

Interactive comment on “Using Deep Learning to Fill Spatio-Temporal Data Gaps in Hydrological Monitoring Networks” by H. Ren et al.

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Received and published: 21 June 2019

Short Reviews of HESS-2019-196: This paper uses long short-term memory (LSTM) neural networks to fill in gaps in spatially distributed time-series data. The performance of the LSTM-based gap-filling method is compared to that of a traditional, popular gap-filling method: autoregressive integrated moving average (ARIMA). Overall, this paper is well written, structured and results seem sufficiently justified and useful. However, this paper is very technical and there is no physical insight beyond just feeding data into a standard code. I think this paper should be published as technical note (not as research article). Several aspects could be further improved in order to having it published in this journal.

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(1) Would you guarantee the LSTM method in your paper can achieve the same excellent performance in other areas of the whole world? Is it possible that the good performance of the LSTM model is just applicable for the case given by the manuscript? The authors should include one more test for another area (maybe not in the text but in the supporting materials).

(2) LSTM model is only compared to ARIMA. Why not compare LSTM with other widely-used methods (such as Kriging interpolation and Gaussian process)? Furthermore, are the authors familiar with DEOF (Data Interpolating Empirical Orthogonal Functions) which are proposed by Beckers and Rixen (2003)? I think that DEOF is powerful and useful for filling temporal and spatial gaps in geophysical datasets. Maybe the authors can compare LSTM with DEOF.

(3) The present title “Using Deep Learning to Fill Spatio-Temporal Data Gaps in Hydrological Monitoring Networks” are inaccurate. I suggest new title like “Using Long Short Term Memory Neural Network Model to Fill Spatio-Temporal Data Gaps in Hydrological Monitoring Networks”

Reference: Beckers, J. M., and M. Rixen (2003), EOF Calculations and Data Filling from Incomplete Oceanographic Datasets, *J. Atmos. Ocean. Technol.*, 20(12), 1839–1856.

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, <https://doi.org/10.5194/hess-2019-196>, 2019.

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