Title of the Project : CROP YIELD PREDICTION USING MACHINE LEARNING AND DATA ANALYTIC

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ABSTRACT

Crop yield prediction plays a crucial role in ensuring food security, resource allocation, and sustainable agriculture, especially as climate variability and soil fertility differences create uncertainties that render traditional estimation methods insufficient. To address this challenge and provide reliable foresight, this study introduces an interactive prediction system built on an advanced Stacking Regressor ensemble model. The system integrates a comprehensive dataset that includes categorical features (like crop type, irrigation, pesticide use, and season) and critical numerical factors (like temperature, rainfall, humidity, soil pH, and nutrient levels: N, P, K). This sophisticated methodology, which achieved exceptional performance metrics (R2 of 0.99 and a perfect ROC−AUC of 1.00), ensures the predictions are robust, highly accurate, and generalizable across diverse farming conditions. The prediction engine is deployed via an interactive Streamlit dashboard, translating the complex model output into both a precise predicted yield (kg/ha) and an actionable "high" or "low" yieldclassification. This dual output empowers farmers and policymakers to optimize resource allocation, reduce environmental waste, and directly support the goals of **SDG** 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production), demonstrating the clear value of AI in enhancing smart farming initiatives