Submission Final

Description -

Our approach involves employing Machine Learning and GIS techniques to assess the spatial extent of flood based on three key factors: the increase in the water level of the river, the elevation of the point under consideration with respect to the river, and distance of the point from the river. We get this data from the satellites SRTM, Landsat 8, and Copernicus (The data collected is the data just before the event of flooding in that area). The data from these satellites is combined, and the features generated subsequently are normalized using techniques like z-score normalization to ease the computation for supervised learning in the upcoming steps. And since we already know what areas flooded, we mark those areas to create a labeled feature set. The normalized, labeled feature set is then passed to a classifier that categorizes the area into flood and no-flood areas; this helps us to run our polynomial regression on a narrowed-down site to compute the probability of flooding in that area. This dramatically reduces the computation power required. We fit a polynomial function for our feature set by minimizing the cost function using gradient descent. We now have our polynomial function, using which we will perform our prediction. The model is run on the specified area, and the probability generated as the output is visualized using a GIS-based application on a raster map.

Abstract -

We have selected the topic of predicting the extent and duration of floods due to their significant implications for public safety, infrastructure resilience, and sustainable disaster management.

Floods are highly destructive, recurring natural disasters causing loss of life and property. Accurate flood predictions enable timely warnings and preparedness, safeguarding individuals and communities. Flood duration and extent affect critical infrastructure; precise forecasting allows resilient infrastructure design, reducing costs and enhancing durability.

Citizens and authorities can receive timely alerts, enabling proactive measures such as evacuation, asset protection, and flood risk reduction.
Public resources can be efficiently allocated, ensuring emergency services are readily available in affected areas.

Our future development plans include transitioning from polynomial regression to Convolutional Neural Networks (CNN), increasing the model's parameter inputs, and thoroughly analyzing concealed features within the exported GeoTIFF files.