

IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS

Special Issue on **Deep Neural Networks for Graphs: Theory, Models, Algorithms and Applications**

Deep neural networks for graphs (DNNG), ranging from (recursive) Graph Neural Networks to Convolutional (multilayers) Neural Networks for Graphs, is an emerging field that studies how the deep learning method can be generalized to graph-structured data. A broader class of models which, beside DNNGs, can also consider Bayesian graph networks and the class of generative graph networks, can be included with the term Deep Graph Networks (DGN). In their various incarnations, DNNGs and DGNs have become a topic of intense research by the remarkable ability of graph representations in learning tasks such as node classification, graph classification, graph generation and link prediction. The increasing number of works in DNNGs and related areas indicates that both academic and industrial communities have a considerable demand for developing more advanced technology and algorithms, theoretical foundations, tools and platforms for real-world applications. The core is to develop new DNNG/DGN models and efficient algorithms, in either spectral, recursive, spatial, or mixture form. Various practical scenarios, such as large-scale, dynamic, ambiguous graphs, add on the challenge of modeling and efficient algorithmic design for the broad class of DNNG/DGNs. Besides, one needs appropriate mathematical underpinnings and rigorous theories to interpret and validate the power and limitations of DNNG/DGNs. More succinctly, the research foci of the special issue include theoretical study, model design, algorithmic development and advanced applications of DNNG/DGN models.

Topics of interest include, but are not limited to

- Deep Neural Networks for Graphs
- Deep Learning for Graphs
- Graph Representation Learning
- Fast and/or Distributed Learning Algorithms for DNNG/DGNs
- Novel Approaches to Graph Convolution, Recursion on Graphs, Graph Pooling, Graph Attention, Message Passing on Graphs
- Algorithms for Pre-Trained DNNG/DGNs, Graph Transformer
- Expressive and Generalization Power of DNNG/DGNs
- Spectral Graph Theory, Graph Wavelets
- Learning Theory on DNNG/DGNs
- Generative Models of Graphs
- Combination of Neural Network for Graphs and Gaussian Processes
- Heterogeneous DNNG/DGNs, Hyper-DNNGs, Multi-View DNNGs
- Adversarial Attacks and Defenses on Graphs
- Trustworthy Approaches for Deep Learning on Graphs
- Advanced Applications Based on Novel DNNG/DGNs

Timeline

- Submission Deadline: 21 August 2021
- First Decision: 22 December 2021
- Revision: 5 April 2022
- Final Decision: 6 July 2022

Guest Editors

Ming Li, Zhejiang Normal University, China

Alessio Micheli, University of Pisa, Italy

Yu Guang Wang, Max Planck Institute for Mathematics in the Sciences, Germany

Shirui Pan, Monash University, Australia

Pietro Liò, University of Cambridge, UK

Giorgio Stefano Gnecco, IMT School for Advanced Studies, AXES Research Unit, Italy

Marcello Sanguineti, University of Genoa, Italy

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 leading guest editor Dr. Ming Li (mingli@zjnu.edu.cn) with the subject "TNNLS special issue submission" to notify about your submission
- Early submissions are welcome. We will start the review process as soon as we receive your contributions