**Flood Prediction & Alert System**

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**Problem Definition:**

Floods are among the most common and devastating natural disasters, affecting millions of people worldwide every year. Early and accurate flood forecasting is crucial for minimizing the impact of floods on communities, allowing for timely evacuation and preparation. This proposal outlines a project aimed at developing a flood forecasting system using advanced data analytics and machine learning algorithms. The proposed system will not only predict flood events with higher precision but also provide actionable insights for disaster response teams using our web/mobile application. This will address the critical need for early detection and forecasting of flood events to mitigate the adverse effects on affected populations and infrastructure.

**Importance:**

The development of an accurate and reliable flood forecasting system has significant implications for disaster preparedness and response. By improving the accuracy and lead time of flood forecasts, emergency response teams can be better prepared, evacuation plans can be initiated sooner, and ultimately, the human and economic losses associated with flood events can be significantly reduced.

In addition,as it is feasible to leverage cutting-edge technologies such as machine learning and data analytics, this project also opens avenues for innovation in disaster risk management. It paves the way for the integration of more sophisticated predictive models and real-time data analysis.

**Novelty:**

This project proposes a novel approach by integrating environmental and weather data from multiple sources, including satellite imagery, weather stations, and IoT sensors in rivers and flood-prone areas. By leveraging machine learning algorithms, the system will analyze this data to identify patterns and predict potential flood events with greater accuracy and speed than current forecasting methods. This project will also integrate a web/mobile application that would provide a user interface for predicting floods.

**Solution:**

Project Tasks

1. *Dataset Preparation and Integration*: Gather and integrate data from various sources, including satellite images, weather station reports, and IoT sensors in water bodies.

2*. Data Processing and Feature Extraction*: Process the collected data to extract relevant features that influence flood events, such as precipitation levels, river water levels, soil moisture, and topographical data.

3. *Machine Learning Model Development:* Develop machine learning models to analyze the data and predict flood events. The models will be trained and tested using historical flood data to continuously improve accuracy.

4. *Model Validation and Testing*: Validate the forecasting system using historical events. Test the system's accuracy, timeliness, and reliability in predicting flood events under various conditions.

5. *User Interface and Alert System Development*: Develop a user-friendly interface to access real-time forecasts and receive alerts.

**Future Work:**

In the future, it is possible to implement a detection scheme for Complex Water Flow flooding by developing a water-level sensor system that works in various installation environments using infrared image processing with both low installation and operation cost.Furthermore, We can make use of the real time dataset to predict the flood events.

**Timeline and roles of the team members:**

March 21: Project proposal submission

April 15 : Dataset Preparation & Model Training

April 20: Model Testing

April 30: App Development & Deployment

May 6: Final report submission

Dataset Preparation & Integration: Sneha, Danya

Machine Learning: Sneha, Esshaan

App Deployment & Testing: Danya, Esshaan

**Reference:**

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