Project Idea Proposal: **Rainfall Prediction and Drought Forecasting**

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1. Project Idea

Our project aims to develop a predictive model for rainfall and drought forecasting using historical weather and satellite data. The goal is to provide accurate short-to-medium-term predictions to support agriculture, water management, and climate resilience.

2. Relevance to SDGs

This project aligns with:

- SDG 13 (Climate Action) – Improving climate adaptation through early drought warnings.

- SDG 2 (Zero Hunger) – Assisting farmers in crop planning to enhance food security.

- SDG 6 (Clean Water & Sanitation) – Optimizing water resource management.

3. Literature Examples

A. "Machine Learning for Rainfall Prediction" (IEEE, 2020) – Used satellite and weather station data with ML models (Random Forest, SVM) for rainfall forecasting.

B. "Deep Learning-Based Drought Forecasting"(Nature, 2021) – Applied LSTM networks on climate indices (e.g., SPI) for drought prediction.

4. Data Description

We will use:

- Primary Source: NOAA historical weather data (temperature, humidity, precipitation).

- Additional Dataset:[Kaggle Rainfall Dataset](https://www.kaggle.com/code/abdigonfagofte/best-dataset) (geospatial rainfall records).

=> Format: CSV (structured weather data), GeoTIFF (satellite imagery).

- Preprocessing: Handle missing values, normalize features, extract time-series trends.

5. Approach (Machine Learning or Deep Learning)

We will use:

- Deep Learning (LSTM, CNN) – For capturing temporal patterns in rainfall sequences.

- Hybrid Model (ML + DL)– Compare XGBoost (for feature importance) with LSTM (for sequential forecasting).

# Next Steps:

- Perform exploratory data analysis (EDA) on the Kaggle dataset.

- Train and compare different models for accuracy.

- Deploy a prototype for real-time forecasting.