JASPIQ

(Judgment and Smart Prediction Intelligence for Urban Crises)

An intelligent, modular system called JASPIQ was created to evaluate, customize, and suggest evacuation choices in real time during cascading disasters in smart cities. In order to provide accurate, transparent, and useful advice during emergencies, it integrates multimodal urban data, including sensors, weather, economic signals, and mapping infrastructure.

The system has a simplified pipeline: a logic-based risk engine processes timestamp-aligned data in real time. Based on 7-day transaction averages, this engine assesses major crisis triggers such as excessive flood sensor readings, energy dips that indicate blackouts, abnormally high rainfall, and economic slowdowns. A trust score is derived from each of these signals, which classify risk levels as High, Medium, Low, or Unlikely. The credibility and urgency of new dangers are better understood by citizens and city leaders thanks to this score.

By concentrating on the existence and susceptibility of vital infrastructure in the focal zone, in this case Zone C, JASPIQ also takes cascading risk into consideration. The method highlights extra risks including delayed emergency response, regional blackout propagation, and medical inaccessibility if critical services like hospitals, power grids, or fire stations are located in high-risk locations.

Another key strength is the ability to customize the weather. JASPIQ provides city-level risk warnings, such as severe winds, excessive rainfall, or unsafe temperatures for evacuation, based on previous weather recordings that are accurately related to the chosen timestamp. By ensuring that decisions take into account current environmental hazards, this data gives the trust score an additional layer of insight.

The system has built-in evacuation advice. JASPIQ advises moving to safer locations based on risk level and exposure to cascading infrastructure. Because of its stronger infrastructure and lesser historical catastrophe impact, Zone D is designated as the safest evacuation zone for this pilot, while Zone C is assumed to be in danger. Evacuation plans are made both hyper-local and efficient by employing geodesic distance to choose the three closest shelters or hospitals in Zone D.

All of these elements are provided via **Streamlit's responsive dashboard** (click on it for link). For risk assessment, users choose a date and time, a location coordinate, and their current zone. They receive a live-rendered evacuation map, weather warnings, safe facility listings, risk factor breakdowns, active transport alternatives, and trust levels in exchange. In order to replicate a real-time decision-support environment for emergency situations, each action is changed dynamically as the user modifies information.

Data Assumptions & Enrichment: To build JASPIQ, we made key assumptions and enriched the data for zone-specific crisis modeling. Zone C was treated as the high-risk area, while Zone D was assumed to be the safest for evacuation due to its infrastructure and low disaster history. Weather data was treated as city-level and matched by timestamp. We created custom, cleaned datasets for precision:

- zone_c_social_alerts_with_trust.csv with trust scores based on sensor and anomaly logic
- sensor_zone_c_joined.csv for timestamp-aligned flood and environmental readings
- updated_city_map.geojson to improve zone boundaries and map visuals

Geodesic distances were calculated to recommend the nearest safe facilities. Rolling 7-day averages were used to detect economic anomalies, and cascading risks were identified based on the presence and type of critical infrastructure. All logic was implemented using an interpretable, rule-based approach — avoiding black-box machine learning and ensuring transparency for emergency decision-making.

Impact & Scalability: JASPIQ offers interpretable, location-aware decisions and speeds up emergency reaction times. It is completely scalable to other zones or full-city deployments, transforming dispersed city data into actionable risk intelligence.

Future Scope: Real-time alerts from residents or field agents, multi-zone extension, API interaction with municipal control systems, and integration with live social feeds and CCTV are among the planned improvements.