Title: Smart Agricultural Advisor — Milestones & Checklists

Milestone 1: Data Ingestion and Model Training

Goal: Build the core machine learning models for crop recommendation and yield prediction.

- **Checklist:**
  - **Data Collection:** Gather comprehensive datasets on weather, soil, and historical crop yields.
  - **Data Pre-processing:** Use Pandas and NumPy to clean and prepare data.
  - **Model Training (Crop Recommendation):** Train a classification model using scikit-learn. Consider algorithms like Random Forest, Decision Trees, or Naive Bayes.
  - **Model Training (Yield & Profitability):** Train a regression model using scikit-learn. Random Forest Regression is a great option.
  - **Model Saving:** Save the trained models for future use with joblib or pickle.
  - **Smoke Tests:** Create basic tests to verify model predictions.

Milestone 2: Backend and API Development

Goal: Create the backend system to handle user input and serve model predictions.

- **Checklist:**
  - **API Framework:** Set up a web framework like Flask or Django.
  - **Weather Data Integration:** Use the requests library or a dedicated library like Meteostat to fetch weather data from an API.
  - **Soil Data Integration:** Implement a method for users to input soil data.
  - **Model Integration:** Load the saved models and integrate their prediction logic into the API endpoint.
  - **Logging:** Implement comprehensive logging for API requests and model responses.

Milestone 3: Frontend UI and User Experience

Goal: Build a user-friendly interface for farmers to interact with the system.

- **Checklist:**
  - **UI Framework:** Develop a simple user interface using HTML, CSS, and JavaScript.
  - **Input Form:** Create a form for location and soil data input.
  - **Output Display:** Design a clean and readable page to display the recommended crops and their profitability.
  - **Deployment:** Create a requirements.txt file and prepare the project for deployment.

Milestone 4: Evaluation and Refinement

Goal: Ensure the system is reliable, accurate, and ready for use.

- **Checklist:**
  - **Metrics:** Define and measure performance metrics like accuracy for classification models and RMSE for regression models.
  - **Testing:** Conduct thorough testing with various data inputs to handle edge cases.
  - **Model Retuning:** Tune model parameters to improve prediction performance based on evaluation results.
  - **Documentation:** Write clear documentation on how to run and use the project.