PROJECT TITLE:AI-POWERED CLIMATE RISK PREDICTION AND EARLY WARNING SYSTEM FOR AFRICA

1. **Project Idea:**
   Develop a Continental Climate Risk Prediction and Response Platform for Africa that uses satellite data, regional weather station data, and socio-economic indicators to forecast extreme climate events such as droughts in the Sahel, floods in West and Central Africa, and cyclones in Southern Africa. The platform will provide early warning alerts, vulnerability maps, and climate adaptation recommendations for governments, NGOs, and local communities.

2. **Relevance to Sustainable Development Goals (SDGs):**
   This project directly supports **SDG 13: Take urgent action to combat climate change and its impacts** by enhancing Africa's capacity to prepare for and respond to climate-related hazards. It also aligns with **SDG 2 (Zero Hunger)** by safeguarding agriculture-dependent economies, **SDG 6 (Clean Water and Sanitation)** by anticipating drought impacts, and **SDG 11 (Sustainable Cities and Communities)** by improving disaster resilience in urban and rural areas.

3. **Literature Examples:**
   - African Climate Policy Centre (2022) — "State of the Climate in Africa" report, which highlights the need for advanced predictive models to manage extreme weather risks and promote adaptation.
   - FAO's Early Warning Action Program in Africa (2021) — a practical example of combining data analytics with field interventions to protect communities from drought and flood disasters.

4. **Describe Your Data:**
   The project will leverage:
   - **Satellite data** from NASA Earth Observations and the African Regional Data Cube.
   - **Meteorological data** from African national weather services and the African Centre of Meteorological Applications for Development (ACMAD).
   - **Socio-economic data** from the African Development Bank and World Bank.
     Data will include rainfall, temperature, vegetation cover, river flows, and land use in CSV, shapefile, and NetCDF formats. Preprocessing will involve cleaning, geospatial alignment, normalization, and integration of multi-source datasets.

5. **Approach (Machine Learning or Deep Learning):**
   A hybrid approach will be implemented:
   - **Machine Learning** (e.g., Random Forest, Gradient Boosted Trees) for localized short-term hazard prediction.
   - **Deep Learning** (e.g., LSTM for time-series data, CNN for satellite image analysis) for long-term climate trend detection and large-scale spatial pattern recognition.
     This combination allows for both precise local forecasting and broader continental-scale climate insights.