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Maximum Daily Discharge Prediction using Multi Layer Perceptron Network

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Prediction of maximum daily flow is essential for planning of water resources systems. This study presents the use of an Artificial Neural Network (ANN) to maximum daily flow prediction in the Khosrow Shirin watershed, in north-west Fars province in Iran. Precipitation from four meteorological stations was used to develop a Multi Layer Perceptron (MLP) optimized with the Levenberg-Marquardt (MLP_LM) training algorithm and using a tangent sigmoid activation function. Different methods to construct the input vectors were considered during models development. In the first method the precipitation signal is imported separately as input vectors for training. In the second method area-weighted precipitation and related Hydrographs were used in MLP development. In addition to precipitation, in the last model three inputs were used that were base on antecedent flows with one and two days time lag. The performance of each of these models was investigated with the root mean square errors (RMSE) and correlation coefficient (R2). The results show that the second method with weighted precipitation has higher prediction efficiency. R2 and RMSE of training and validation phase for third the model with weighted precipitation were 0.98 and 0.96, respectively Addition of antecedent flow as input vector and use of weighted precipitation provide better results in maximum daily flow prediction.

Keywords: Multi Layer Perceptron, Maximum Daily Flow Prediction, Weighted Precipitation, Antecedent flow, Levenberg-Marquardt Algorithm.