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CS 667



PRECISION

Modernizing Indian Agriculture with Technology

FARMING

Agriculture in India

Introduction



01

Agriculture's Importance

- 58% of India's population depends on agriculture for livelihood.
- Contributes approximately 18% to the GDP.

02

Challenges Faced:

- Lack of access to modern tools and data-driven insights.
- Overuse of resources like fertilizers and water.
- Adverse effects of unpredictable weather and soil degradation.

03

Opportunities:

- Leveraging precision farming to optimize yields and resource utilization.
- Implementing machine learning for crop prediction and sustainable practices.

India is home to one of the most diversified soil types globally, including alluvial, black, red, laterite, and desert soils.

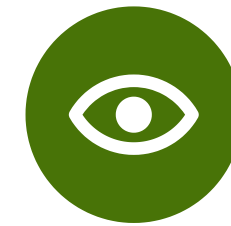
However, farmers often stick to traditional crops due to lack of awareness or resources to experiment with crops better suited to their soil.



Value

Provides precise crop recommendations to improve yield, income, and sustainability, bridging traditional farming with modern technology.

My Vision & Mission



Vision

- Transform Indian agriculture by promoting data-driven crop selection and maximizing yield.
- Encourage farmers to explore diverse crops suited to India's rich soil conditions.



Mission

- Implement precision farming by leveraging machine learning models for crop recommendations.
- Use soil and environmental data to help farmers make informed decisions.

Project Implementation

Stage 1

The first stage involves converting of the Raw data that we have into a merge able dataset for Classification and prediction purposes. In simpler terms, organizing the data. . We create an array for the entire dataset with respect to the four columns of temperature, humidity, ph values and rainfall for that crop. Similar procedure is then followed for the fertilizer data set containing the ratios of the N,P K. Then we merge both of these final filtered and cleaned datasets.



Stage 2

The next Stage involves creation of the final data set for crop and fertilizer recommendation system

	temperature	humidity	ph	rainfall	label
0	20.879744	82.002744	6.502985	202.935536	rice
1	21.770462	80.319644	7.038096	226.655537	rice
2	23.004459	82.320763	7.840207	263.964248	rice
3	26.491096	80.158363	6.980401	242.864034	rice
4	20.130175	81.604873	7.628473	262.717340	rice
...
895	26.774637	66.413269	6.780064	177.774507	coffee
896	27.417112	56.636362	6.086922	127.924610	coffee
897	24.131797	67.225123	6.362608	173.322839	coffee
898	26.272418	52.127394	6.758793	127.175293	coffee
899	23.603016	60.396475	6.779833	140.937041	coffee

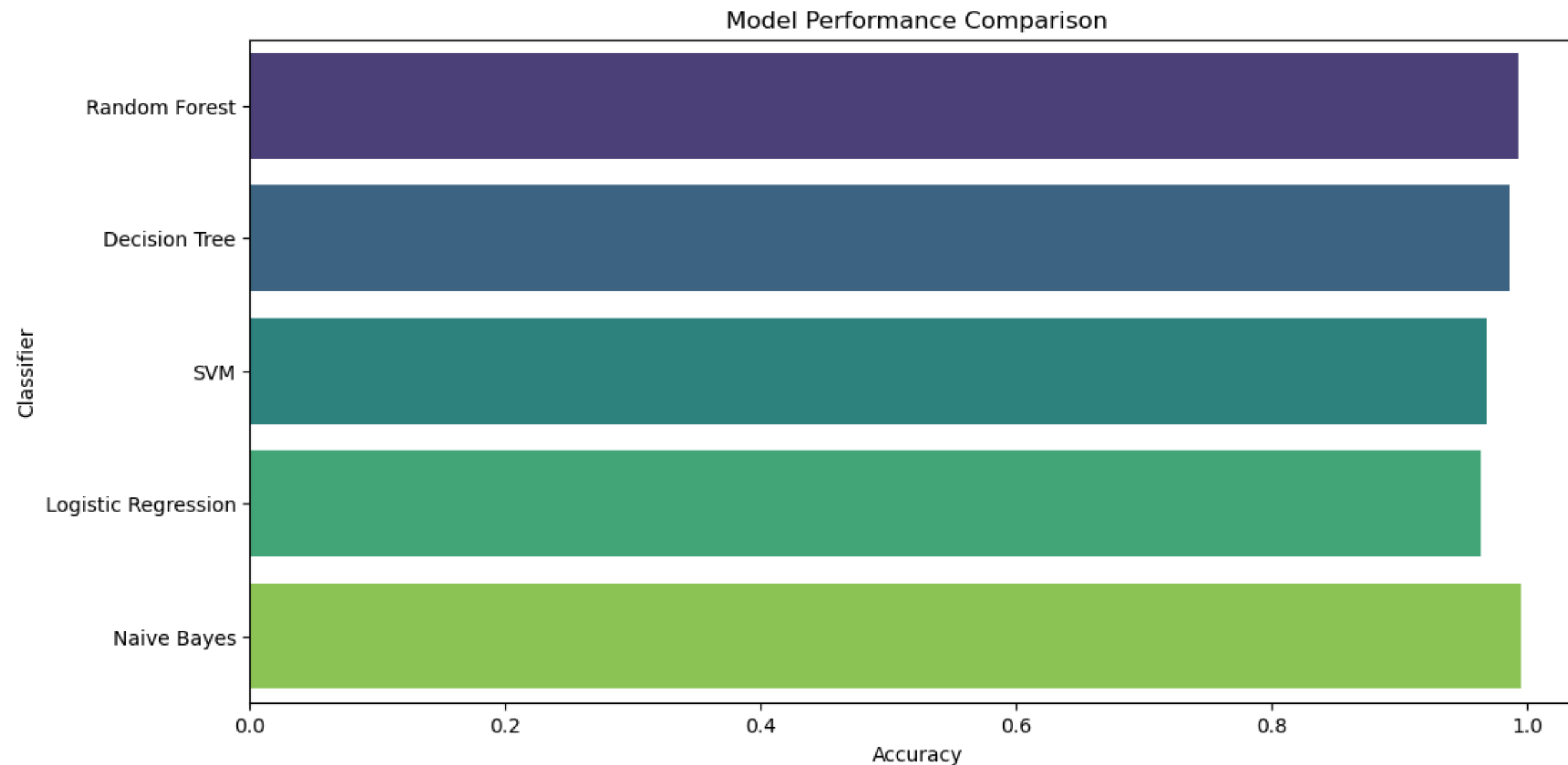
	Crop	N	P	K	pH
0	rice	80	40	40	5.5
3	maize	80	40	20	5.5
5	chickpea	40	60	80	5.5
12	kidneybeans	20	60	20	5.5
13	pigeonpeas	20	60	20	5.5
14	mothbeans	20	40	20	5.5
15	mungbean	20	40	20	5.5
18	blackgram	40	60	20	5.0
24	lentil	20	60	20	5.5

Stage 3

Stage 3 involves using Machine Learning Algorithms to test the prediction of the data and then testing the accuracy of prediction. We set the target variable as the label name of the crop that we want to predict

Key Insights

- **Naive Bayes achieved the highest accuracy at 99.55%, making it the most effective model for crop recommendation.**
- **Random Forest and Decision Tree closely followed, demonstrating strong classification capabilities.**
- **This highlights the importance of both probabilistic and ensemble-based approaches for this dataset.**



Process:

1. Inputs:

- The code uses 7 parameters: Nitrogen, Phosphorus, Potassium, Temperature, Humidity, pH, and Rainfall.

2. Standardization:

- Input values are scaled to ensure uniformity across features.

3. Prediction:

- A trained model (e.g., Naive Bayes) predicts the most suitable crop based on these inputs.

```
# Making a sample prediction using the top-performing model
sample_data = np.array([[100, 30, 25, 38, 80, 8, 100]])
sample_data_scaled = scaler.transform(sample_data)
predicted_crop = top_model.predict(sample_data_scaled)
print("Predicted Crop:", predicted_crop)
```

```
Predicted Crop: ['maize']
```

How This Code Helps:

- Provides data-driven crop recommendations, enabling farmers to shift from traditional to modern, precise farming techniques.
- Encourages crop diversity by identifying the most suitable crops for specific soil and climatic conditions.
- Reduces resource wastage, ensuring sustainable farming practices.



Future Potential:

- With more exposure and refinement, this approach can:
- Include predictions for crop yield and profitability, helping farmers plan financially.
- Integrate real-time weather and soil data to provide dynamic recommendations.
- Support government policies for agricultural reform based on regional insights.





Future Growth



As a family with a long history in farming, this project directly addresses the challenges faced by farmers in my native region.

Better crop recommendations mean higher yields and improved incomes for farmers.

Promote sustainable and modern farming practices



THANK
♥ you



**Let's sow the seeds of innovation and harvest a brighter tomorrow for Indian
agriculture.**

