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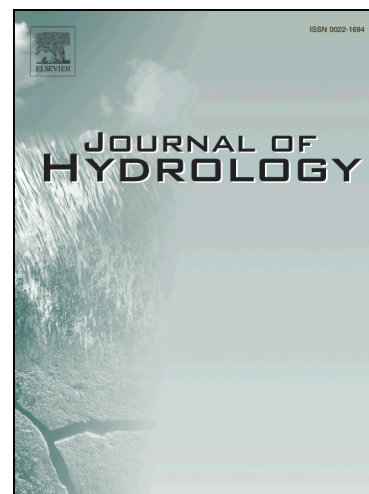
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Rainfall-Runoff modelling using a self-reliant fuzzy inference network with flexible structure**Tak Kwin Chang¹, Amin Talei^{1*}, Chai Quek², Valentijn R. N. Pauwels³**¹ School of Engineering, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, 47500 Subang Jaya, Malaysia² Center for Computational Intelligence, Nanyang Technological University, School of Computer Engineering, 50, Nanyang Avenue, Singapore 639798, Singapore³ Department of Civil Engineering, Monash University, Clayton, Victoria, Australia*Corresponding Author: amin.talei@monash.edu

Abstract:

Conventional neuro-fuzzy systems used for rainfall-runoff (R-R) modelling are generally dependent on expert knowledge. In these models, not only the structure is designed by the expert user, but also all the required knowledge for fuzzy partitioning of the input-output space and rule base need to be provided by the expert. To move towards NFS with a more flexible rule base and structure, efforts are made to integrate the self-reliant mechanisms into the learning algorithm that enable the model to identify the position and distribution of fuzzy labels in input-output space and generate the required rule base. In this study, the Self-adaptive Fuzzy Inference Network (SaFIN) is used for the R-R application. SaFIN employs a new clustering technique known as Categorical Learning-Induced Partitioning (CLIP) which allows the model to adapt to the new incoming tuple by consistently updating the model. SaFIN is also equipped with a rule-pruning mechanism that can exclude inconsistent and obsolete rules. In this study, SaFIN R-R models are developed in three different catchment types and sizes where the results are compared against a benchmark NFS model and few physical models including URHM, HBV, GR4J. Results shows that SaFIN is a capable and robust tool for R-R modeling under varying

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