

Hydrol. Earth Syst. Sci. Discuss., community comment CC2 https://doi.org/10.5194/hess-2021-423-CC2, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

Clarify on CC1

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-CC2, 2021

I'd like to make use of this extended discussion period to clarify the one question I have of some co-authors' previous statement, the latter part of which reads "This [LSTM] (i.e., is it not a one-step-ahead forecast model)." (CC1, paragraph 2).

Among the autoregressive (AR) class of time series models for prediction, a simplest one being a one-step-ahead extrapolation/forecast model. This is a second-order one, written as AR(2, 2, -1), i.e. $y^{t+1} = 2^{y} \{t\} - y_{t-1}$.

The drawback of the AR(2) is to always overshoot by one time step the timing of peaks and troughs of an observed hydrograph (Mizukami et al., 2019, SC1 therein; Ding, 2018).

Isn't AR(2, 2, -1) a special case of the LSTM network models?

References

Ding, J.: Interactive comment on "On the choice of calibration metrics for "high flow" estimation using hydrologic models" by Naoki Mizukami et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-391-SC1, 2018.

Mizukami, N., Rakovec, O., Newman, A. J., Clark, M. P., Wood, A. W., Gupta, H. V., and Kumar, R.: On the choice of calibration metrics for "high-flow" estimation using hydrologic models, Hydrol. Earth Syst. Sci., 23, 2601–2614, https://doi.org/10.5194/hess-23-2601-2019, 2019.