Hydrology and Earth System Sciences Discussions

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Comment on hess-2021-423

John Ding

Community comment on "Deep learning rainfall–runoff predictions of extreme events" by Jonathan M. Frame et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-423-CC1, 2021

I'm intrigued by the opening sentence in the Abstract that "(t)he most accurate rainfall-runoff predictions are currently based on deep learning. " And after a quick read, I'd have to concur with the authors in their findings.

One question I have is about one of their previous works. Kratzert et al. (2019a, Section 3.1, paragraph 2) wrote that "This [LSTM] is not dissimilar to any standard hydrological simulation model (i.e., is it not a one-step-ahead forecast model)."

The word "it" inside the parentheses seems out of place. I'd appreciate a clarification of this.

The conceptual model the authors adopt for benchmarking is the Sacramento Soil Moisture Accounting model (SAC-SMA). This includes "a [linear] unit hydrograph routing function" (Line 122).

As a proponent of using a nonlinear response function to simulate what I've called Childs-Minshall phenomenon (Ding, 2011, Figures 1 and 2), I feel the SAC-SMA can be improved by moving to a nonlinear store or storage. But then advancing the state of the art of a standard conceptual model is a separate issue.

References

Ding, J. Y.: A measure of watershed nonlinearity: interpreting a variable instantaneous unit hydrograph model on two vastly different sized watersheds, Hydrol. Earth Syst. Sci., 15, 405–423, https://doi.org/10.5194/hess-15-405-2011, 2011.