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Investigation of Shannon and PolyWog Wavelet Neural Networks In Monthly River Flow Modeling

H. Abghari (1), N. van de Giesen (2), and M. Noury (3)

(1) Assisstant Professor, Urmia University, Urmia, Iran. (Hiradab@Gmail.com) Fax:+98 (0)441 2770489, (2) Professor, TUDelft, Delft, Netherlands. (N.C.vandeGiesen@Tudelft.nl) Fax: +31 (0)15 2787180, (3) MSc. in Water Stracture, Mahab Ghods Consultant Co. (mojtabanoury@yahoo.co.uk)

Intelligence models consist of distributed parallel processors that learn to reproduce the relationship between input and output signals and present the best topology of patterns simulation. Due to nonlinearity of hydrological events the learning process has restrictions . In this study, using a combination of Wavelet theory and a Multi Layer Perceptron Network, two Wavelet Neural Network models for monthly flow of Nazloochaei River basin in Iran were developed. Instead of using common sigmoid activation functions in the MLP network a wavelet function was used, The hybrid wavelet neural network (WNNs) employing a nonlinear wavelet basis was developed as an alternative approach to nonlinear fitting. Result of MLP base model show the 86% in training and 79% in model testing. Results of the MLP base model show a goodness of fit of 86% in training and 79% in model testing. Results shows that the Polywog neural network with the best topology has a 94% accuracy in the training phase and 89% in testing of model. The Shannon neural network with the best topology produces 79% accuracy in training phase and 61% in testing of model. Comparison of WNN and MLP shows that Polywog wavelet could have better accuracy in time series modeling. Classic sigmoid activation functions in the MLP network show better results than the Shannon wavelet.

Keywords: Shannon and PolyWog Wavelet, Wavelet Neural Networks, Nazloochaei River Basin, River Flow Modeling.