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**

1. "Machine Learning for Rainfall Prediction" (IEEE, 2020) – Used satellite and weather station data with ML models (Random Forest, SVM) for rainfall forecasting.
2. "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.