Hackathon Ideation Round: Coastal Threat Alert System

Team name: Phantoms

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Description

Coastal regions play a key role in blue carbon storage. These areas are under constant threat from storm surges, coastal erosion, pollution, and illegal activities. The problem is, how do we develop a sophisticated multi-hazard early warning and alerting system that merges data from physical sensors like tide gauges and weather stations, satellites, and other historical feeds.

With the help of AI/ML, we will attempt to analyze data to recognize looming threats, such as severe weather, increased illegal activity, rising sea levels, algal blooms, and more.

Using AIML models, the objectives of the system will be:

- Detect anomalies and predict upcoming threats.

- Assess long-term trends such as erosion and sea level rise, algal blooms, illegal dumping, and cyclonic activity.

- Generate heat-maps and risk zones for coastal vulnerability assessment.

The system will use a multi-channel alert dissemination system to provide timely and responsive communication to the authority and at-risk communities, SMS, mobile app alert and call, and a web dashboard.

The system will also be community-based, meaning that alerts will be tailored to the specific community in their local vernacular and dialect, detailing actionable guidance such as evacuation paths, safe houses, fishing bans, and shelter locations.

It blends Local Fisher Folk’s observations with AI for a more accurate and guided prediction technology.

The system’s design will be scalable and modular in nature enabling customization for various coastal cities or island countries. This design also allows the integration of other data sources like buoys, vessels, and even social media.

Target Users

• Disaster management departments

– Need real-time alerts for evacuation coordination, rescue team deployment, and resource allocation during coastal emergencies.

– Gaining predictive insights will allow acting proactively which will minimize casualties and damage.

• Coastal city governments

– Data helps in planning the infrastructure. (Sea walls, flood barriers, and drainage systems.)

– Make policy decisions on zoning, urban expansion, and coastal regulation based on accurate threat assessments.

• Environmental NGOs

– Long-term ecological indicators monitoring such as mangrove cover, coral reef health, and water quality.

– Advocacy, awareness campaigns, and conservation project planning.

• Fisherfolk

– Enhanced sea safety with timely alerts on hazardous sea conditions, cyclones, and pollution incidents.

– Access to sustainable fishing aids and resources to defend their livelihoods.

• Civil defence teams

Based on precise location identification and timely notifications, they have the ability to efficiently manage and position resources for relief operations.

Impact

- Enables timely responses that protect human lives and decreases the resulting economic impact.

- Prevents avoidable degradation of vital blue carbon ecosystems.

- Helps manage coastlines sustainably while fostering community resilience.

- Combines modern AI driven forecasts with community based local knowledge to enhance disaster response capacity.

- Helps manage resources efficiently for long-term plans by focusing on high-risk areas.

- Fulfills obligations on international climate agreements by providing information on sea level changes, carbon sequestration, and the health of ecosystems.

Technologies That Can Be Used

- Ingestion pipelines

- AI/ML modeling (TensorFlow, PyTorch)

- Dashboards (React, D3.js)

- Mobile/web notifications (SMS and push)

- GIS mapping with Leaflet, Map box, Google Maps API

- Containerized and deployed with Docker