mess@mess-earth.org

World Multidisciplinary Earth Sciences Symposium

WMESS

WWW.MESS-EARTH.ORG

WMESS 2016

5-9 September, 2016 - Prague (Czech Republic)

Evaluation of the ability of some artificial intelligence models for rainfall-runoff simulations in hill slope scale

Mohammad Taghi Dastorani *, M.M. Zaree, M. Mesdaghi

Ferdowsi University of Mashhad, Faculty of Natural Resources and Environment, Mashhad, Iran

ABSTRACT

There are several ways to simulate watersheds hydrological processes but since the measuring of all parameters needed to assess the reaction of the basin is not possible due to the cost and time therefore, the selection of a model with simple structure, using minimal input data, and ability to provide accurate forecasts is important. In order to achieve the best results, modelling and identification of factors affecting the output of the model is carried out. In this regard, in present study, it has been tried to identify the factors and estimating the amount of runoff using a variety of methods of artificial intelligence and multiple regression. Then, to evaluate the efficiency of the implemented models and choose the best model, some performance criteria including the correlation coefficient (R), Nash-Sutcliffe coefficient (NSE), the root mean square error (RMSE) and the mean absolute error (MAE) were used . The data used in this study were 9 rainfall events data measured in time period of 2011- 2015 taken from the Khakh watershed of Gonabad. Artificial intelligence models used in this study were: normal feed forward neural networks, feed forward Cascade neural networks, feed backward Elman neural networks, Adaptive Neuro-Fuzzy Inference System (ANFIS) and regression decision tree model (Regression Tree) that were implemented in MATLAB software environment and also step multiple regression as statistical methods which was implemented in Minitab software. The results showed that the statistical as well as artificial intelligence methods considered in this research are sensitive to the different number of input parameters. Also inartificial intelligence models, in addition to the number of input parameters, the number of hidden layers and the number of neurons in hidden layer can lead to different estimates. Overall, the findings show that the performance of the models is acceptable, as often all of them are able to estimate the amount of runoff with reasonable accuracy, and relatively low error.

Key words: Propagation; feedback; feed forward; decision trees; Neural Networks; modelling, ANFIS.

* Corresponding Author