Phase 2: Innovation & Problem Solving
Title:AI-Powered Natural Disaster Prediction and Management System

1. Problem Identification

Natural disasters increasingly threaten lives and infrastructure. Traditional systems fail due to delayed communication, fragmented data, and lack of real-time analysis. There's a need for a smart, adaptive system that can predict disasters, issue alerts, and assist in emergency response using AI and IoT technologies.

2. Literature Review

Previous research shows that machine learning and IoT improve disaster forecasting. Models like LSTM, CNNs, and decision trees have shown promise but often lack real-time updates, multilingual support, or integration with local emergency services. Our system addresses these gaps with adaptive AI, live data processing, and user-friendly interfaces.

3. Methodology

Data Sources: IoT sensors and APIs (e.g., OpenWeatherMap) collect real-time weather .

Processing: Cleaned and preprocessed using Python (Pandas, NumPy).

Prediction Models: LSTM, SVM, and Random Forest used to detect patterns and anomalies.

Alerts: Generated automatically based on risk levels; sent via app, SMS, and web dashboard.

Feedback Loop: User input improves prediction accuracy and system responsiveness.

Tech Stack:

- Python, TensorFlow, Firebase

- Web dashboard

- Google Maps, FCM for alerts

4. System Design

Data Layer: Gathers sensor and satellite data

AI Layer: Analyzes patterns and predicts risks

Alert Layer: Sends notifications in user's language

Admin Layer: Monitors disaster zones and plans response

5. Innovative Solutions Proposed

- Real-Time Multi Source Integration: Combines sensor, satellite, and community data.

- Adaptive AI: Models retrain using new data for improved accuracy.

- Multilingual Alerting: Voice and text warnings in regional languages.

- On-Ground Feedback Loop: Users report real-time conditions to update the system.

- Custom Disaster Modes: Each type of disaster handled uniquely with targeted features.

6. Innovation Highlights

- Real-time data fusion from multiple sources

- Adaptive AI that evolves with new inputs

- Multilingual voice/text alerts

- Community feedback for on-ground updates

- Custom behavior for each disaster type

7. Expected Outcome

- Functional prototype predicting disasters with high accuracy

- Real-time alerts and interactive dashboards

- Faster emergency response and informed decision-making

- User-friendly app improving community safety

- Preparedness plans with evacuation routes and live updates

8.Next Steps

- Conduct real-world field testing

- Launch beta version of mobile app

- Partner with local authorities for deployment

- Optimize AI model for faster predictions

- Train users through awareness campaigns and workshops

Frontend:

HTML, CSS, JavaScript – For web-based dashboard interface

Google Maps API – For location tracking and route guidance

Backend:

Python – For data processing and AI model integration