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# CROP RECOMMENDATION MODEL

**KHUSH GADA J029**  
**MANAN JAIN J036**  
**KANISH JAIN J025**



# Introduction



Precision agriculture is in trend nowadays. Precision agriculture is a modern farming technique that uses the data of soil characteristics, soil types, crop yield data, weather conditions and suggests the farmers with the most optimal crop to grow in their farms for maximum yield and profit. This technique can reduce the crop failures and will help the farmers to take informed decision about their farming strategy.

In order to mitigate the agrarian crisis in the current status quo, there is a need for better recommendation systems to alleviate the crisis by helping the farmers to make an informed decision before starting the cultivation of crops.





# PROBLEM STATEMENT

Agricultural productivity depends on factors like soil quality, climate, temperature, and rainfall. Farmers often face challenges in selecting the right crop, leading to low yields and inefficient resource use. This project aims to develop a machine learning-based Crop Recommendation System that analyzes soil and climate parameters to suggest the most suitable crop. By leveraging data-driven insights, the model will help farmers maximize yield, optimize resource usage, and promote sustainable farming practices.





# GOAL OF THE MODEL

To recommend optimum crops to be cultivated by farmers based on several parameters and help them make an informed decision before cultivation

Collect detailed environmental, crop, and market data to train machine learning models that predict optimal crop suitability and yield. Develop a user-friendly platform providing personalized recommendations, incorporating real-time updates and farmer feedback for continuous improvement.



# Challenges and Barriers Agriculture

## Soil Degradation & Nutrient Imbalance

Affected States: Punjab, Haryana, UP, Bihar, Maharashtra

Problems: Overuse of fertilizers, soil erosion, and salinity.

Solutions: Soil testing, organic farming, balanced fertilizer use.

## Climate Change Impact

Affected States: Rajasthan, Maharashtra, Gujarat, Tamil Nadu, Assam

Problems: Rising temperatures, erratic rainfall, droughts, and floods.

Solutions: Drought-resistant crops, rainwater harvesting, adaptive farming.

## Water Scarcity & Rainfall Issues

Affected States: Rajasthan, Gujarat, Maharashtra, Karnataka, Tamil Nadu

Problems: Groundwater depletion, low rainfall, floods in the East.

Solutions: Drip irrigation, water-efficient crops, improved drainage.

## Soil pH Imbalance

Affected States: Rajasthan, Punjab, Haryana (Alkaline); Assam, Kerala, WB (Acidic)

Problems: pH extremes limit crop growth.

Solutions: Lime for acidic soil, gypsum for alkaline soil, pH-based crop selection.

# ABOUT THE DATASET



The data used in this project is made by augmenting and combining various publicly available datasets of India like weather, soil, etc. You can access the dataset [here] (<https://www.kaggle.com/atharvaingle/crop-recommendation-dataset>). This data is relatively simple with very few but useful features unlike the complicated features affecting the yield of the crop.

The data have Nitrogen, Phosphorous, Pottassium and pH values of the soil. Also, it also contains the humidity, temperature and rainfall required for a particular crop.



# ABOUT THE DATASET

- N - ratio of Nitrogen content in soil
- P - ratio of Phosphorous 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
- rainfall - rainfall in mm



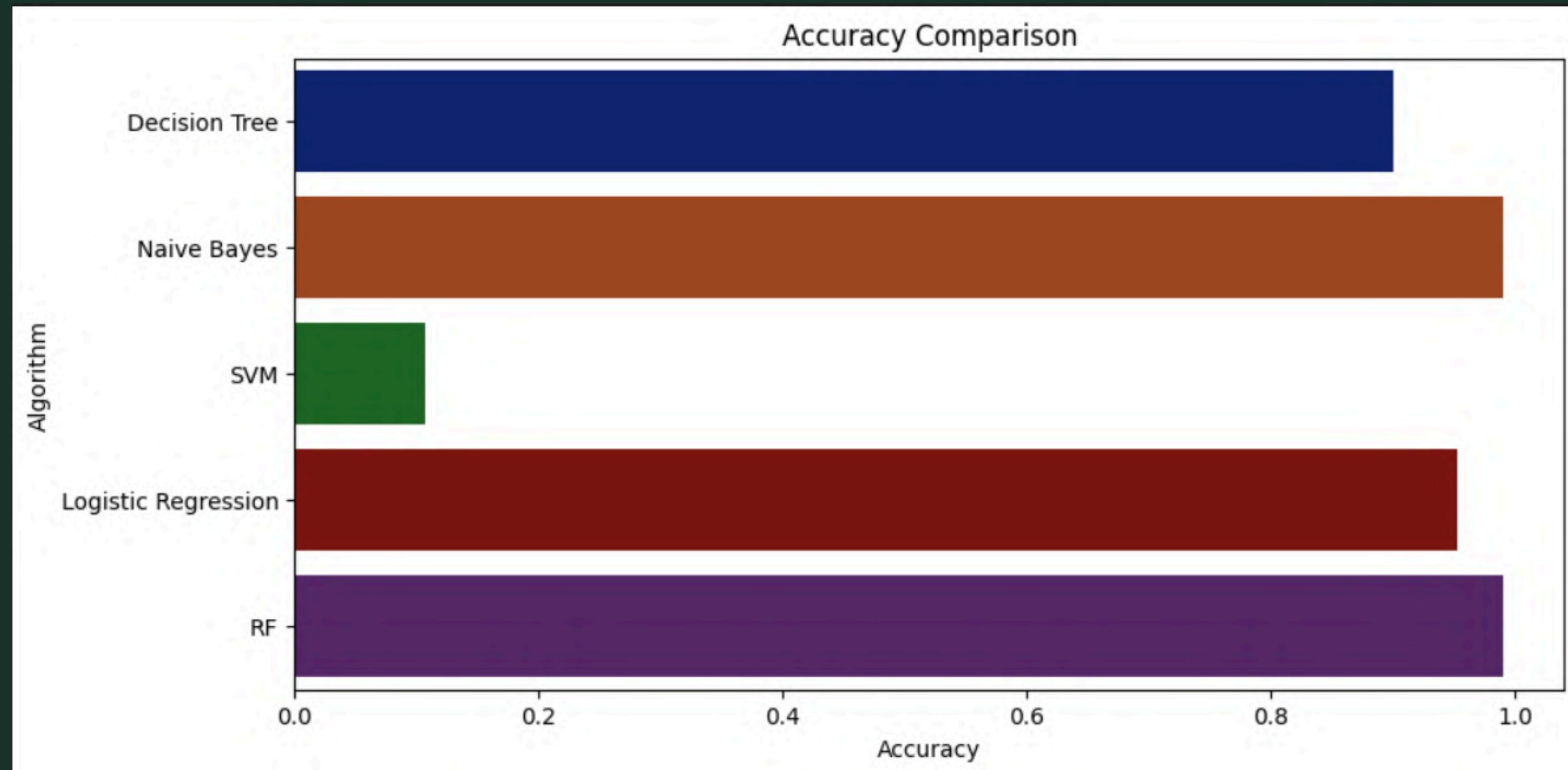
22  
UNIQUE  
VALUE

7  
FEATURES

5  
MODELS

	N	P	K	temperature	humidity	ph	rainfall	label
2195	107	34	32	26.774637	66.413269	6.780064	177.774507	coffee
2196	99	15	27	27.417112	56.636362	6.086922	127.924610	coffee
2197	118	33	30	24.131797	67.225123	6.362608	173.322839	coffee
2198	117	32	34	26.272418	52.127394	6.758793	127.175293	coffee
2199	104	18	30	23.603016	60.396475	6.779833	140.937041	coffee

# ML MODELS



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**LETS LOOK  
AT IT IN  
ACTION!!  
(STREAMLIT BASICALLY)**



# Conclusion



In conclusion, our Crop Recommendation Model provides a data-driven solution to one of agriculture's biggest challenges—selecting the right crop for optimal yield and sustainability. By leveraging machine learning, this system helps farmers make informed decisions based on soil conditions, climate, and environmental factors. With better crop selection, we can increase productivity, reduce resource wastage, and promote sustainable farming practices. This model has the potential to revolutionize agricultural decision-making, benefiting both farmers and the environment.

**JAY  
JAWAN  
JAY  
KISAAN**

