

Flood Prediction Application (FPA)

Group: 11

Members:

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Project idea:

The project aims to develop a machine learning-based application for predicting flood risks in Afghanistan. The primary goal is to enhance disaster preparedness and minimize damage to communities, infrastructure, and the environment by providing accurate and timely flood risk assessments.

Relevance to SDG:

This project aligns with the following SDGs:

SDG 13: Climate Action – By mitigating flood impacts, the project supports adaptation to climate-related risks.

SDG 11: Sustainable Cities and Communities – Protects urban and rural areas by enhancing resilience against natural disasters.

SDG 6: Clean Water and Sanitation – Ensures the protection of water resources from flood-induced contamination.

Literature example:

1. **Flood Prediction Using Machine Learning Models (Journal of Hydrology, 2022):** This study used hydrological and meteorological data to develop predictive models, demonstrating the effectiveness of Random Forest algorithms for flood risk prediction.
2. **Machine Learning for Disaster Risk Reduction: Review and Research Directions (Paul Michael Z. Labis, 2021):** This paper outlines the application of machine learning techniques in disaster risk reduction, highlighting methods relevant to flood prediction.

Data:

Sources: Global datasets such as NASA's Earth Data (DEM), Sentinel-1 (satellite imagery), and ERA5 (meteorological data).

Format: Mixture of CSV files, raster images, and real-time APIs.

Size: Approximately 20 GB for historical data, scalable with real-time updates.

Preprocessing: Includes normalization, feature extraction (e.g., rainfall intensity, elevation), and spatial alignment.

Approach:

The project will utilize a machine learning approach (e.g., Random Forest or Gradient Boosting) due to its effectiveness with structured data and interpretability. Deep learning may be considered for future expansions involving spatial data.