AN EVALUATION OF ARTIFICIAL NEURAL NETWORK TECHNIQUES FOR FLOW FORECASTING IN THE RIVER YANGTZE

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It is only in the last six years that artificial neural networks have been applied to the rainfall-runoff process. Although their configuration and internal parameters have no physical interpretation, they can provide accurate representations of the rainfall-runoff process.

This paper evaluates two neural networks; the popular multilayer perceptron (MLP) and the radial basis function network (RBF). While the MLP has been used in many runoff studies, the RBF has been used in only a limited number of cases.

Although the MLP can produce accurate flow forecasts it does have a number of drawbacks. For example, training an appropriate network can take a long time, and there are a number of parameters that must be determined by the neural network engineer. The RBF, on the other hand, can be trained in a fraction of the time, it has fewer parameters that have to be determined, and, in certain cases, predicts river flow more accurately than the MLP.

Comparisons are made between these two neural networks and conventional statistical techniques; stepwise multiple linear regression, auto regressive moving average models, and a zero order forecasting approach. All these models are evaluated using six-hourly rainfall-runoff data for the River Yangtze at Yichang (upstream of the Three Gorges Dam), during the period 1991 to 1993.