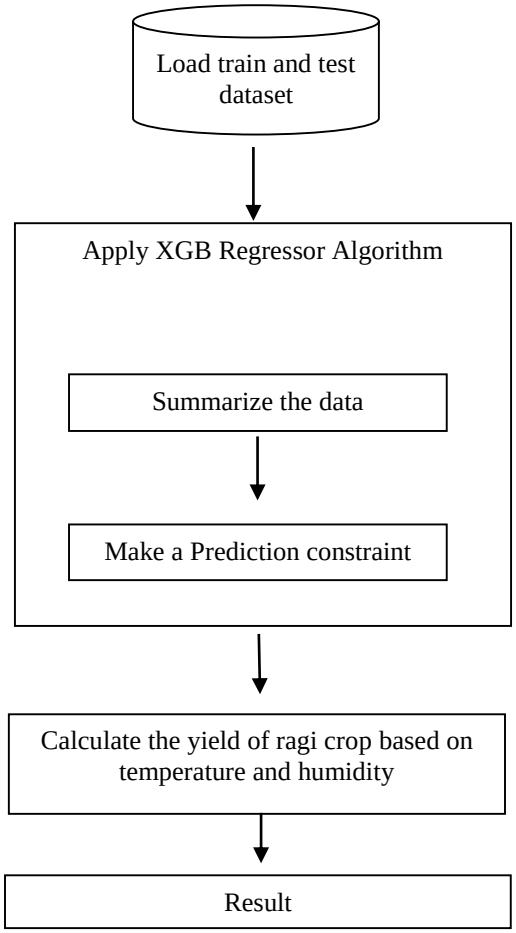

Fig 1: Demonstrated procedure

Fig 1 depicts the method used to demonstrate how the data is compiled, the XGB regressor algorithm is used, and the outcome is produced.

IV. IMPLEMENTATION AND RESULT

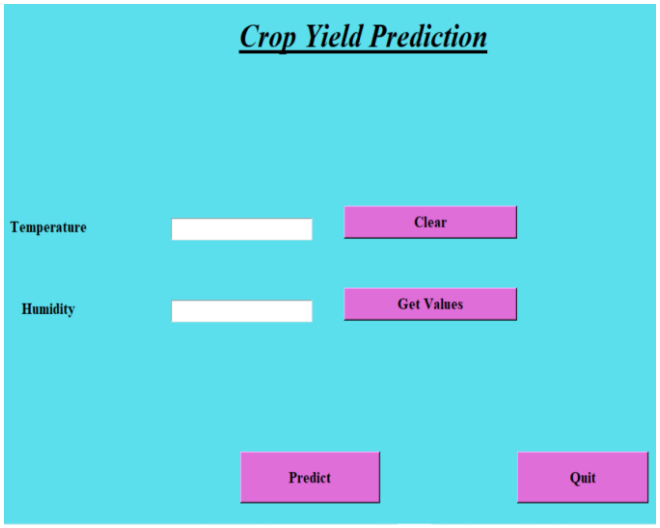

Fig 2 represents the home page of the project which takes the input and predict the yield of crop based on XGB regressor algorithm

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V. CONCLUSION

In conclusion, predicting Ragi crop yields using machine learning techniques, particularly the XGBoost (XGB) Regressor algorithm, has enormous potential for the agriculture sector. Based on different input parameters, including climate variables, soil properties, and agricultural practises, the created model shows the capability to reliably estimate Ragi yields. The XGB Regressor algorithm and historical data are combined to create a predictive model that offers farmers useful information for making educated choices about the production of Ragi. Accurate yield forecasts help farmers allocate resources more effectively, plan crop rotations, and put good irrigation and fertiliser practises into practise, ultimately increasing productivity and profitability.

Using machine learning-based yield prediction has advantages in terms of better agricultural planning, better resource management, and lower risk. Through preemptive interventions and optimum resource use, the model helps farmers reduce the possibility of output losses. Additionally, the model's precision and effectiveness allow farmers to adapt quickly to shifting climatic conditions and market demands. The cultivation of Ragi could be transformed by incorporating this predictive model into agricultural practises. It enables farmers to optimise their decision-making processes and raise overall productivity by giving them accurate yield projections. The XGB Regressor algorithm's application, which successfully captures complex correlations between input variables and Ragi yields, helps to the model's accuracy.

REFERENCES

1. P.Priya, U.Muthaiah M.Balamurugan. Predicting yield of the crop using machine learning algorithm. International Journal of Engineering Science Research Technology.
2. J.Jeong, J.Resop, N.Mueller and team. Random forests for global and regional crop yield prediction.PLoS ONE Journal.
3. Narayanan Balkrishnan and Dr. Govindarajan Muthukumarasamy. Crop production Ensemble Machine Learning model for prediction. International Journal of Computer Science and Software Engineering (IJCSSE).
4. S.Veenadhari, Dr. Bharat Misra, Dr. CD Singh.Machine learning approach for forecasting crop yield based on climatic parameters. International Conference on Computer Communication and Informatics (ICCCI).
5. Shweta K Shahane , Prajakta V Tawale. Prediction On Crop Cultivation. IInternational Journal of Advanced Research in Computer Science and Electronics Engineering (IJARCSEE) Volume 5, Issue 10, October 2016.
6. D Ramesh ,B Vishnu Vardhan. Analysis Of Crop Yield Prediction Using Data Mining Techniques. IJRET: International Journal of Research in Engineering and Technology.