Project Title:

Fertilizers Recommendation System for Plants using Machine Learning

Abstract:

In modern agriculture, the efficient and accurate application of fertilizers plays a crucial role in enhancing crop yield and ensuring sustainable farming. Traditional approaches to fertilizer recommendations often rely on generalized guidelines, which may not consider the unique soil properties, crop types, and environmental conditions of specific fields. This project aims to develop a data-driven, machine learning-based Fertilizers Recommendation System that provides customized suggestions to farmers regarding the type and amount of fertilizer required for optimal plant growth.

The system leverages various datasets such as soil test results (pH, moisture, nutrient levels), crop-specific nutrient requirements, historical climate data, and regional agricultural practices. These features are used to train machine learning models that predict the ideal fertilizer type (nitrogen, phosphorus, potassium, etc.) and dosage required for different crops under varying conditions. The goal is to improve nutrient uptake by plants while minimizing excess fertilizer application, thus avoiding soil degradation and environmental pollution such as water eutrophication.

The project employs a hybrid approach, using a combination of supervised learning algorithms such as Decision Trees, Random Forest, and Support Vector Machines (SVM) to classify and predict fertilizer requirements. By evaluating different models, the system aims to find the most accurate prediction technique. The model is fine-tuned and validated using cross-validation techniques and real-world agricultural data.

In addition, the system incorporates a user-friendly interface that allows farmers to input field-specific data such as soil test results, crop type, and location to get real-time fertilizer recommendations. The interface may also integrate satellite imagery and weather predictions to further improve the system's precision.

This project holds significant potential to improve agricultural productivity and sustainability by offering precise, science-based recommendations, leading to increased crop yield, improved soil health, and reduced environmental impact from over-fertilization.

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