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Neural network modelling of two river flow systems in Iceland

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Artificial neural networks have been applied to hydrological modelling problems for over 15 years. Often referred to as *neurohydrology*, this emerging field of research has seen numerous studies in many different catchments worldwide. In many cases such networks have been shown to be effective and accurate in modelling river flow based on past and present conditions (for example, antecedent discharge, rainfall, PET etc). While there are a number of neural network models available, by far the most popular has been the multi-layer perceptron (MLP) trained using an error back propagation algorithm. This training method takes the error between observed and modelled data, propagating it back through the network to adjust the network's interconnecting weights. By repeating this procedure many times (epochs) the network slowly begins to learn the relationship between the predictors and the predictand and the network becomes trained.

In this paper the popular MLP is applied to two Icelandic rivers – the Jokulsa Eystri and the Vatnsdalsa – one of which is affected by glacial melt. The paper explores the use of different input parameters including a temperature 'hint' that provides information on glacial melt to the neural network. The paper also examines the behaviour of hidden units to determine how the input data are being utilised and relates this to modelled discharge.