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**Science Fair Project Abstract**

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**A Novel Deep Learning Approach to Automated Global Flood Forecasting**

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Between 1995 and 2015, over 2.3 billion people have been affected by flooding events across the world (Wallamacq et al. 2015). To mitigate the effects of these types of natural catastrophes on the human population, scientists employ two different forecasting techniques: they build statistical systems that utilize the return period as the identification method of flash flood disasters, or create complex hydrological models that use a list of physical processes to model the behavior of a given river (Cloke and Pappenberger 2009). However, while each of these techniques have their advantages, they are also flawed. Firstly, while probabilistic models are fairly easy to set up, they are unable to incorporate exogenous variables into the equation. On the other hand, while hydrological models offer the ability to generate detailed flooding simulations, they require enormous amounts of measurements and careful tuning from hydrologists in order to offer an accurate riverine simulation. The implementation of a deep learning technique can bring the best of both worlds because of their ability to incorporate external variables for forecasting without the costly setup requirements that are necessary to simulate accurate flood maps. The project involves the use of Big Data technology to offer worldwide flood prediction in the goal of providing many parts of the world with timely flooding information to local populations who are notified through a live email-alert system and can be visualized through an online website made with the Google Maps API. The design has demonstrated improvements to current ensemble prediction systems (EPS) made by the Global Flood Awareness System (GloFAS) 30-day forecasting models. This research provides new insight into the ways Deep learning and Big Data techniques can be used to provide the human population with flood forecasts and inundation models.

Key Words: Flood forecasting, Deep Learning, Machine Learning, Big Data, Alert System, Long Short-Term Memory, Hydrological Modelling, flood mapping,

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