AGRIINTEL : ML & DL for Smart Farming

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Abstract: *India, one of the world's leading agricultural producers, relies heavily on its farming community, which forms the backbone of the national economy. Despite their central role, many Indian farmers face persistent challenges, particularly in selecting the most suitable and profitable crops for cultivation, due to regional variations in soil types and a lack of accessible, reliable technological tools. This paper presents an AI-driven crop recommendation system that leverages machine learning (ML) models to analyze parameters such as soil type, regional characteristics, historical yield data, and market prices to predict the optimal crop for a given environment. In recent years, unpredictable climate changes have further complicated agricultural planning, leading to reduced crop yields and economic instability among farmers. Moreover, plant diseases remain a significant concern, as early detection and diagnosis are critical to maintaining crop health and productivity. This study also explores the integration of deep learning techniques for plant disease detection, with a focus on tomato leaf diseases, using advanced models such as Convolutional Neural Networks (CNNs) and ResNet50 for image-based classification. By combining predictive analytics for crop recommendation with automated plant disease detection, the proposed framework aims to enhance decision- making in agriculture, thereby supporting food security and improving farmer livelihoods.*

Keywords: Crop Recommendation, Plant Disease Detection, Machine Learning, Deep Learning, CNN, ANN, MobileNet, RandomForestClassifier, SVC, XGBoost