IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS

Special Issue on

Deep Learning for Earth and Planetary Geosciences

Earth and planetary geosciences study the physical, chemical and biological characterizations of the Earth and other planets aimed at the understanding of their physical phenomena and natural systems. These studies play a crucial role in providing the insight needed to address a number of challenges of momentous societal importance and scientific value. With increasing complexity and data availability, these present a unique opportunity for machine learning, and deep learning methods in particular, to help advance these fundamental challenges. However, the domain specific characteristics of earth and planetary geoscience problems and datasets pose significant challenges to direct applications of deep learning methods. Some of the difficulties include high dimensionality, strong spatiotemporal correlations, heterogeneity in the data, and interpretability of the results. Furthermore, the scarcity of ground truth for supervision due to the difficulty or high-cost of acquiring such data, or that the elements of interest are sparse or rare can be significant challenges especially when combined with the often complex underlying physical, chemical and biological processes. Therefore, the application of deep learning methods to earth and planetary geoscience problems necessitates the development of novel approaches and frameworks to tackle them. This special issue aims to document and promote the development of state-of-the-art deep learning methods for earth sciences and new learning formulations to tackle the above-mentioned challenges. More broadly, it is hoped that this special issue can bring together geoscientists and machine learning researchers and encourage future work and collaboration on these important topics.

Topics of interest include, but are not limited to:

1. Hybrid physics- and deep learning-based models
2. Deep learning surrogate models of large-scale physical processes
3. Earth and planetary geoscience data analysis
4. Multi-modal data analysis and modeling
5. Robustness of deep learning models in the geosciences
6. Deep learning from sparse geoscience data
7. Uncertainty quantification in geophysical models
8. Deep learning in climate modeling
9. Deep learning for weather forecasting
10. Land and atmospheric remote sensing

Timeline

- Paper submission deadline: March 12, 2021
- Review results: May 21, 2021
- Revision submission: June 25, 2021
- Final decision: July 30, 2021

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Submission Instructions

- Read the Information for Authors at http://cis.ieee.org/tnnls.
- Submit your manuscript at the TNNLS webpage (http://mc.manuscriptcentral.com/tnnls) and follow the submission procedure. Please, clearly indicate on the first page of the manuscript and in the cover letter that the manuscript is submitted to this special issue. Send an email to the lead guest editor Dr. Antonio Paiva (arpaiva@ieee.org) with subject “TNNLS special issue submission” to notify of your submission.
- Early submissions are welcome. We will start the review process as soon as we receive your contributions.