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Application of artificial neural network model for regional frequency analysis at Han River basin, South Korea

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Regional frequency analysis (RFA) is used to improve the accuracy of quantiles at sites where the observed data is insufficient. Due to the development of technologies, complex computation of huge data set is possible with a prevalent personal computer. Therefore, machine learning methods have been widely applied in many disciplines, including hydrology. There are also many previous studies that apply the machine learning methods to RFA. The main purpose of this study is to apply the artificial neural network (ANN) model for RFA. For this purpose, performance of RFA based on the ANN model is measured. For the homogeneous region in Han River basin, rainfall gauging sites are divided into training and testing groups. The training group consists of sites where the record length of data is more than 30 years. The testing group contains sites where the record length of data is spanned from 10 to 30 years. Various hydro-meteorological variables are used as an input layer and parameters of generalized extreme value (GEV) distribution for annual maximum rainfall data are used as an output layer of the ANN model. Then, the root mean square error (RMSE) values between the predicted and observed quantiles are calculated. To evaluate the model performance, the RMSEs of quantile estimated by the ANN model are compared to those of the index flood model.