

DL4SD

Deep Learning for Graphs

ECML-PKDD 2018 Tutorial - 14th September 2018

Organized by:

[Davide Bacciu](#) - Università di Pisa (bacciu@di.unipi.it) - Contact person

[Alessio Micheli](#) - Università di Pisa (micheli@di.unipi.it)

About

The tutorial will provide an in-depth introduction to the emerging field of deep learning for graphs and to its applications to network data analysis, to bioinformatics, chemistry, physics and vision. Dealing with graph data requires learning models capable of adapting to structured samples of varying size and topology, capturing the relevant structural patterns to perform predictive and explorative tasks while maintaining the efficiency and scalability necessary to process large scale networks.

This tutorial will offer a totally novel perspective on this emerging topic, integrating the latest cutting edge research with foundational works dating back to over 20 years ago and whose knowledge and understanding is currently not widely diffused in the community.

The tutorial is targeted to both early career researchers seeking ideas for their doctoral studies as well as to more advanced stage researchers looking to enter into a lively field of deep learning and seeking both foundational knowledge as well as a perspective on current research.

DL4SD

The course is organized into two modules. The first module will be devoted to introducing the basic concepts of learning with structured data, followed by a review of the foundational learning models and frameworks for graphs and structured data processing. The second module will build on such foundational concepts to discuss the most recent advances in deep learning for graphs together with their most impacting applications, finally highlighting key open research questions.

Module 1 – Foundational models (2h) - [PDF](#)

- Introduction to structured data processing
- Recursive models
- Learning with cyclic graphs
 - Models for network data
 - Contextual approaches for variable-size graphs
 - Contractive encodings for variable-size graphs

Module 2 – Deep learning models (2h) - [PDF](#)

- Convolutional neural networks for network data – spectral approach
- Extending convolutional neural networks to variable size graphs
- Deep contextual approaches for scalable network data processing and variable sized graphs
- Directions of future research

Instructors

Davide Bacciu is Assistant Professor at the Computer Science Department, University of Pisa. The core of his research is on Machine Learning (ML) and deep learning models for structured data processing, including sequences, trees and graphs. He is the PI of an Italian National project on ML for structured data. He has been teaching courses of Artificial Intelligence (AI) and ML at undergraduate and graduate levels since 2010. He is the Secretary of the Italian Association for Artificial Intelligence (AI*IA), member of the IEEE CIS Task Force on Deep Learning and Associate Editor of the IEEE Transactions on Neural Networks and Learning Systems.

Alessio Micheli is Associate Professor at the Department of Computer Science, University of Pisa, where he is the coordinator of the [Computational Intelligence & Machine Learning Group](#) (CIML). His research interests include Machine Learning, Neural Networks, Deep Learning, learning in structured domains (sequence, tree and graph data) and relational learning. He has co-authored more than 140 papers published in international journals and conference proceedings. According to Google Scholar, Alessio Micheli has more than 1700 citations, with an H-index of 23 (at April 2018). He is the national coordinator of the "Italian Working group on Machine Learning and Data Mining" of AI*IA. He is member of the IEEE CIS Task Force on Deep Learning and PC member of conferences in ML and AI.

DL4SD

The tutorial is hosted by the ECML-PKDD 2018 conference: for informations on the venue please check the [conference website](#).

The tutorial will run on the 14th of September 2018 from 9a.m. to 12.40 a.m., Nally Room, Croke Park Conference Center.

Davide Bacciu (2018)