FLASH: An AI Chatbot for Real-Time Flash Flood Risk Detection and Information Dissemination

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Flash floods are among the most destructive and unpredictable natural disasters, posing serious threats to life, property, and infrastructure. This project introduces FLASH (Flood Level Assessment and Situational Helper), an AI-driven system designed to deliver real-time flash flood alerts and localized water level information. The architecture integrates a continuous data ingestion pipeline that monitors hydrological data from the United States Geological Survey (USGS) WaterWatch system. Streamflow readings from nationwide sensors are normalized and analyzed in real time, with current discharge levels compared to historical percentiles to detect anomalous behavior indicative of flood risk. At the core of the system is a flood risk classification model that leverages both percentile-based thresholds and temporal discharge gradients (rate-of-change metrics) to flag dangerous conditions. This model is implemented using PyTorch, enabling flexible and efficient deployment of neural network-based components optimized for real-time inference.

FLASH's conversational interface, built with Streamlit, enables users to query local flood conditions using natural language, returning geolocated, context-aware updates and up-to-date safety information collected from the National Weather Service, American Red Cross, and other credible sources. This chatbot layer abstracts away the complexity of hydrological data interpretation, making flood intelligence accessible to the general public, emergency responders, and decision-makers. The system demonstrates a scalable, modular approach to environmental hazard monitoring by combining open government data, deep learning, and user-centric design principles.