**CROP YEILD PREDICTION:USING HYBRID AI MODELS**

ABSTRACT:

Crop yield prediction plays a crucial role in modern agriculture, enabling farmers to make informed decisions and optimize productivity. Traditional machine learning models often struggle with capturing the complex, nonlinear dependencies between environmental factors, soil properties, and crop growth patterns. This research proposes a **hybrid deep learning model combining Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks** to enhance the accuracy and efficiency of crop yield prediction. The CNN component extracts spatial patterns from satellite and remote sensing data, while the LSTM network captures temporal dependencies from historical weather and soil data. Additionally, an ensemble learning approach incorporating Decision Trees and Random Forest is explored to improve predictive performance. The proposed model is validated using real-time agricultural datasets, integrating soil health indicators, weather conditions, and crop characteristics. Experimental results demonstrate that the hybrid CNN-LSTM approach outperforms traditional machine learning techniques in terms of **accuracy, root mean square error (RMSE), and computational efficiency**. This study aims to contribute to precision agriculture by providing a **scalable and adaptive solution** for predictive analytics in crop management.