

# Introduction

Graphs (a.k.a., networks) are the universal data structures for representing the relationships between interconnected objects. They are ubiquitous in a variety of disciplines and domains ranging from computer science, social science, economics, medicine, to bioinformatics.

Representative examples of real-world graphs include social networks, knowledge graph, protein-protein interaction graphs, and molecular structures. Graph analysis techniques can be used for a variety of applications such as recommending friends to users in a social network, predicting the roles of proteins in a protein-protein interaction network, and predicting the properties of molecule structures for discovering new drugs.

One of the most fundamental challenges of analyzing graphs is effectively representing graphs, which largely determines the performance of many follow-up tasks. This workshop aims to discuss the latest progress on graph representation learning and their applications in different fields. We aim to bring researchers from different communities such as machine learning, network science, natural language understanding, recommender systems, drug discovery. We specially invite submissions related to toolkits and frameworks which make it easy to apply deep learning on graphs. The topics of interest include but are not limited to:

- Unsupervised node representation learning
- Learning representations of entire graphs
- Graph neural networks
- Graph generation
- Adversarial attacks to graph representation methods
- Heterogeneous graph embedding
- Knowledge graph embedding
- Graph alignment
- Dynamic graph representation
- Graph matching
- Graph representation learning for relational reasoning

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  - Graph anomaly detection
  - Applications in recommender systems
  - Applications in natural language understanding
  - Applications in drug discovery
  - Toolkits and frameworks which make it easy to apply deep learning on graphs
  - Other applications

## Speakers

1. **Stephan Günnemann**: Professor of data mining & analytics at Technische Universität München
2. **Danai Koutra**: Assistant Professor, University of Michigan, Ann Arbor
3. **Pietro Liò**: Professor of Computational Biology at the University of Cambridge
4. **Yizhou Sun**: Associate Professor at University of California, Los Angeles
5. **Srinivasan Parthasarathy**: Professor at The Ohio State University

# Call for Papers

The SDM'19 Deep Learning for Graphs workshop encourages submissions that present both original results and preliminary/existing work. **We welcome extended-abstract submissions to introduce preliminary works and ideas, as well as recently-published research at the top conferences.** The workshop accepts both full papers (4 to 8 pages) and extended abstracts (1 to 2 pages) for published or ongoing work. Papers should be submitted as PDF, using the SIAM conference proceedings style, available at [here](#) and submitted via [EasyChair](#).

The organizers can be reached at [event-dlg@googlegroups.com](mailto:event-dlg@googlegroups.com)

## Important Dates

**Submission deadline:** March 22, 2019

**Acceptance Notification:** March 30, 2019

**Workshop date:** May 4, 2019

## Target Audience

This workshop could be potentially interesting to researchers in a variety of fields including researchers working on fundamental research of representation learning (especially graph representation learning), and researchers in different application domains of graph representation learning including network science, recommender systems, natural language understanding, and drug discovery.

## Program

Following is the agenda for the worksop:

- 9:00 am - 9:10 am: Opening Remarks
- 9:10 am - 9:55 am : Invited Talk: **Pietro Liò**
- 9:55 am - 10:25 am: Presentation of the following papers:
  - **Euler: a framework for deep learning on large-scale graphs** - Yan Zhang, Shuai Li, Yi Ren, Siran Yang, Yuan Wei, Genbao Chen, Xu Tian, Shiyang Wen, Wei Lin, Di Zhang and Jinhui Li. (10 minutes)
  - **Introducing Graph Smoothness Loss for Training Deep Learning Architectures** - Myriam Bontonou, Carlos Eduardo Rosar Kos Lassance, Ghouthi Boukli Hacene, Vincent Gripon, Jian Tang and Antonio Ortega. (10 minutes)
  - **Using Embeddings of Line Graph Powers to Retrieve Item Substitutes** - Brooke Fitzgerald, Dora Jambor and Putra Manggala. (10 minutes)
- 10:25 am - 11:00 am: Break
- 11:00 am - 11:45 am: Invited Talk: **Danai Koutra**
- 11:45 am - 1:30 am: Lunch Break
- 1:30 am - 2:15 am: Invited Talk: **Stephan Günnemann**
- 2:15 am -2:45 am: Presentation of the following papers:
  - **Geometric Scattering for Graph Data Analysis** - Feng Gao, Guy Wolf and Matthew Hirn. (10 minutes)
  - **A Unified Deep Learning Formalism For Processing Graph Signals** - Myriam Bontonou, Carlos Eduardo Rosar Kos Lassance, Jean-Charles Vialatte and Vincent Gripon. (10 minutes)
  - **Graph Laplacian Problems on Graph Neural Networks** - Tse-Yu Lin and Yen-Lung Tsai. (10 minutes)

2:45 am - 3:20 am: Break

3:20 am - 4:05 am: Invited talk: **Yizhou Sun**

4:05 am - 4:50 am: Invited talk: **Srinivasan Parthasarathy**

4:50 am - 5:00 am: Closing Remarks

# Organizers

- **Jian Tang** is currently an assistant professor at Montreal Institute for Learning Algorithms (Mila) and HEC Montreal since December, 2017. He finished his Ph.D. at Peking University in 2014, was a researcher at Microsoft Research between 2014-2016, and was a Postdoc fellow at the University of Michigan and Carnegie Mellon University between 2016- 2017. His research focuses on graph representation learning with applications in natural language understanding, recommender systems, and drug discovery. Most of his papers are published in top-tier venues across machine learning and data mining conferences (ICML, KDD, WWW, and WSDM). He co-organized a tutorial on graph representation learning at KDD 2017, and published one of the first papers on node representation learning (LINE). One of his papers on learning extremely low-dimensional node representations for graph visualization (LargeVis) was nominated for the best paper at WWW 2016. He also received a best paper at ICML 2014 for a constructive theoretical analysis of statistical topic models.
- **Shagun Sodhani** is a MSc student at Montreal Institute for Learning Algorithms (Mila) since September 2017 under supervision of Dr Jian Tang. Prior to that, he was working with the Machine Learning team at Adobe Systems where he was awarded the Outstanding Young Engineer Award. His research interest focuses on applications of graph representation learning.
- **William L. Hamilton** is a Visiting Researcher at Facebook AI Research, and he will be joining McGill University's School of Computer Science as an Assistant Professor in January 2019. He completed his PhD at Stanford University in 2018 under the supervision of Jure Leskovec and Dan Jurafsky, and prior to that he completed a MSc at McGill University under the supervision of Joelle Pineau. His research focuses on Graph Representation Learning as well as large-scale computational social science. He has published papers on Graph Representation Learning in top-tier venues across machine learning and network science (NIPS, ICML, KDD, and WWW) and co-organized a tutorial on the topic at WWW 2018 (i.e., TheWebConf). He is the lead developer of GraphSAGE, a state-of-the-

an open-source framework for Graph Representation Learning. He was the SAP Stanford Graduate Fellow 2014- 2018, received the Cozzarelli Best Paper Award from the Proceedings of the National Academy of Sciences (PNAS) in 2017, and his work has been featured in numerous media outlets, including Wired, The New York Times, and The BBC.

- **Reihaneh Rabbany** is an Assistant Professor at the School of Computer Science, McGill University. She is a member of Mila - Quebec's artificial intelligence institute, and a Canada CIFAR AI Chair. Her research is at the intersection of network science, data mining and machine learning, with a focus on analyzing real-world interconnected data, and social good applications. She has contributed to more than 20 peer-reviewed research papers, published in top-tier conference and journals including KDD, NeurIPS, AAAI, ECML/PKDD, DMKD, and Plos One. Before joining McGill, she was a Postdoctoral fellow at the School of Computer Science, Carnegie Mellon University, and completed her Ph.D. in Computing Science Department at the University of Alberta. She has been recognized as a top female graduate in the fields of electrical engineering and computer science in the 2016 Rising Stars program, and was a recipient of the Queen Elizabeth II Graduate Scholarship during graduate studies.
- **Vincent Gripon** is a permanent researcher with IMT-Atlantique (Institut Mines-Telecom), Brest, France. He obtained his M.S. from École Normale Supérieure of Cachan and his Ph.D. from Télécom Bretagne. His research interests lie at the intersection of graph signal processing, machine learning and neural networks. He co-authored more than 70 papers in the above-mentioned domains. Since October 2018, he is an invited professor at Université de Montréal.