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"Gheorghe Asachi" Technical University of Iasi, Romania

SEMI-DISTRIBUTED NEURAL NETWORK MODELS FOR STREAMFLOW PREDICTION IN A SMALL CATCHMENT PINANG

Ali H. Ahmed Suliman[1]*, Intan Zaurah Mat Darus[2]

[1]Department of Geography, College of Education, University of Al-Hamdaniya, Nineveh Plain, Iraq; Faculty of Civil Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Malaysia
[2]Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Malaysia

Abstract

This paper applied an artificial intelligence methodology for streamflow prediction in a flash flood in Pinang catchment based on TOPMODEL input and output data sets. TOPMODEL is a semi-distributed rainfall runoff model widely used in numerous water resource applications. However, literature has indicated relative weakness in TOPMODEL performances in streamflow prediction. Thus, radial basis function neural network (RBF-NN) has been employed to improve the accuracy of streamflow prediction and then compared with TOPMODEL and multilayer perceptron neural network (MLP-NN) performances. Four years of daily hydro-meteorological data sets (for the period between 2007 to 2010) were used for calibration and validation analysis. The results have shown an improvement from 0.749 and -19.2 of the calibration period to 0.957 and 0.001, and from 0.774 and -19.84 of the validation period to 0.956 and -3.611 of Nash-Sutcliffe model (NS) and Relative Volume Error (RV_E), respectively. RBF-NN performance has been established to improve the daily streamflow prediction; however, the MLP-NN was better in contrast with the involved method in the study. It can be concluded that TOPMODEL performance showed a high ability to simulate the peaks compared with both AI methodologies.

Key words: flash flood catchment, Malaysia, radial basis function, streamflow prediction, TOPMODEL

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* Author to whom all correspondence should be addressed: e-mail: wateraliwater@gmail.com; Phone: +964-7503644441