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Intercomparison of machine-learning algorithms for flood event separation

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Many hydrological research questions require flood events which have to be separated from continuous time series of discharge, e.g. to characterize the response of a watershed to heavy precipitation or snowmelt. Nevertheless several tools and methods exist like manual graphical methods, digital filters, recession-based approaches and tracer-based methods, we tested a new approach to avoid limited general applicability with regard to additional data requirements (e.g. precipitation), subjectivities or methodological biases. Here, we specify the separation of flood events as merely pattern-based analyses, where we propose machine-learning tools for the separation of these events. These machine-learning tools combine the advantages of expert knowledge and the speed of digital filters.

In our study, we compare four different methods (Support Vector Machines, Extreme Learning Machines, Artificial Neural Networks, and CART regression trees) in terms of performance (volume and temporal accordance of separated events). Moreover, we address the question how the optimal training data is found and whether trained machines can be used for regionalization. Our investigations show that machine learning algorithms can be a suitable tool for flood event separation which could reduce the workload for these tasks drastically.