

Forecasting the Water Level of the Euphrates River in Western Iraq Using Artificial Neural Networks (ANN)

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Abstract

Forecasting water levels of rivers downstream major dams are essential for agricultural and industrial purposes as well as for efficient water management. Haditha Dam is one of the major projects on the Euphrates River in Iraq that is used for flood control and water management. The area downstream of the dam contains many strategic agricultural and industrial projects that are highly affected by the variation in the river water level. In this study, a neural network model (ANN) was created to forecast the levels of the Euphrates downstream of Haditha Dam. The model was trained in MATLAB with four inputs representing water levels at present and previous times. The data was utilized for training a daily model for 496 days and a monthly model for 241 months. The results indicated that ANN can estimate water level ($t+1$) with a high degree of accuracy. Furthermore, the results provide that the ANN is an effective technique to predict daily and monthly water levels and that the empirical equation can be used to compute daily and monthly levels with a regression coefficient greater than 92 percent for (training, validation, testing, and all data) for the daily model and greater than 84 percent for the monthly model. The ANN model could be simplified into a practical and straightforward formula from which the water level for the two models could be calculated