Applying of an Adaptive Neuro-Fuzzy Inference System (ANFIS) for Estimation of Flood Hydrographs

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Abstract : This paper presents the application of an Adaptive Neuro-Fuzzy Inference System (ANFIS) to flood hydrograph modeling of Shahid Rajaee reservoir dam located in Iran. This was carried out using 11 flood hydrographs recorded in Tajan river gauging station. From this dataset, 9 flood hydrographs were chosen to train the model and 2 flood hydrographs to test the model. The different architectures of neuro-fuzzy model according to the membership function and learning algorithm were designed and trained with different epochs. The results were evaluated in comparison with the observed hydrographs and the best structure of model was chosen according the least RMSE in each performance. To evaluate the efficiency of neuro-fuzzy model, various statistical indices such as Nash-Sutcliff and flood peak discharge error criteria were calculated. In this simulation, the coordinates of a flood hydrograph including peak discharge were estimated using the discharge values occurred in the earlier time steps as input values to the neuro-fuzzy model. These results indicate the satisfactory efficiency of neuro-fuzzy model for flood simulating. This performance of the model demonstrates the suitability of the implemented approach to flood management projects.