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Exploring the Frontiers of Deep Learning for Earth System Observation and Prediction

Monday, 5 October 2020 15:00 (30 minutes)

In the last few years, the Earth System Science community has rapidly come to adopt machine learning as a viable and useful approach for doing science, and it has been applied to a surprising diverse array or problems, with an ever-increasing degree of success. However, despite our progress, there remains much to learn. In its current form, ML may be best viewed as an alternative and complimentary approach to traditional software development. However, we have a great deal to learn about how to best employ and deploy these tools, which require a new and more 'orgnanic'process. Furthermore, there are many challenges specific to science that need to be further explored including: massive data labelling, enforcing physical constraints, uncertainty quantification, explainability, reliability, AI safety, data movement problems, and the need for benchmarks. Finally, it is my opinion that ML has the potential to grow far beyond its current limits, as a wide range of possibilities open up when both the software and the software-engineer and composed of code. In this presentation, we will explore these issues and the survey cutting-edge research that is taking place on the frontiers of ML sampling from topics like: self-supervision, continual learning, online-learning, human in the loop, AutoML, neural architecture search, expanded use of GANs, loss-function learning, spatio-temporal prediction, equation identification, ODE learning, differential programming, amongst others.

Thematic area

1. Machine Learning for Earth System Observations - Including Retrieval Algorithms, Fast/Improved/New Forward Models, Advanced Quality Control, De-biasing Techniques

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