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Software Based Emergency Management Using Historic and Real Time Data

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Abstract: *This paper presents the design and implementation of an IoT-based flood detection and alert system that leverages both real-time and historical weather data to predict flood risks using a supervised machine learning model. The system integrates cloud-based architecture with a modular client-server design to support scalability, reliability, and low-latency response. Real-time data, including rainfall, humidity, and temperature, is acquired via weather APIs and processed through a Gradient Boosting Regression model trained on historical flood datasets. A web dashboard and mobile application interface provide users with live updates, risk visualizations, and instant notifications through SMS, email, and push alerts. Performance analysis demonstrated high prediction accuracy ($R^2 = 0.91$), fast alert delivery (<12 seconds), and robust scalability across concurrent users. The system was validated through analytical modeling and live field testing in flood-prone zones, confirming its practical applicability and real-time responsiveness. This work demonstrates the potential of combining AI, cloud computing, and IoT technologies to build efficient early warning systems for disaster risk reduction and emergency management*

Keywords: Flood Prediction, Machine Learning, Real-Time Data, IoT, Emergency Alert System

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