CROP PREDICTION

Cultivating the Future of Sustainable Agriculture

CATEGORY: MACHINE LEARNING

GROUP MEMBERS

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INTRODUCTION

This project seeks to create a machine learning model that helps farmers choose the most suitable crop for their farm based on soil composition and climate factors. By considering these elements, the model aims to maximize farm yield and profitability. It also provides a user-friendly web application that offers crop recommendations without requiring personal data, ensuring privacy and convenience for farmers.

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OBJECTIVE

The main goal of this project is to create a crop prediction model that considers soil suitability and climate factors with high accuracy and reliability. The specific objectives are as follows:

1. Gather and analyze soil data to understand its nutrient content, pH levels, and other factors that impact crop growth.
2. Incorporate climate data, including humidity, rainfall, and temperature, to evaluate which crops are suitable for specific regions.
3. Construct a robust machine learning model that can predict 21 different crops based on the provided input features.
4. Develop a user-friendly web application that allows farmers to input their soil and climate data and receive personalized crop recommendations.

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EXISTING PROBLEM

- Traditional approaches to crop prediction, relying on manual analysis of historical data, have limitations in terms of accuracy and efficiency.
- To overcome these challenges, this project proposes a machine learning-based approach.
- By leveraging historical data and advanced algorithms, the model aims to provide more accurate and efficient predictions for optimal crop selection.
- The integration of this model into a user-friendly web application enhances accessibility and usability, allowing farmers to input parameters and receive real-time crop recommendations.

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PROPOSED SOLUTION

1. Our project proposes a machine learning-based solution for crop prediction, utilizing historical crop data and environmental parameters to recommend the best crop for cultivation.
2. The Random Forest Classifier algorithm is employed to analyze relationships between factors like rainfall, soil content, temperature, humidity, and pH level, ensuring accurate predictions for optimal crop selection.
3. The proposed solution offers advantages such as high accuracy, robustness, and feature selection, empowering farmers with informed decision-making and ultimately enhancing agricultural productivity and profitability.

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PROJECT FLOW

1. User interacts with the UI to enter the input.

2. Entered input is analysed by the model which is integrated.

3. Once model analyses the input the prediction is showcased on the UI

4. We can use this web application anytime and the model will give the best crop based on the soil content & climate-oriented factors.

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HARDWARE & SOFTWARE REQUIREMENTS

- Python programming language
- pandas library for data manipulation
- scikit-learn library for machine learning algorithms
- Flask framework for building the web application
- HTML, CSS, and JavaScript for the user interface

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METHODOLOGY

Data preprocessing

Cleaning and preparing the dataset for model training

Model selection & training

selecting the Random Forest Classifier. The model was trained on the training dataset

Model evaluation

Assessing the performance of the trained model using evaluation metrics

Integration with web application

Developing a user interface & integrating the trained model with a Flask web application.

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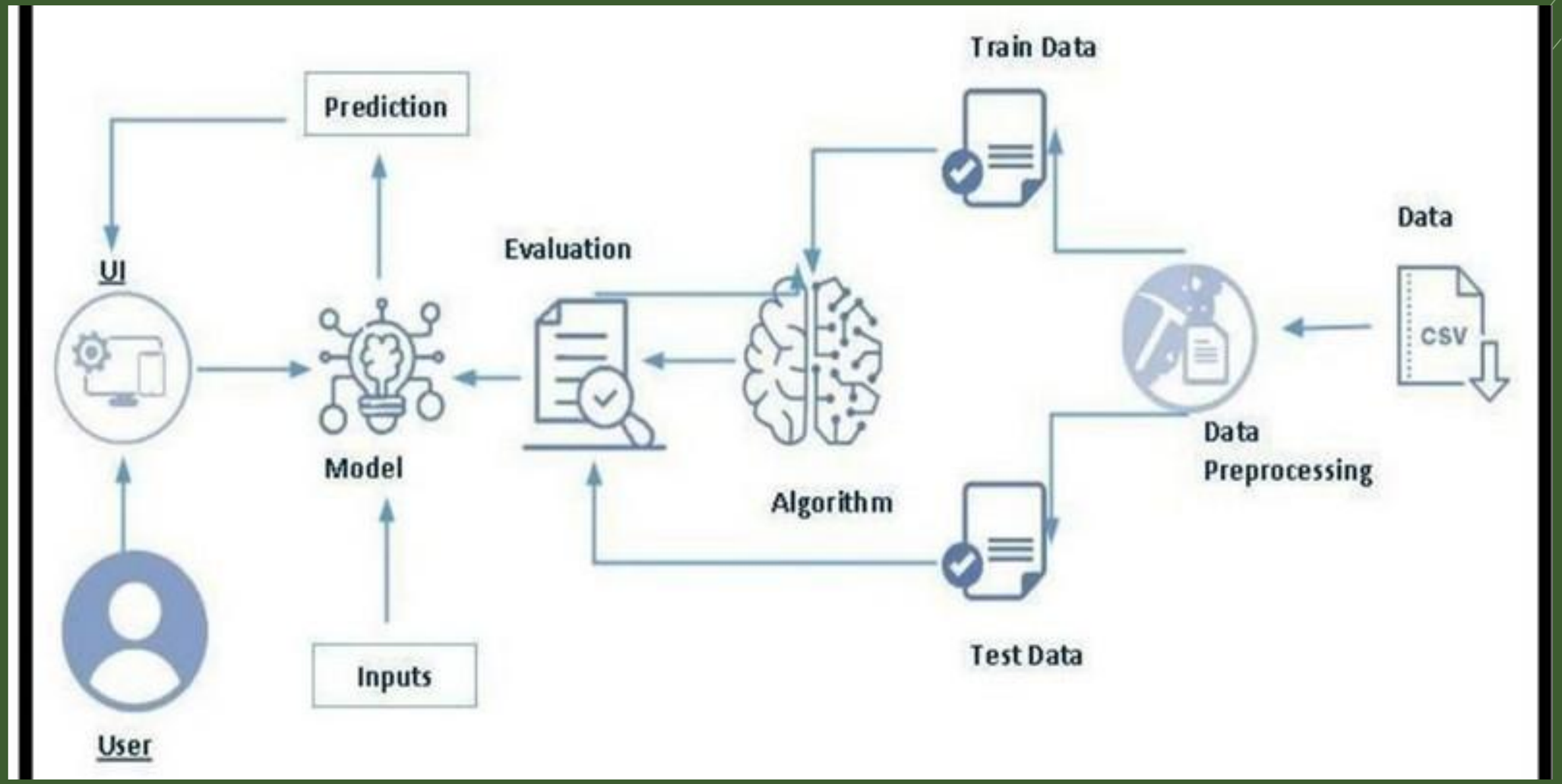
BLOCK DIAGRAM



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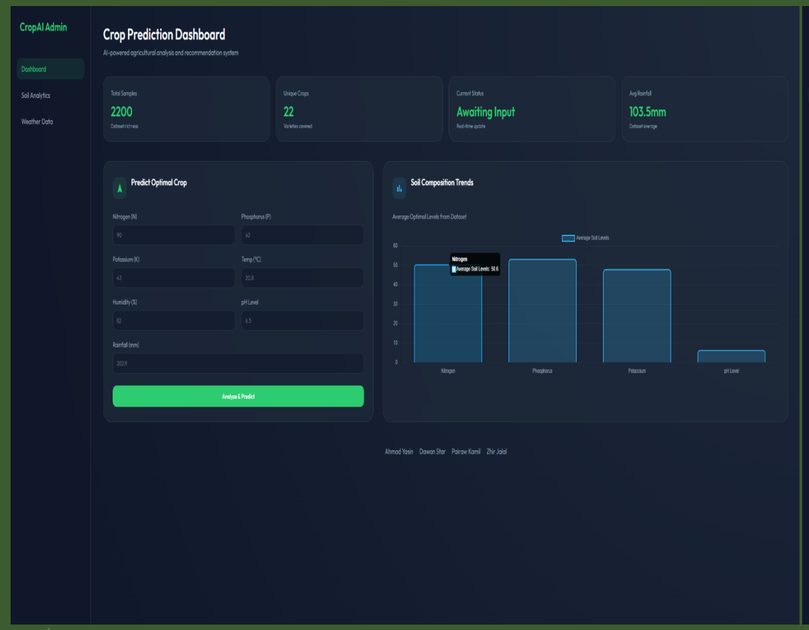
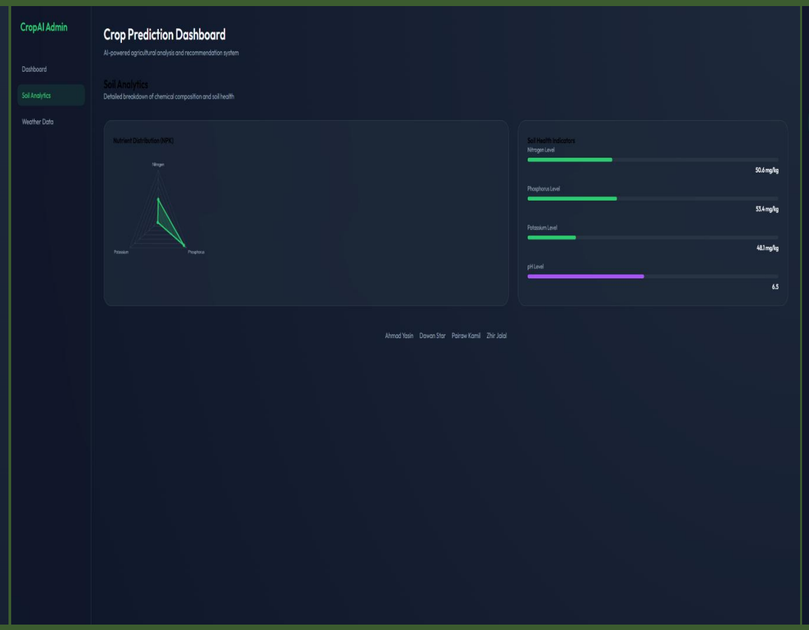
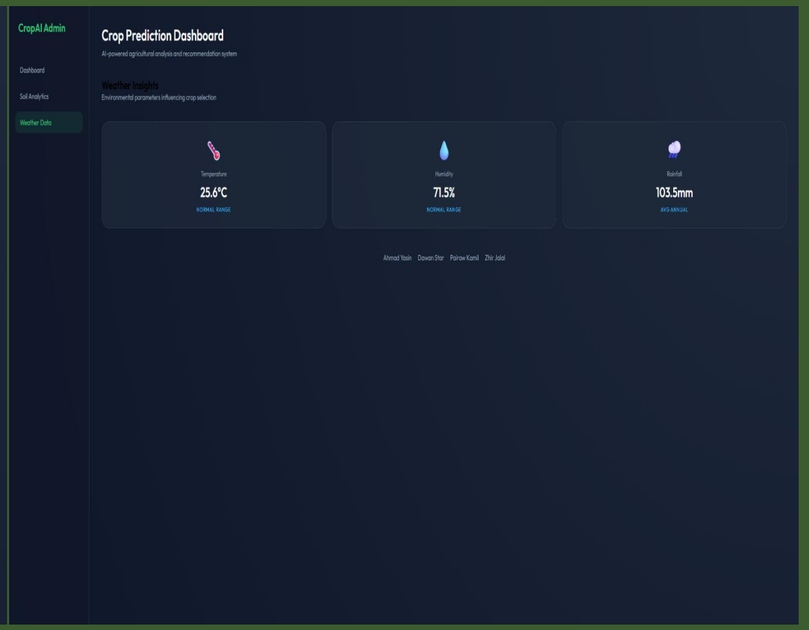
Web Dashboard / Analytics







RESULT

1. The project has created a reliable crop prediction model that utilizes machine learning algorithms to analyze historical data and environmental parameters, enabling accurate recommendations for crop selection.
2. The integration of the model into a user-friendly web application enhances its accessibility and usability, allowing farmers to easily input parameters and receive crop recommendations.
3. Extensive testing and validation confirm the model's accuracy, and the web application provides additional features like market prices and yield estimation, empowering farmers to make informed decisions for maximizing profitability.

THANK YOU

FOR YOUR ATTENTION