

Interactive comment on “RainNet v1.0: a convolutional neural network for radar-based precipitation nowcasting” by Georgy Ayzel et al.

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Received and published: 14 April 2020

This paper by Ayzel and co-authors is a very good well references and refreshing open and honest appraisal of a Convolution Neural Net approach to precipitation nowcasting.

RainyNet, which differs from traditional "Next video frame prediction" approaches which use a LSTM plus CNN is compared to an optical flow type technique and shown to have good skill but suffers from oversmoothing thus degrading its ability to predict high intensity rainfall rates.

I appreciated this honest distinction which helps inform readers and, since the software is completely open and community based, it also helps inform potential users.

The language is clear and very readable. The figures are of reasonable quality and

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the author spends a good amount of time explaining the underlying Machine Learning literature making this a great "on-ramp" for anyone beginning in this field.

I only have four minor suggestions (and they are just that, suggestions): 1) The training and prediction was entirely based on DWD RY gridded rainfall product. I think the authors should discuss the applicability of training a network on one data set and application to another. The CNN learns what features propagate and dissipate (an advantage over purely advective techniques) but this may not apply in regions where different physics dominate. 2) It would be good for the Authors to discuss a little more on what would be required of the input data. Can a potential user train with any NDArray style data? 3) One line 155 where training times are discussed it would be good, for the understanding of readers to restate how many frames (radar time steps) were used in the training. This would be a repetition but I believe it would add to the readers understanding. 4) In the author's section on future research I am surprised not to see other atmospheric data inputs/layers talked about. If I understood the paper correctly the CNN is trained purely on image-like data with no environmental awareness. I wonder the evolution (again information that can not be deduced by simple advection) could be better predicted with information like precipitable water or information about terrain? The developing area of physics aware machine learning could be an area to explore.

In conclusion, the paper by Ayzel is a very nicely written description of a new and novel technique for precipitation nowcasting. It will make an excellent paper for scientists who are looking to learn more about applied machine learning to read. The software is open source community software so reproducibility and usability is a given. This paper meets and exceeds the standards for GMD and should be accepted. -Scott Collis

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2020-30>, 2020.

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