AIML ABSTRACT

Title: Crop Recommendation System Using Machine Learning Algorithms

Abstract:

The Crop Recommendation System leverages Artificial Intelligence (AI) and Machine Learning (ML) techniques to suggest suitable crops for cultivation based on environmental and soil parameters. By analyzing data such as soil type, pH, moisture, temperature, rainfall, and nutrient levels, the system recommends the most appropriate crops for a given region or farm. Algorithms like decision trees, random forests, support vector machines (SVM), and ensemble models are employed to improve prediction accuracy. The system is trained on agricultural datasets that include soil characteristics, weather conditions, and crop yield data. This project explores various classification and prediction models, their optimization, and the balance between accuracy, efficiency, and usability. The objective is to aid farmers in making data-driven decisions to enhance productivity and sustainable agriculture.

Dataset:

The dataset used for training the Crop Recommendation System typically includes:

- **Soil Information:** pH level, nitrogen, phosphorus, potassium content, moisture levels.
- **Weather Data:** Temperature, humidity, rainfall, and sunlight exposure.
- **Crop Yield Records:** Information on which crops performed best under specific conditions.
- **Geographic Metadata:** Region-specific features such as altitude and proximity to water bodies.

Agricultural datasets like those from government agriculture departments or platforms like Kaggle (e.g., the "Crop Recommendation Dataset") provide comprehensive features for model training.

Algorithm:

The Crop Recommendation System uses a combination of the following Machine Learning algorithms:

1. **Decision Trees and Random Forests:**
   These models are effective in capturing non-linear relationships between environmental features and suitable crops. Random Forests enhance prediction stability by aggregating multiple decision trees.
2. **Support Vector Machines (SVM):**
   SVMs are used to classify crops based on the optimal separation of feature space defined by soil and climate variables.
3. **K-Nearest Neighbors (KNN):**
   This method suggests crops based on similarity to nearby instances in the dataset, considering similar conditions.

4. **Naive Bayes Classifier:**
   Assumes independence between features and uses probabilistic reasoning to suggest the best crop.

5. **Evaluation Metrics:**
   Model performance will be assessed using accuracy, precision, recall, F1-score, and confusion matrices to ensure high-quality recommendations.

Team Members:
2320030275 - Sasidhar
2320090062 - Kiran Teja
2320030439 - Vishnu Vardhan