



Journals Magazines Proceedings Books SIGs Conferences People

ACM Proceedings Conferences when & where ICPS Proceedings

A Deep Learning Approach to Short-Term Quantitative Precipitation Forecasting



Authors:  [Nishant Yadav](#),  [Auroop R. Ganguly](#)

[Authors Info & Affiliations](#)

CI2020: Proceedings of the 10th International Conference on Climate Informatics • September 2020 • Pages 8–14 • <https://doi.org/10.1145/3429309.3429311>

Published: 22 September 2020

 0  62



Get Access

CI2020:
Procee...

A Deep
Learni...
Pages
8–14

←
Previou
s
Next →

ABSTRA
CT

Referenc
es

Index

ACM  DIGITAL
LIBRARY

ABSTRACT

Short-term, spatially distributed quantitative precipitation forecasting (SD-QPF), or ‘precipitation nowcasting’, is important for hydrological and water resources applications, such as flash flood warning systems and operations of dams and reservoirs. The state-of-the-art methods in SD-QPF include radar extrapolations, numerical weather prediction (NWP) models, and hybrid methods that combine the two. Despite the diversity of methods that have been used, SD-QPF remains difficult: even sophisticated methods may not be able to consistently outperform relatively simple baselines such as Persistence. Methods in Deep Learning (DL) have demonstrated significant and often unexpected improvements across a wide variety of domains ranging from image and video processing to machine translation and speech recognition. Emerging research has suggested that that DL may improve point predictions in the context of very short-term – 0–2 hours – distributed QPF (VSD-QPF) by

taking advantage of growing data from in-situ weather sensors as well as remote sensors such as radar and satellites, along with advances in computing. Here we examine the hypothesis that DL can improve VSD-QPF, specifically point predictions, based on observed hourly precipitation data over the contiguous United States, by leveraging a Convolutional Long Short-Term Memory (LSTM) recurrent neural network for 1-hour precipitation nowcasting. We find the DL approach performs better than the baseline method of Persistence and a state-of-the-art method using Optical Flow.

References

1. [n.d.]. NLDAS-2 Forcing Dataset Information URL: <https://ldas.gsfc.nasa.gov/nldas/v2/forcing> 
2. Ata Akbari Asanjan, Tiantian Yang, Kuolin Hsu, Soroosh Sorooshian, Junqiang Lin, and Qidong Peng. 2018. Short-Term Precipitation Forecast Based on the PERSIANN System and LSTM Recurrent Neural Networks. *Journal of Geophysical Research: Atmospheres* 123, 22(2018), 12,543–12,563. <https://doi.org/10.1029/2018JD028375> 
3. G. L. Austin and A. Bellon. 1974. The use of digital weather

radar records for short-term precipitation forecasting. Quarterly Journal of the Royal Meteorological Society 100, 426(1974), 658–664. <https://doi.org/10.1002/qj.49710042612>  | 

[Show All References](#)

***Index Terms* (auto-classified)**

A Deep Learning Approach to Short-Term Quantitative Precipitation Forecasting



Computing methodologies



Machine learning



Machine learning approaches



Neural networks

Comments

DL Comment Policy

Comments should be relevant to the contents of this article, (sign in required).



[Comments](#) [!\[\]\(74d4806277d7e73349d8e8c0897931e9_img.jpg\) Privacy Policy](#)

 Tweet

 Share

Sort by Newest ▾

Nothing in this discussion yet.

[View Table Of Contents](#)

Categories

Journals

Magazines

Books

Proceedings

SIGs

Conferences

Collections

People

About

[About ACM Digital Library](#)

[Subscription Information](#)

[Author Guidelines](#)

[Using ACM Digital Library](#)

[All Holdings within the ACM](#)

[Digital Library](#)

[ACM Computing Classification](#)

[System](#)

Join

[Join ACM](#)

[Join SIGs](#)

[Subscribe to](#)

[Publications](#)

[Institutions and](#)

[Libraries](#)

Connect

 [Contact](#)

 [Facebook](#)

 [Twitter](#)

 [Linkedin](#)

The ACM Digital Library is published by the Association for Computing Machinery. Copyright © 2021 ACM, Inc.

[Terms of Usage](#) | [Privacy Policy](#) | [Code of Ethics](#)



Association for
Computing Machinery

Feedback