

The thesis deals with the application of computational artificial intelligence models on hydrological predictions. The short term rainfall-runoff prediction problem is studied on the real data of physical time series measured in the watershed of river Plučníce. A brief statistical study including correlation and regression analyses is performed. The high level of variance and noise is concluded. The evolution of the proper input filter providing an input set for the neural network is performed. In the main part of the thesis several neural network models based on multilayer perceptron, RBF units, and neuroevolution are constructed together with two neural ensembles inspired by the bagging method. The models are tested on the three subsequent years summer data. The greater generalization ability of multilayer perceptron architectures is concluded. The resulting multilayer perceptron models are able to reduce the mean squared error of the prediction by 15% compared to the prediction by the previous value.