

Neural networks based nonlinear time series regression for water level forecasting of Dungun river

Abstract :

The Department of Irrigation and Drainage (DID) Malaysia and Meteorological Malaysia Department (MMD) has been measured the flood characteristics benchmark which included water level, area inundation, peak inundation, peak discharge, volume of flow and duration of flooding. In terms of water levels, DID have introduced three categories of critical level stages namely normal, alert and danger levels. One of the rivers detected by DID that had reached danger level is Sungai Dungun located at Dungun district, Terengganu. The aim of this study is to find suitable prediction model of water level with input variables monthly rainfall, rate of evaporation, temperature and relative humidity taken from the same catchment at Dungun River using Neural Networks based Nonlinear Time Series Regression methods which are Backpropagation Neural Network (BPNN) and nonlinear autoregressive models with exogenous inputs (NARX) networks. The variables selection criteria procedures are also developed to select a significant explanatory variable. In addition, the process of pre-processing data such as treatment of missing data has been made on the original data collected by DID and MMD. The methods are compared to obtain the best model for prediction water level in Dungun River. Based on the experiments, the NARX model with five predictor variables is the best model compared to BPNN. In addition, treatment of missing data using mean and OLR approach produced comparable results for this case study.