

Abstract:

Artificial neural networks (ANN) are robust tools for modeling nonlinear phenomena. They are increasingly used for modeling complex processes by connecting input and output data without requiring neither detailed knowledge of the phenomena nor hard to collect data. In hydrological application, ANNs are widely used to model rainfall / runoff relationships. Comparatively, little attention has been devoted to ANN prediction of river stages. The current research explores the possibility of simulating flood routing based solely upon river stage data at Malakal and Melut stations on the White Nile in Sudan. To predict actual downstream river stage, several combinations of antecedent river stages downstream are used as inputs. Different ANN structures are tested and the one that has the highest generalization ability is selected based on Bayesian information criteria. ANN's performance is compared to hydrodynamic models as well as to linear statistical methods such as multiple regression techniques. ANNs outperform distributed routing models as well as linear statistical techniques. Therefore, ANN's can be successfully used to replace complex, extensive data, distributed routing models.