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INNOVATIVE APPROACH FOR CROP YIELD PRODUCTION AND RECOMMENDATION USING MACHINE LEARNING WITH SPECIFIC PARAMETERS

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Abstract: ***Crop yield prediction is an important topic in the field of agriculture. The use of machine-learning algorithms for crop yield prediction has gained popularity in recent years due to its potential to increase agricultural sustainability and food production. It provides an overview of the latest developments in crop yield prediction using machine learning and provides an understanding of future implementation. The examines different types of machine learning algorithms, like linear Regression, Decision Tree, Random Forest, KNN, Naive Bayes, and Gradient Boosting, and their applications in crop yield prediction. Also discusses the factors that affect crop yield, such as Nitrogen(N), Potassium(K), and Phosphorous(P) the content of the soil, along with the Humidity, Rainfall, Temperature, and pH factor of the soil. It recommends the type of crop to be yielded concerning these factors and seasons, depending on which they can be incorporated into the machine learning models. Thus, this helps the farmers to know the crop yield in advance to plan and choose a crop that would give a better yield. It concludes that crop yield prediction using machine learning has enormous potential in improving agricultural sustainability and increasing food production and that future implementation will lead to more efficient and effective agricultural practices. Later we will include the use of precision agriculture, big data, and remote sensing and we build the website including a chat bot in the farmer's native language.***

Keywords: Machine Learning,Data Analytics,Agronomics.

1. INTRODUCTION

Globally, there is a greater demand for food due to rising population. The United Nations estimates that by 2030, there will be 8.5 billion people on the planet. Therefore, it is thought that in order to boost productivity in the agriculture sector, technical advancements are the crop yield and stop impending food catastrophes. Specifically, tracking the production of several crops for each. A key factor in estimating agricultural productivity is the season. To anticipate crop yields, several elements including soil, climate, temperature, etc. can be analyzed. Since machine learning (ML) models have demonstrated accurate performance for prediction and forecasting challenges in a variety of sectors, including retail, incorporating them to analyze these factors existing in the agriculture data is an intriguing approach. Since India has the second-largest population in the world and food security is of highest concern, particularly in the state of Rajasthan, we concentrated on the Indian agricultural sector in this work. Rajasthan's economy is based primarily on agriculture, which generated 25.56% of the state's total GDP in 2019–2020 . Additionally, it provides a living for the great majority of people in rural India. As a result, a lot of people rely on the seasonal production, making crop yield forecast crucial for planning and storage. Evidently, it is challenging for Indian farmers to acquire remote sensing data for crop genotyping, vegetation index, and yield prediction. As a result, knowledge on agricultural output and the factors that increase crop yield. We used crop data from the Open Government Data (OGD) platform in India and freely accessible data from Rajasthan's agriculture website. Two distinct sets of information were gathered to represent the seasons of Rabi and Kharif. We combined the gathered data set with an already-existing smart farm ontology, which captures the connections between various data elements. In addition, we created a knowledge graph that supports SPARQL querying. The outcomes of the querying process are used as input for the ML models. The goal of integrating ML

models is to deliver valuable insights, such as agricultural production predictions, which in turn help farmers make decisions that will result in high crop yields. Farmers can make use of the information in a variety of ways while preparing for the upcoming crop season based on the anticipated output. Farmers can simultaneously predict the crops that produce the most in a given season and plan accordingly based on weather conditions. For instance, if a crop requires specific soil nutrients to grow more productively, farmers might make plans to utilize the right fertilizers and aim to increase crop yield.

RELATED WORKS:

Here are the general steps involved in building a crop yield prediction model using machine learning:
Collect and preprocess data: Collect historical data related to crop yields, weather, soil conditions, and other factors. Preprocess the data by cleaning, transforming, and normalizing it as needed. Feature selection: Identify the most relevant features that will be used to train the model. For example, weather variables such as temperature, rainfall, and humidity might be important predictors of crop yield. Split the data: Split the historical data into training and testing sets. The training set is used to train the model, while the testing is used to evaluate its performance. Choose and train a model: Choose a machine learning model that is appropriate for the task, such as a linear regression, decision tree, or random forest model. Evaluate the model: Evaluate the performance of the model on the testing set using metrics such as mean absolute error or mean squared error. Use the model to make predictions: Once the model is trained and evaluated, it can be used to predictions on new data.. Continuously improve the model: As new data becomes available, the model can be retrained and refined to improve its accuracy and make more accurate predictions.

EXISTING SYSTEM:

India is an agricultural country, its providence mostly hang on agriculture provide extension and related agricultural industry outputs. In Indian agriculture, the farming is induced by downfall by high inconstancy. An agricultural development also hangs on different soil variables and gases present in atmosphere, namely Nitrogen gas, Phosphorous, Potassium, Rotation of crops, Ground wetness, Exterior degrees and climatic facets which include degrees and downfall. The online dataset is collected which includes states and districts names, growth year of crops, climatic conditions, region, mass production and which crop has to be grown. Then, the random forest classifier is applied on the dataset to verify the data. Random forest classifier is a powerful bagging technique and not a boosting technique. The model that uses supervised learning to categorize various datasets Techniques for classification and regression are included in supervised learning. It is possible to anticipate the dataset's accuracy using the supervised learning technique
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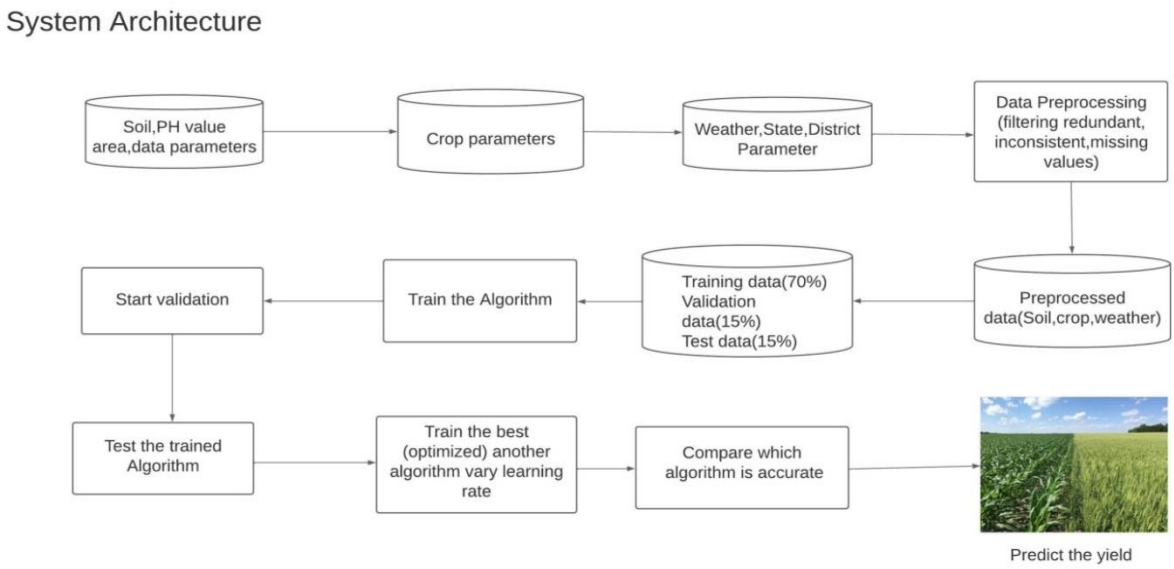
ARCHITECTURE DIAGRAM:



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PROPOSED SYSTEM

Decision-makers at all levels, including those at the national and regional levels, face a significant problem when predicting crop yields. Using an accurate crop production prediction model, farmers can help them choose what to grow and when. For decision-makers at all levels, particularly at the national and regional levels, predicting crop yields is a challenging challenge. A crop production prediction model is a tool that farmers can use to decide what and when to sow. Forecasting crop production can be done using a variety of techniques. This review study examines the research on the application of machine learning to agricultural yield prediction. The article's status as a survey or standard review is one of them. algorithm for machine learning that can classify various datasets. Attributes are crop,soil,PHlevel,Climate,area,district,state,humidity,temperature.Algorithms are used in Gradient Boosting algorithm, Decision Tree, Linear Regression, Naive Bayes, Random Forest, and KNN are examples of algorithms.

RESULTS:

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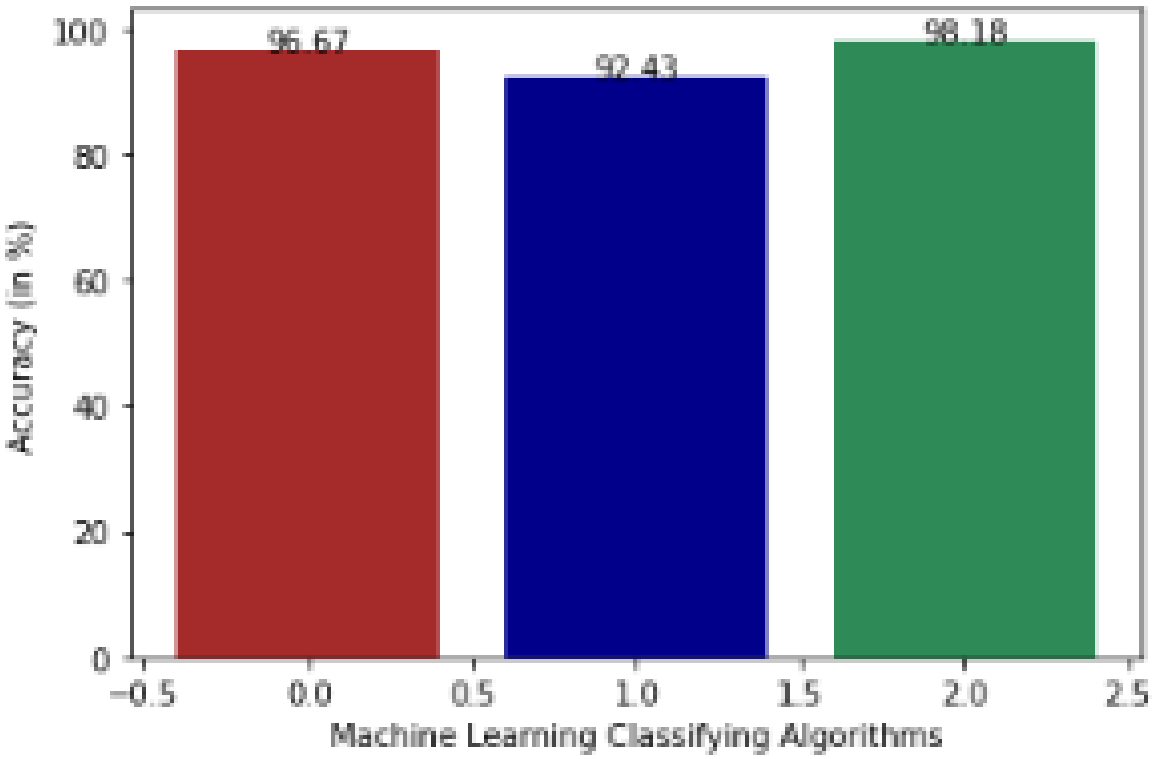

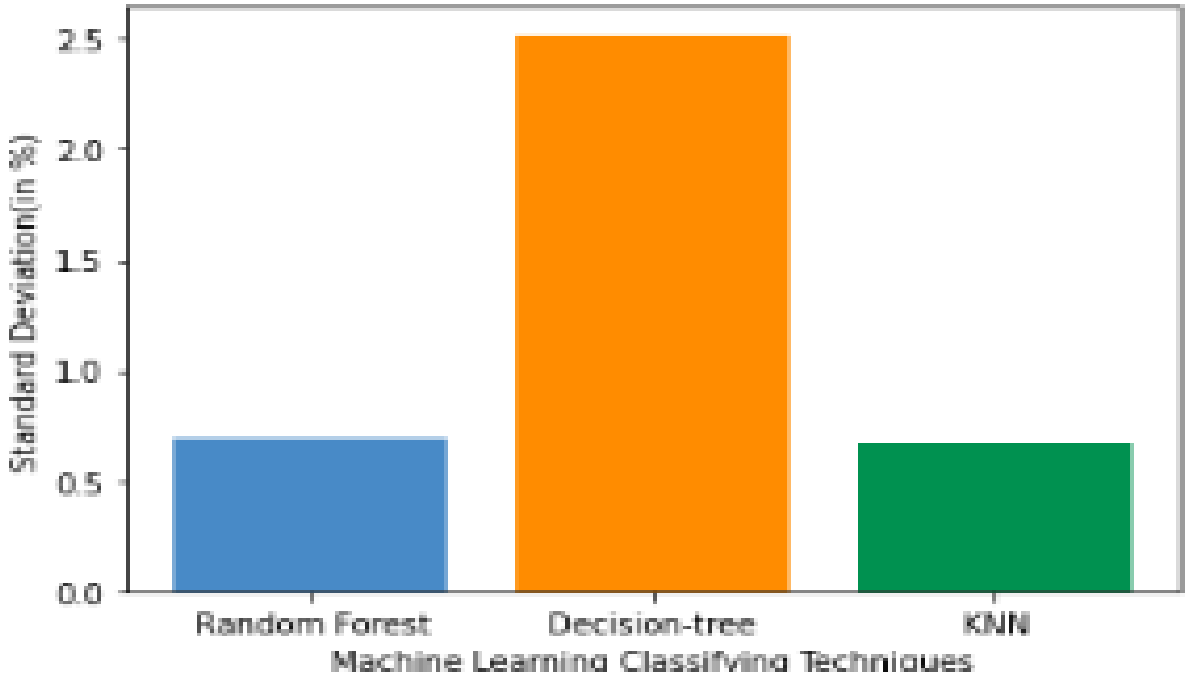

II.

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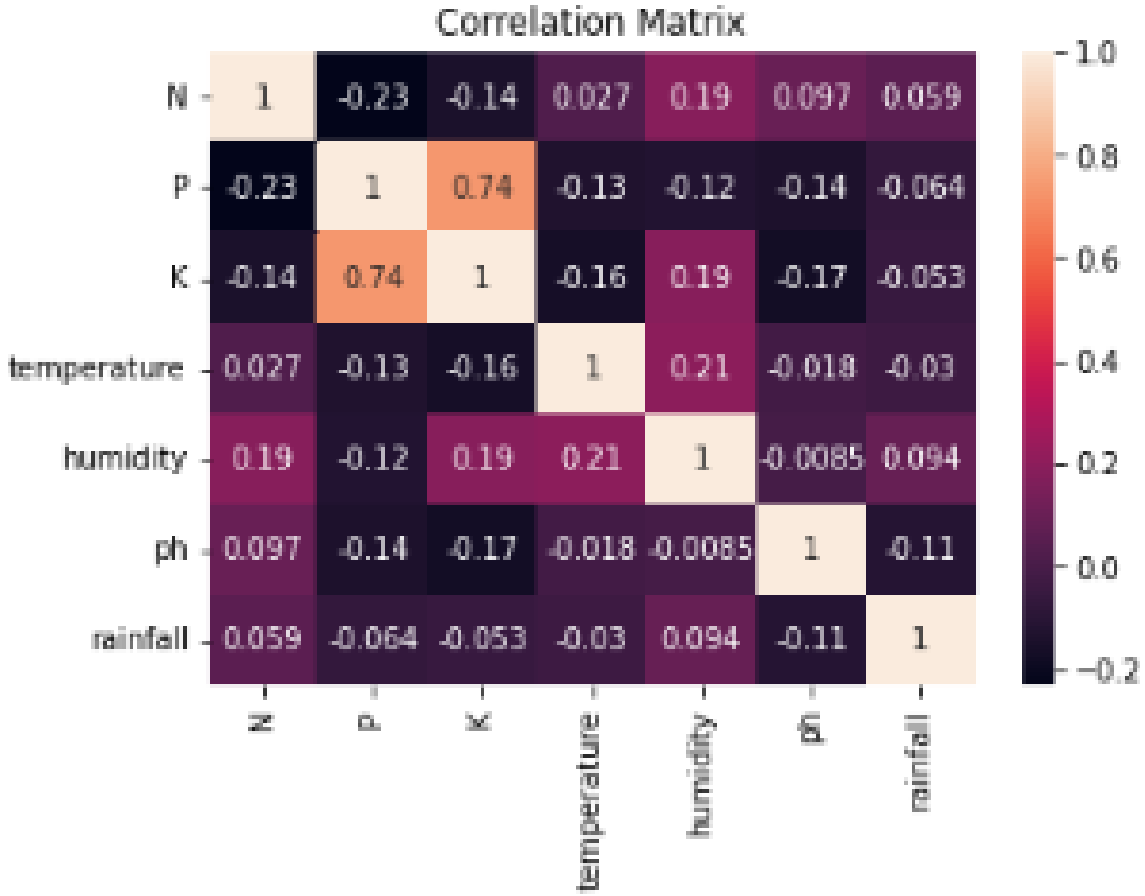

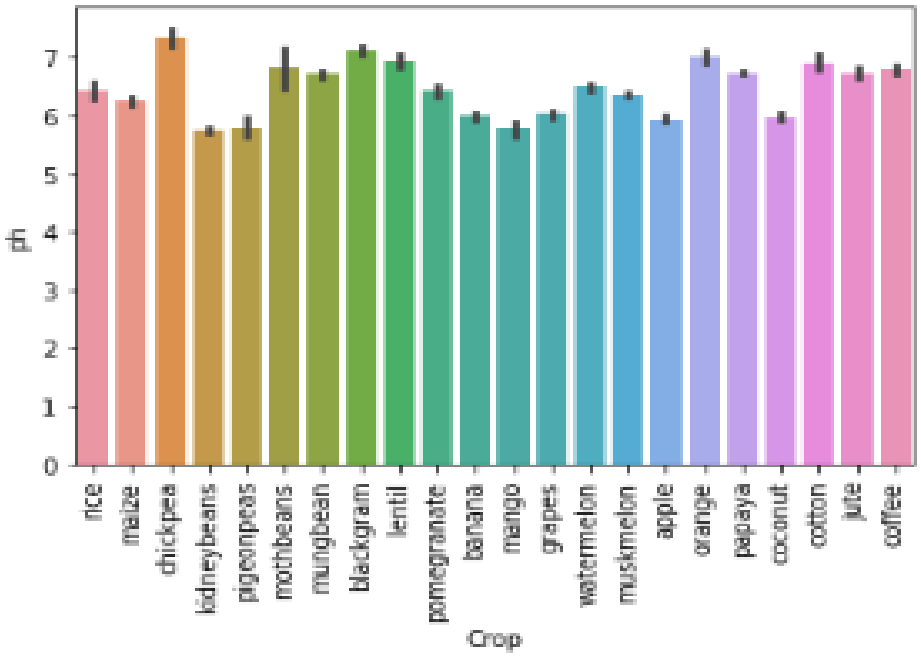

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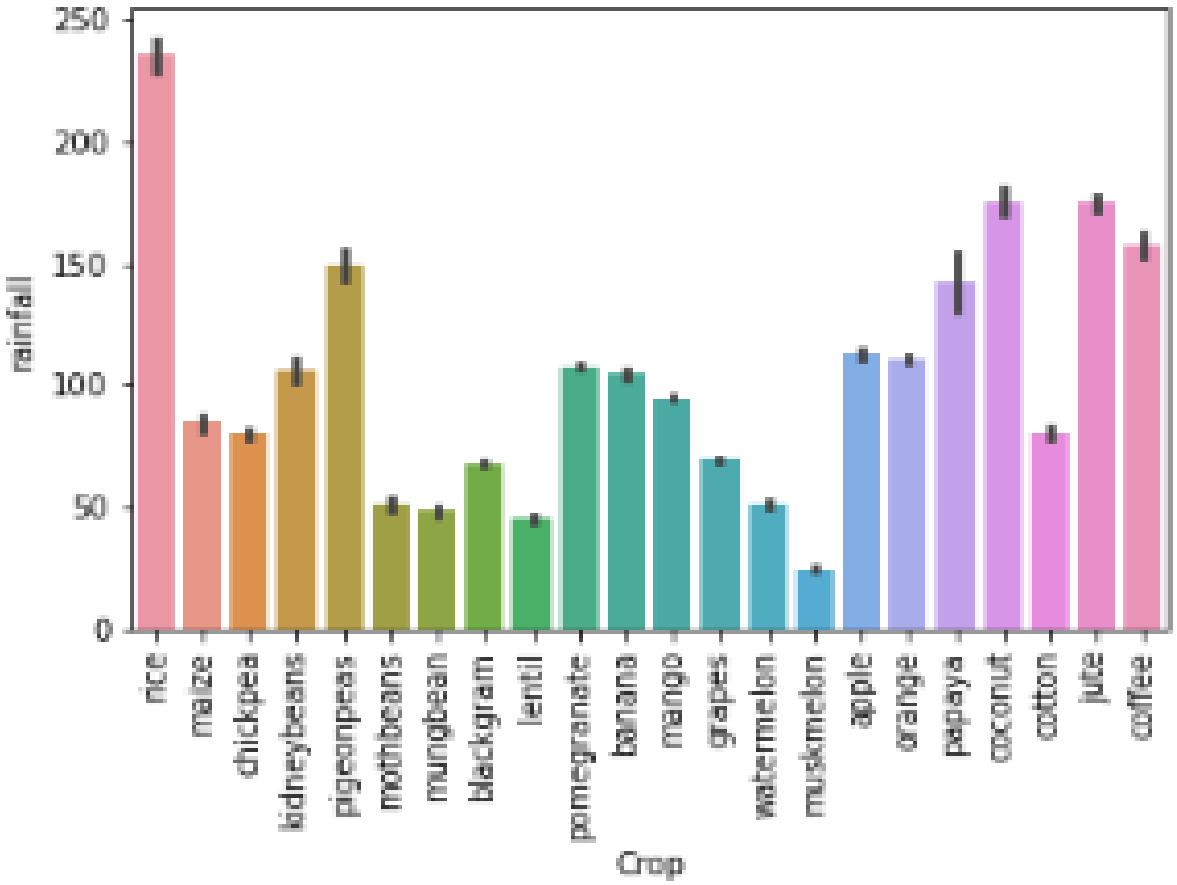

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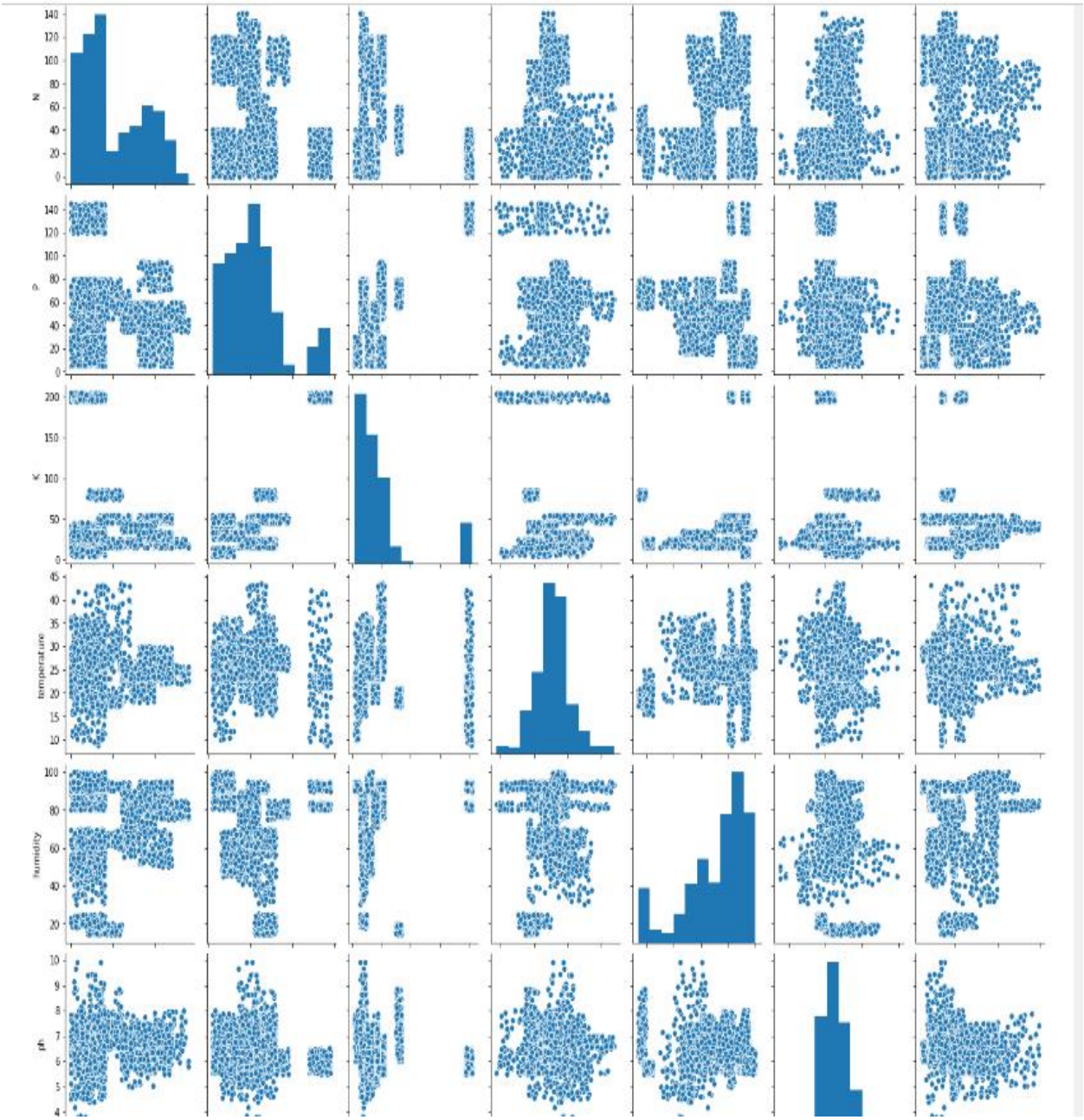

A Performance evaluation of various classifiers based on the dataset:

We compare the best fit algorithms to find the better accuracy for crop recommendation.

ALGORITHMS	ACCURACY
Decision Tree	0.967272727272727273
Naïve Bayes	0.9709090909090909
KNN classifier	0.97454545454545
Random Forest	0.98
Gradient Boosting	0.98181818181818

CONCLUSION:

Crop yield prediction is an important topic in the field of agriculture. The use of machine-learning algorithms for crop yield prediction has gained popularity in recent years due to its potential to increase agricultural sustainability and food production. It provides an overview of the latest developments in crop yield prediction using machine learning and provides an understanding of future implementation. The examines different types of machine learning algorithms, like linear Regression, Decision Tree, Random Forest, KNN, Naive Bayes, and Gradient Boosting, and their applications in crop yield prediction. Also discusses the factors that affect crop yield, such as Nitrogen(N), Potassium(K), and Phosphorous(P) the content of the soil, along with the Humidity, Rainfall, Temperature, and pH factor of the soil. It recommends the type of crop to be yielded concerning these factors and seasons, depending on which they can be incorporated into the machine learning models. Thus, this helps the farmers to know the crop yield in advance to plan and choose a crop that would give a better yield. It concludes that crop yield prediction using machine learning has enormous potential in improving agricultural sustainability and increasing food production and that future implementation will lead to more efficient and effective agricultural practices. Later we will include the use of precision agriculture, big data, and remote sensing and we build the website including a chatbot in the farmer's native language.

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