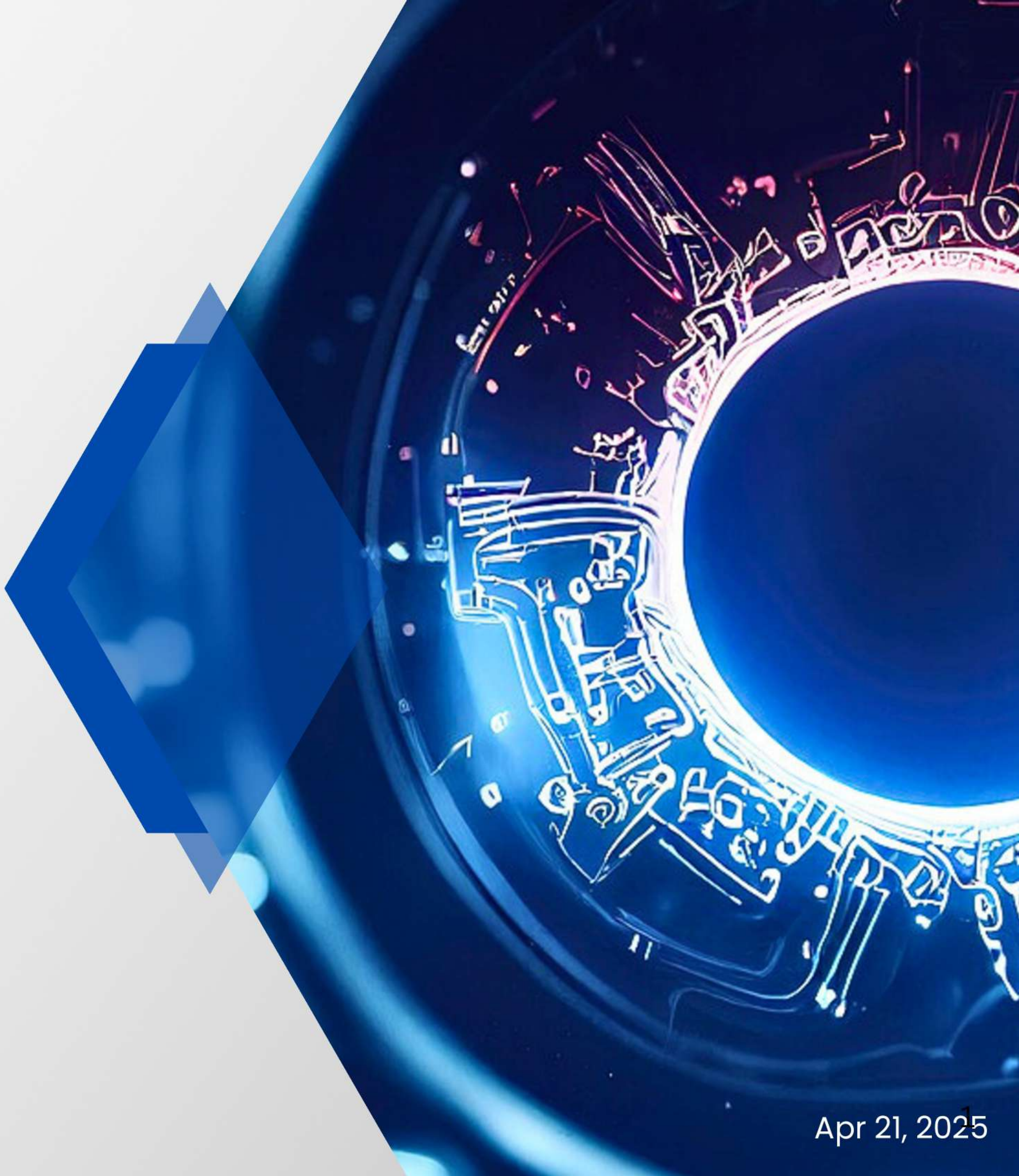
Data Farmers

NEUROPOLIS

AI-Powered Crisis Intelligence System

Aggie Hacks ‘25



Apr 21, 2025

Overview

We have developed an AI-powered Crisis Intelligence System designed to help smart cities anticipate, manage, and respond to high-risk cascading disasters in real-time. This AI-powered crisis intelligence system transforms fragmented urban data into clarity, control, and coordinated action during multi-disaster scenarios.

NeuroPolis uses a two-pronged approach

Predicts Cascading Disasters

Real-time Misinformation Detection

Neuro (Brain) + Polis (City)

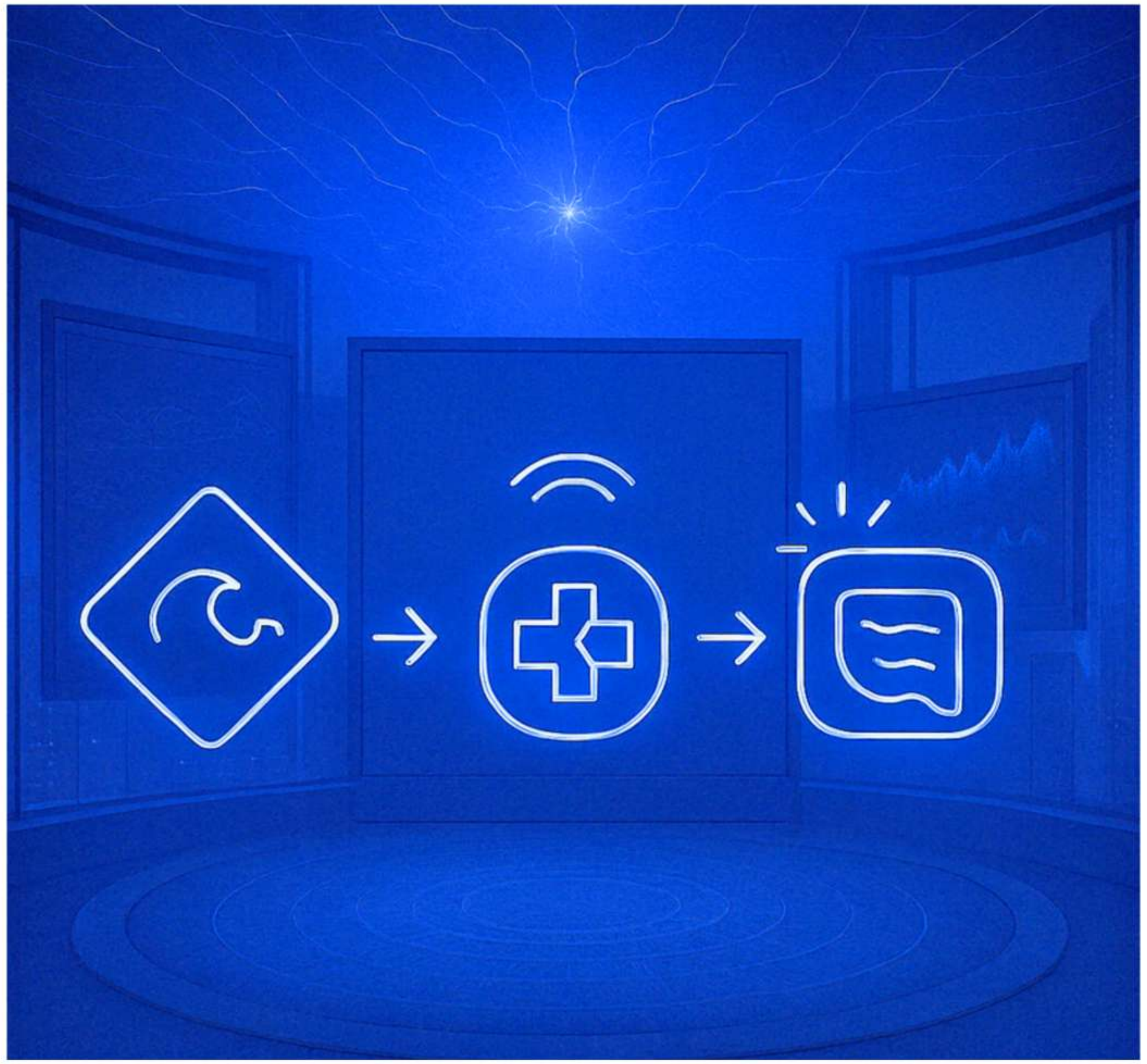
From Signal to Strategy

The Problem

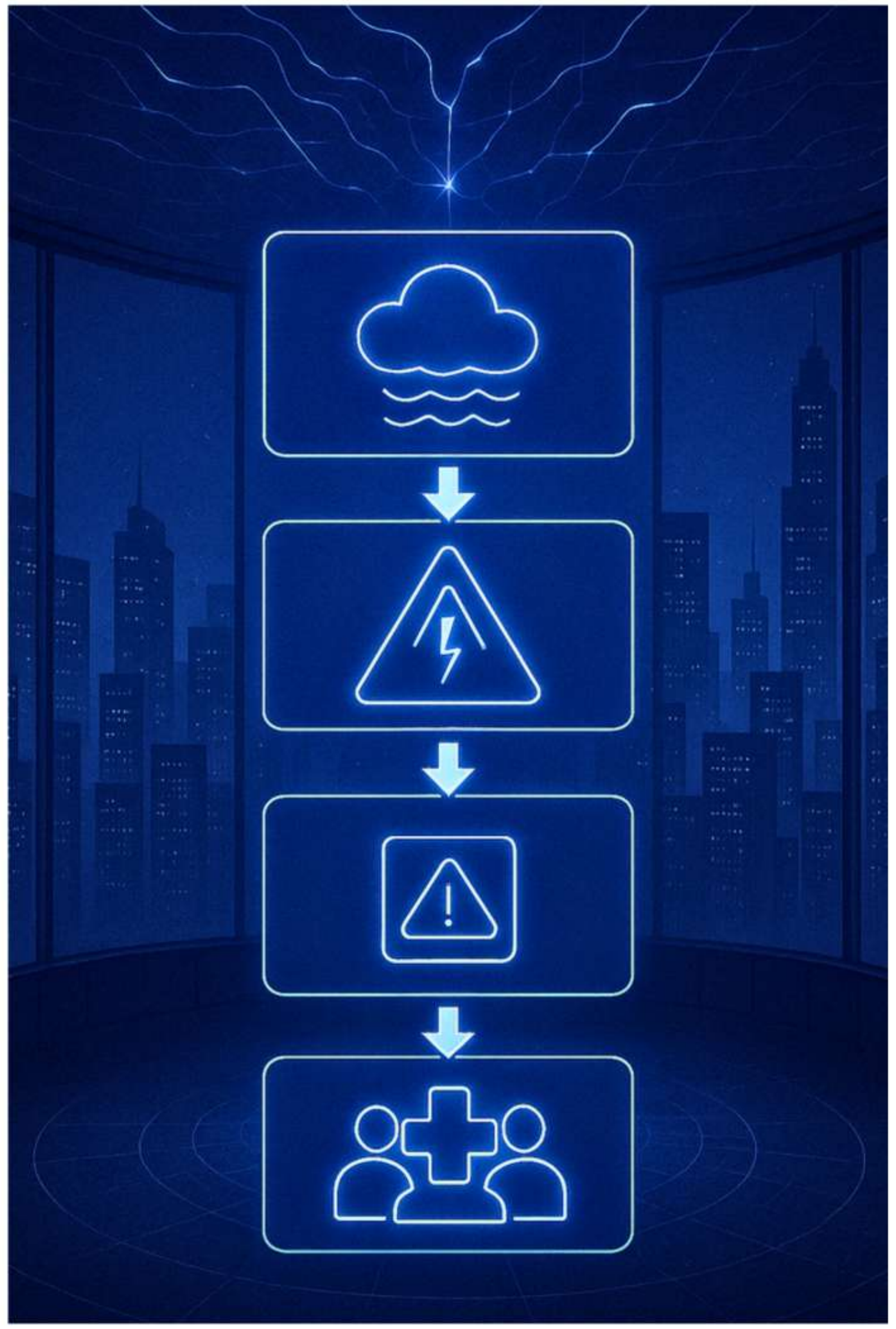
In modern cities, one crisis triggers another. A flood knocks out power. The outage overwhelms hospitals. Panic spreads online, fueled by misinformation. What starts as a single event escalates into a city-wide emergency.

Crisis teams aren't short on data—they're drowning in it. Fragmented systems, delays, and fake news slow down response and cloud decision-making.

To stay ahead, cities need more than alerts. They need systems that connect the dots, forecast what's next, and coordinate real-time action.



Our Solution



NeuroPolis is an AI-powered Crisis Intelligence System that acts as the brain of smart cities during emergencies—delivering real-time insights, predictive alerts, and trusted recommendations to manage cascading disasters with speed and clarity.

At its core, NeuroPolis fuses real-time signals and historical intelligence from sensors, hospital, utility logs, social media chatter, infrastructure networks, and climate records—transforming fragmented, multi-dimensional data into four action oriented capabilities for crisis response.

Predicting cascading disasters

Misinformation Detection

Live Risk Visualization

Decision Recommendation Engine

Our Approach

1. Exploratory Data Analysis*
2. Data Preprocessing
3. Data Visualization
4. Model Building and Evaluation
5. Blockchain & Ledger Development
6. Impact Analysis
7. Technical Documentation*
8. Feasibility Check & Optimization

Technology Stack

Streamlit preswald pandas BLOCKCHAIN

*Refer to appendix for details

How NeuroPolis works From Signals to Strategy

Feature Importance

Cascade Disaster Prediction

High Wind Speed (27%) OR Intense Rainfall (26%) + Casualties (8%) + Severity (33%)

Misinformation Detection

Sensor Match (±10 minutes)

Severity Support (Pct > 70)

Blockchain Validation (3 users)

Live Risk Visualization

High Wind Speed (> 85 kmph)

Intense Rainfall (> 175 mm)

Severity Score (> 8.0)

Decision Recommendation Engine

75%

If: Flood Level > 75%
Then: Evacuate Zone

If: Road accessibility < 30%
Then: Reroute Traffic

If: Hospital Capacity > 90%
Reroute to Hospital B

Innovation Highlight

Intel Engine

- Real-Time Forecasting
- Risk Classification
- Pattern Detection

Models: Random Forest, LightGBM, XGBoost

Trust Ledger

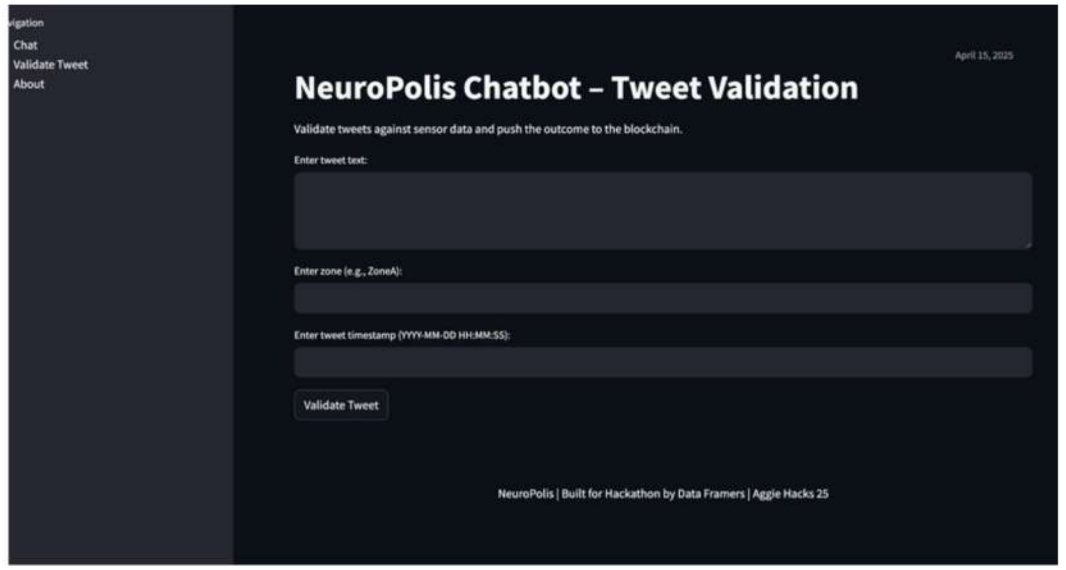
- Verifies alerts & sensor readings
- Logs misinformation
- Enables time-stamped audit trails

Platform: HyperLedger Fabric Blockchain

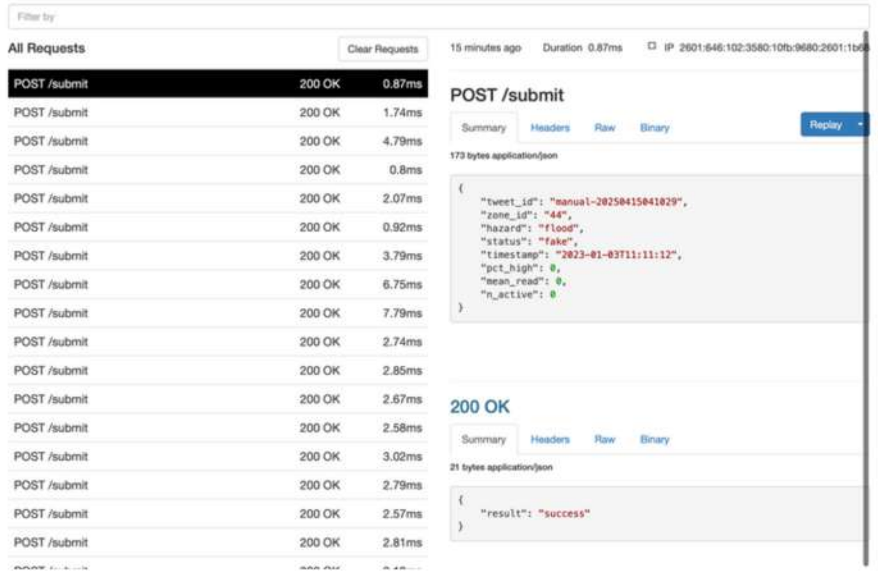
This dual-core architecture transforms fragmented data into accountable, auditable, and actionable urban intelligence.

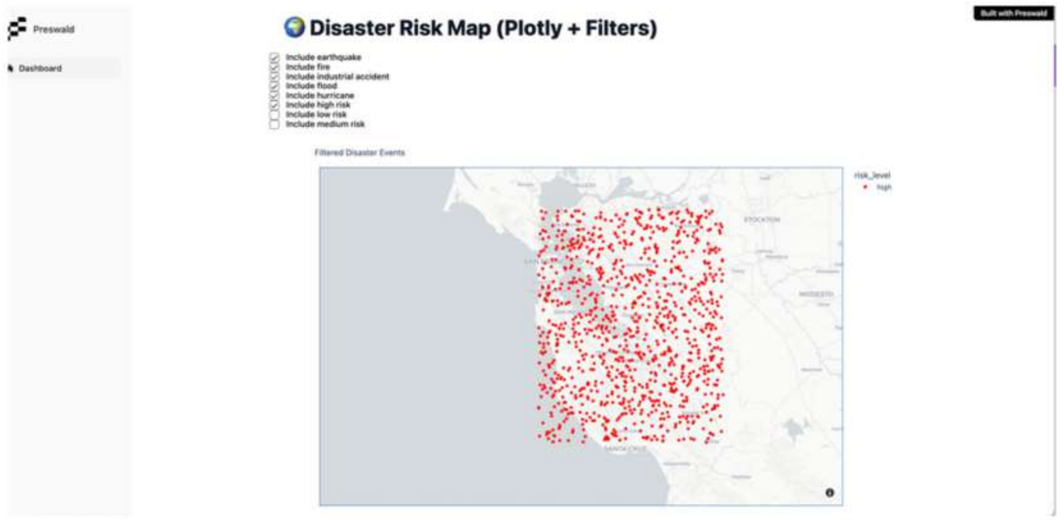
Visual Samples

1. **Multi-purpose Chatbot**

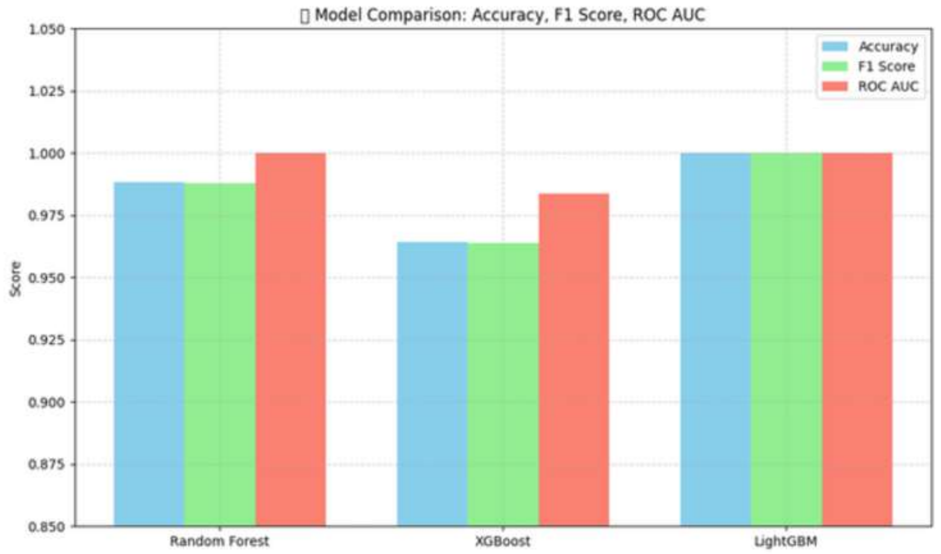


2. **Blockchain-based Ledger**





3. **Live Dashboard**



4. **Model Comparison**

Potential Impact

Simulation results using Hurricane Ian data* (2022) show the life-saving and cost-saving potential of NeuroPolis.

Fatality Rate Reduction

70% ↓

- Up to 70% fatality reduction through early warnings and proactive evacuations
- ~91 lives potentially saved in Hurricane Ian scenario

Economic Loss Reduction

$11bn savings

- 16% of total damages avoided through proactive infrastructure risk mapping
- $11B in economic value preserved during Hurricane Ian

Improved Response Time

50% ↑

- ~50% faster response time via real-time incident tracking
- Accelerated triage and aid delivery to flooded or inaccessible areas

Emergency Assets Efficiency

60% ↑

- 60% increase in emergency asset efficiency during peak crisis
- Smarter rerouting and resource reallocation through real-time system integration

*Estimates derived from modeled simulations using NOAA, EMDAT, and JFK weather datasets contextualized to Hurricane Ian (2022)

Thank you

D A T A   F A R M E R S

Rachel Guo
MSBA

Chaitanya Khot
MSBA

Adeyemi Olalemi
MBA

Avikalp (Avi) Karrahe
MSBA

Appendix

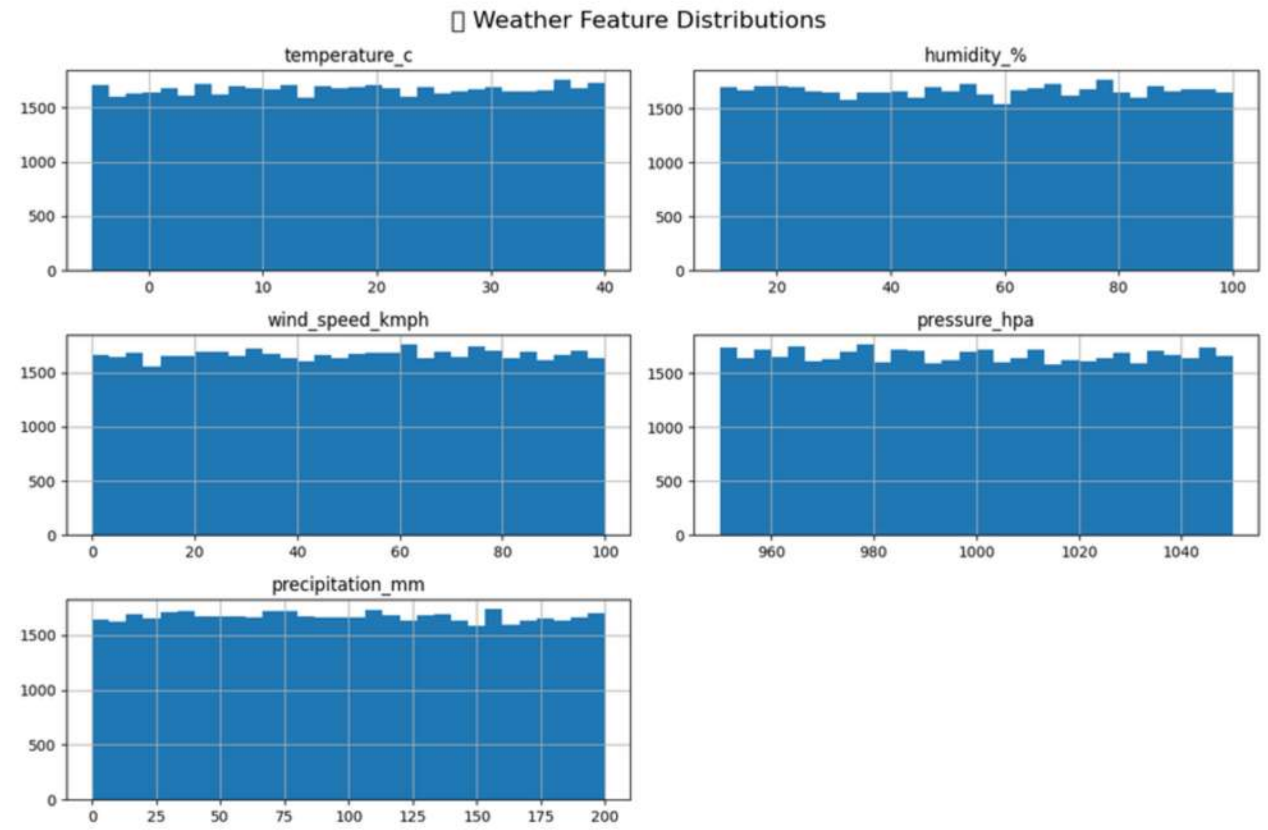
Documentation

1. Executive Summary
2. Disaster Prediction Model
3. Tweet Classification Model
4. Risk Visualization Dashboard
5. Decision Recommendation Module
6. Blockchain Ledger
7. Chatbot
8. Integration Blueprint

Resources

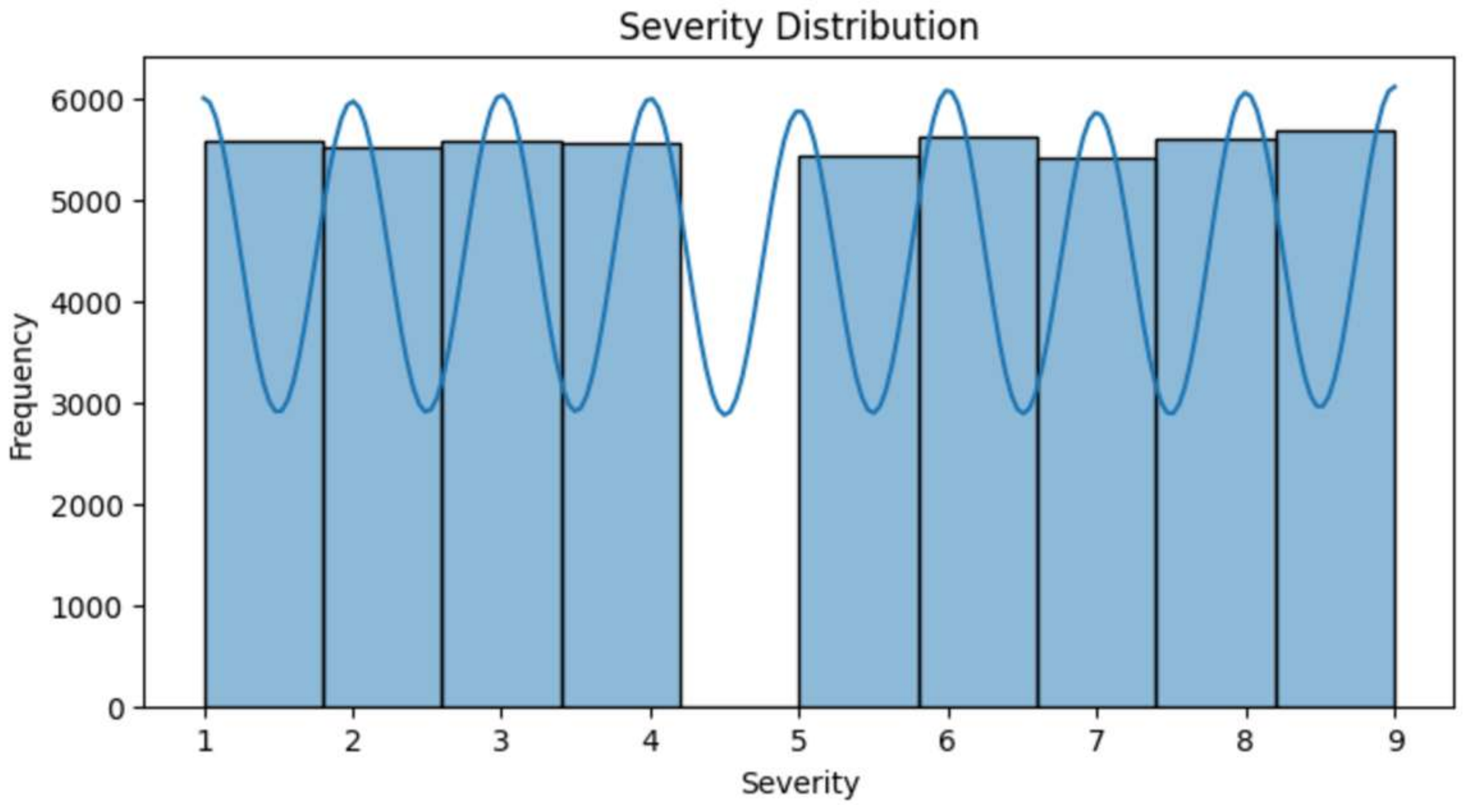
1. Blockchain-based fake news traceability and verification mechanism
2. Predicting Cascading Failures in Power Systems using Machine Learning
3. Artificial Intelligence Tools in Misinformation Management during Natural Disasters
4. Misinformation Detection: A Survey of AI Techniques and Research Challenges
5. Machine Learning for Disaster Risk Reduction – Review and Research Directions
6. Preswald
7. Hyperledger Fabric - Introduction
8. FloodNet NYC
9. Pandas
10. Streamlit
11. EBSCO (Hurricane Ian)

Data Exploration



Weather Feature Distributions

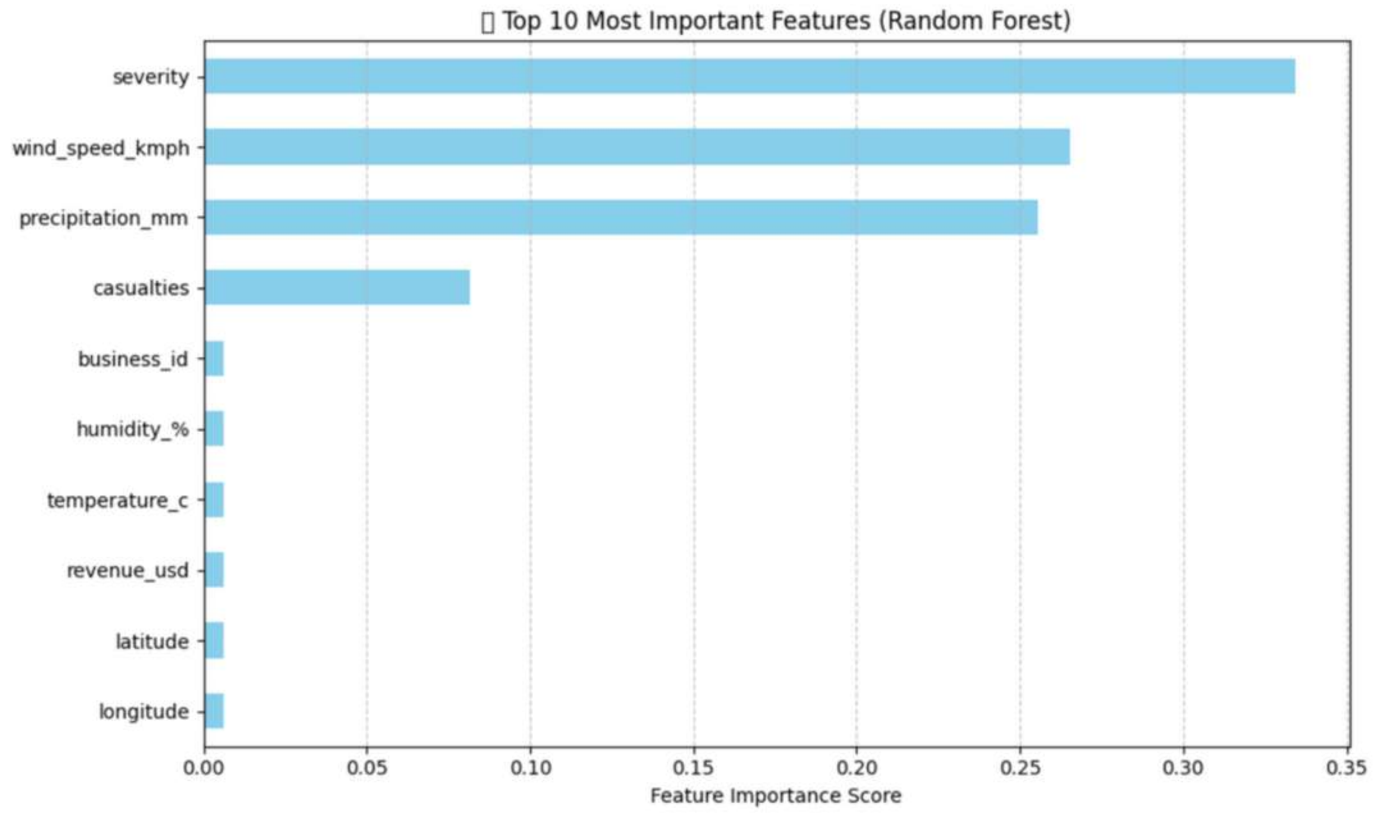
All categories have random noise and no inherent patterns



Severity Distribution

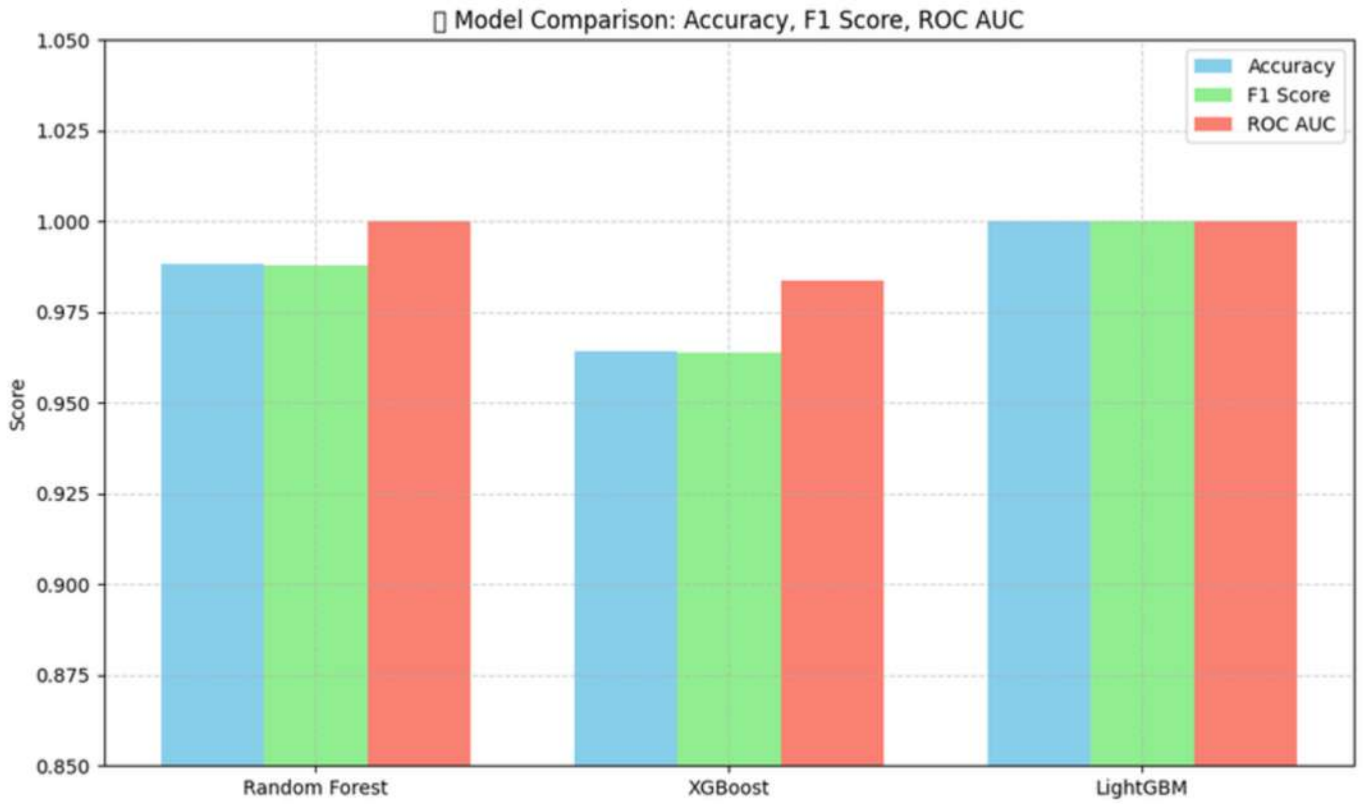
Severity scores are evenly distributed owing to synthetic data

Data Exploration



Feature Importance

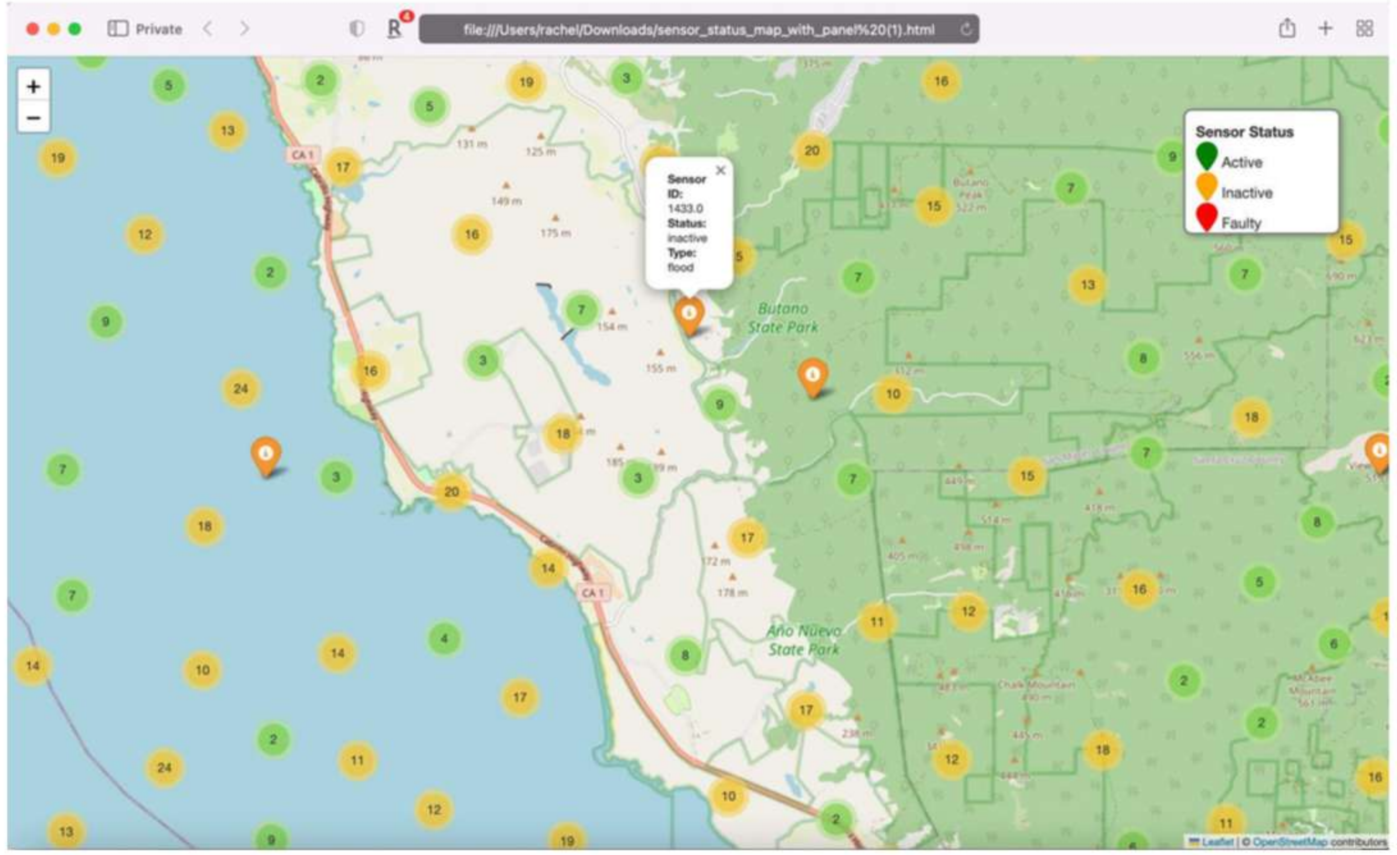
Top Features: Severity, Wind Speed, Precipitation



Model Comparison

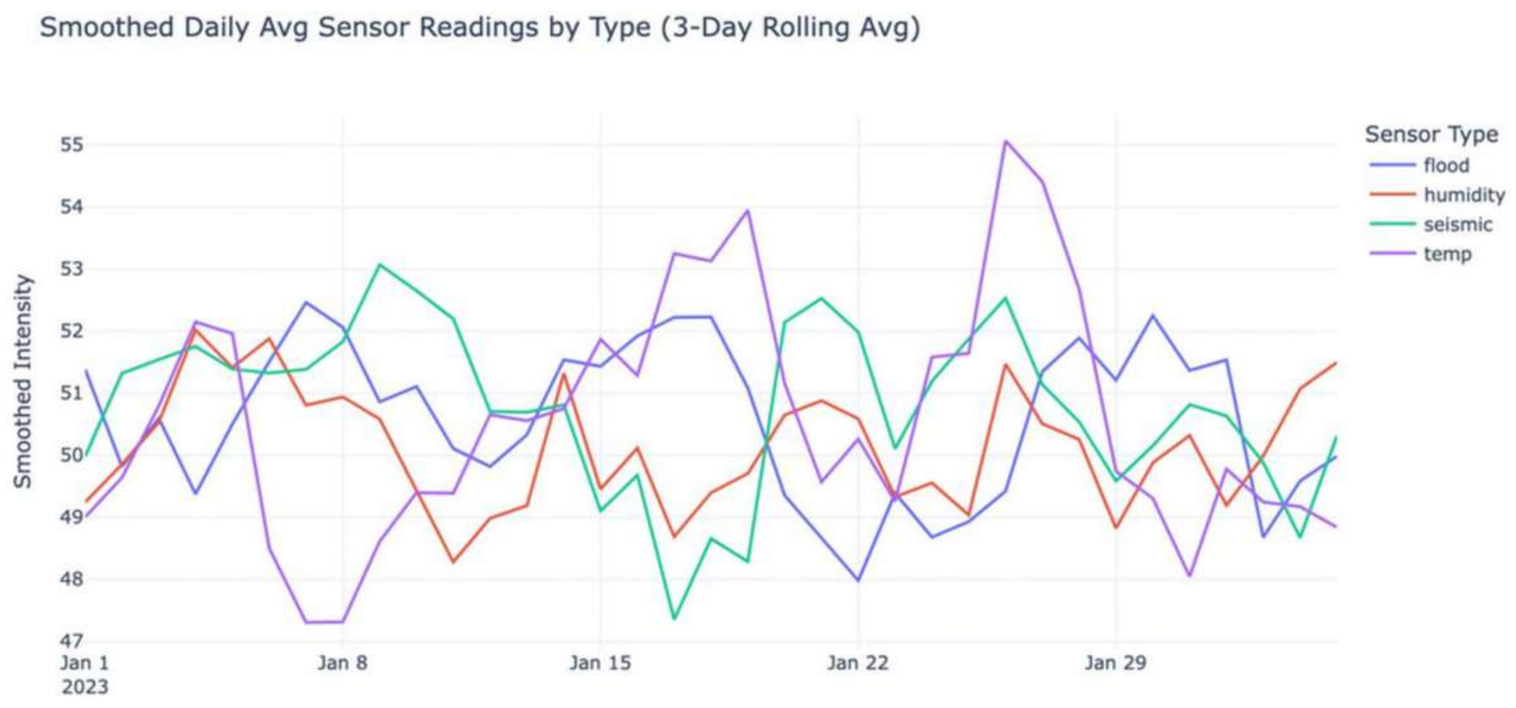
Models have perfect accuracy owing to synthetic data
Results on real-world dataset may vary

Data Exploration



Interactive Risk Map

Low-risk to High-risk classification of zones based on disaster type



Average Sensor Readings

Consistent scores across categories are expected owing to synthetic data