# River Water Level Prediction Method based on LSTM Neural Network

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## Abstract

In this article, we use an open source software library: TensorFlow, developed for the purposes of conducting very complex machine learning and deep neural network applications. However, the system is general enough to be applicable in a wide variety of other domains as well. The proposed model based on a deep neural network model, LSTM (Long Short-Term Memory) to predict the river water level at Okcheon Station of the Guem River without utilization of rainfall – forecast information.

For LSTM modeling, the input data is hourly water level data for 15 years from 2002 to 2016 at 4 stations includes 3 upstream stations (Sutong, Hotan, and Songcheon) and the forecasting-target station (Okcheon). The data are subdivided into three purposes: a training data set, a testing data set and a validation data set. The model was formulated to predict Okcheon Station water level for many cases from 3 hours to 12 hours of lead time. Although the model does not require many input data such as climate, geography, land-use for rainfall-runoff simulation, the prediction is very stable and reliable up to 9 hours of lead time with the Nash – Sutcliffe efficiency (NSE) is higher than 0.90 and the root mean square error (RMSE) is lower than 12cm.

The result indicated that the method is able to produce the river water level time series and be applicable to the practical flood forecasting instead of hydrologic modeling approaches.


**Keywords: deep neural network, LSTM, RNN, Tensorflow, water level prediction**


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