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AI Project

Crop Recommendation System

9 December, 2024

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Problem Statement

Farmers often face the challenge of determining the optimal crop to grow, which could maximize yield and profit. Precision agriculture provides a solution by using data-driven decision-making based on soil characteristics, and climate conditions.

The goal is to reduce crop failure and help farmers make informed decisions on crop selection.

The challenge is to build a recommendation system that leverages available data on soil nutrients, weather conditions, and rainfall to suggest the best crops for a particular farm, mitigating the risk of crop failure.

What We Offer

Data-Driven Insights

Analyzes historical agricultural data, climate patterns, and soil characteristics to generate crop recommendations.

Sustainability

Promotes efficient resource management and reduces waste.

Scalability

Adaptable to various data volumes and agricultural settings.

Related Work

Yield Prediction Models:

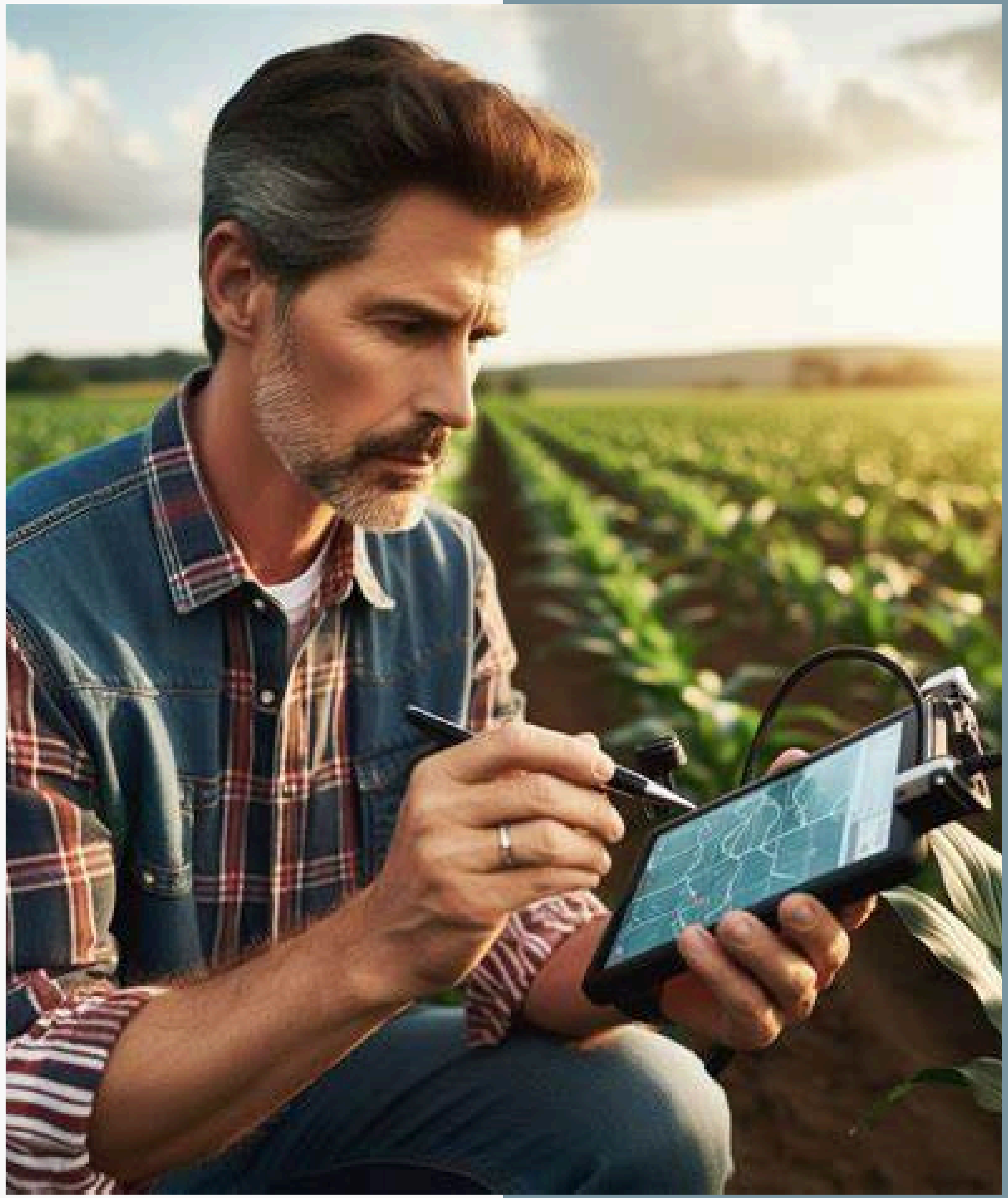
These models help in yield estimation but are generally focused on specific crops rather than providing broader crop recommendations.

Soil and Crop Monitoring Systems:

Several systems have been developed to monitor soil and crop health using IoT sensors, which collect data in realtime.

Remote Sensing and Satellite Image Analysis:

Advanced systems use remote sensing data to analyze large agricultural areas.



Methodology: Dataset Context

Dataset Context:

- It includes 7 critical parameters influencing crop growth:
    - Soil Nutrients: Nitrogen (N), Phosphorus (P), Potassium (K).
    - Environmental Conditions: Temperature, Humidity, Rainfall.
    - Soil pH: Measures the soil's acidity or alkalinity.

Data Cleaning:

- No missing Values

Feature Correlation:

- A correlation heatmap was used to understand relationships between features, ensuring no redundant variables were included.

Balancing Features

- The features were already balanced

Methodology: Model Selection

To determine the best-performing model, we tested several supervised learning algorithms:

- Decision Tree
- Random Forest
- Support Vector Machine (SVM)
- Logistic Regression
- Naive Bayes

Methodology: Model Training and Evaluation

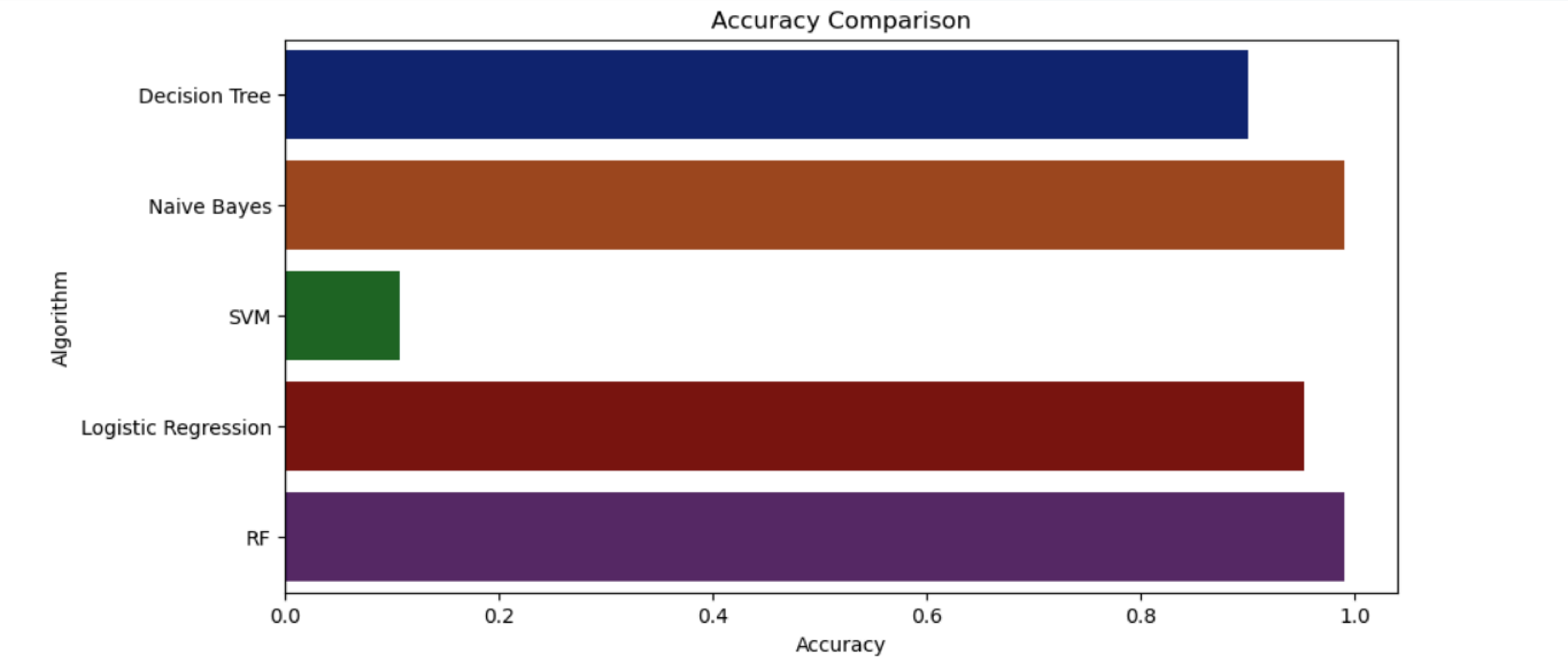
Data Splitting:

- The dataset was divided into training (80%) and testing (20%) sets.
- Cross-validation (5-fold) was used to avoid overfitting and ensure generalizability.

Performance Metrics:

- Accuracy, Precision, Recall, and F1 Score were computed for each model.

Results




```
Decision Tree --> 0.9
Naive Bayes --> 0.990909090909091
SVM --> 0.10681818181818181
Logistic Regression --> 0.9522727272727273
RF --> 0.990909090909091
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Conclusions

Key Takeaways

- The proposed crop recommendation system demonstrates the potential of AI in precision agriculture, enabling informed decision-making for farmers.

Future Work

- IoT Integration
- Expand the dataset
- Mobile Application

Call to Action

- Collaborate with agricultural research institutes and technology providers to scale the system.

Thank you

We would like to hear your thoughts!!