

DEEP LEARNING APPROACH FOR FLASH FLOOD PREDICTION

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i. Abstract

Flash flooding is one of the most frequent and risky natural event in urbanized areas. Road inundations due to short-term heavy downpours are common in cities and have caused substantial disruption for life and property. Climate change, urban development and industrialization are identified as the main cause of frequent flash flood events. Accurate prediction of flash floods will be highly beneficial in taking the preventive measures in terms of city planning and infrastructure development. Recently, deep learning has led to significant changes across many areas of study. In the meteorology and hydrology domain the advent of deep learning algorithms has encouraged in the development of new and improved forecasting models. The aim of this study is to establish a deep learning approach for flash flood forecasting as a tool to aid city planning and infrastructure development. Research conducted in this subject area are observed to be confined to real-time models with predictions of minimum 6 hours of lead time: which are less applicable to take preventive measures for flash floods; and are often either hydraulic or temporal. Hence, an LSTM model considerate of hydraulic, spatial and temporal dynamics of flash floods is proposed as the most novel approach for forecasting flash floods. The study confers a universal approximation approach for flash flood forecasting which contributes in disaster preparedness and mitigation.

Subject Descriptors: Flash Flood Forecasting, Deep Learning, Machine Learning, Neural Network Approaches

Keywords: deep learning, recurrent neural network, long short-term memory, flash flood forecasting