A systematic assessment of machine learning models for short-term water level prediction

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In recent decades there have been many assessments of machine learning models for short-term flood prediction, but few comparisons using water level forecasts. Here, we use high-resolution water level and rainfall data from the UK Environment Agency to compare and assess the usefulness of multiple models including deep artificial neural networks to accurately predict water level at different points of the upper Soar catchment area (UK) with lead-times of 6 to 48 h. Six types of machine learning algorithms in addition to 3 neural network models are developed for every lead time, with increasing complexities and data-pre-processing techniques. The models are then tested for their generalization properties using the complete test set times series and focusing on the rising limb of the hydrographs. Preliminary results indicate that the inclusion of water level from multiple upstream stations with different lag times leads to better performance in most of the models. Overall, the ensemble of decision trees showed good performance, but regularised neural network approach has the highest accuracy.