Fuzzy Clustering-based Neural Networks for Describing Rainfall-Runoff Process

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Abstract.
Since the last decade, several studies have shown the ability of Artificial Neural Networks (ANN) in modeling the rainfall-runoff process. From methodological viewpoint, ANN belongs to more general paradigm, i.e., soft computing or computational intelligence, in which independent methodologies, mostly Fuzzy Logic (FL), ANN, and Genetic Algorithm (GA), are combined together in order to provide an intelligent behavior in computational frameworks. In this study, as our previous article, we focus on the hybridization of soft computing paradigms in order to increase the efficiency of rainfall-runoff modeling. For doing that, the idea of fuzzy clustering is combined with feedforward neural networks for achieving a two-layer system, in which the first layer classifies the rainfall-runoff patterns and the second maps the input values to output. The model is then, applied on Leaf River basin (near Collins, Mississippi). For better evaluation of the model performance, the 40-year data is divided to four 10-year data sets to simulate and evaluate four sequences of modeling. Six error measures are checked for modeling choices and then, the best model is selected. The result is compared with the previous study of authors, i.e. evolutionary neural networks modeling. This comparison shows that Fuzzy clustering-based neural networks have better performance in applied case study

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