Neural network Prediction of Flooding in Chiang Mai, Thailand: Comparison of Input Determination Techniques

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Artificial neural networks (ANNs) have been widely used in hydrology for applications such as forecasting floods, salinity and water quality. The most commonly used type is a feedforward network trained with backpropagation. This type of network will be applied to prediction of river levels on the River Ping in Thailand. Chiang Mai City has suffered in the past from problems of flooding, e.g. in 2005 during the monsoon season, there were two major floods on 14 August and 30 September. This is the first time in the history of this city that two large floods have occurred in the same year. As part of this study, different methodologies are investigated for determining the optimal set of input variables, including correlation, stepwise regression, pruning and self-organising maps. Four years of hourly runoff data are available for training, validation and independent testing of the networks for both Chiang Mai and stations further upstream in the Ping catchment. A series of different evaluation measures are used to assess model performance including coefficient of efficiency, root mean squared error and a series of relative measures.