

# Christopher Morris

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## Address

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## Areas of Specialization

Graph embeddings (graph kernels, graph neural networks, invariant neural networks) from a theoretical as well as applied viewpoint, and their application in combinatorial optimization.

## Education

2015–2019	PhD in Computer Science, TU Dortmund University, Germany, final grade: 1.0 with highest distinction (best possible grade)
2018	Research stay at Stanford, Infolab
2012–2015	MSc in Computer Science, TU Dortmund University, Germany, final grade: 1.0 (best possible grade)
2008–2012	BSc in Computer Science, TU Dortmund University, Germany
1997–2007	University Entrance Qualification, Erzbischöfliches St.-Angela-Gymnasium, Wipperfürth

## Employment

Since 2020	Postdoc in the group of Andrea Lodi, Polytechnique Montréal
2015–2019	PhD student and research associate, TU Dortmund University, within the Collaborative Research Center SFB 876
2007–2008	Mandatory civil service

## Publications

### Conference Papers

- [1] Christopher Morris, Gaurav Rattan, Petra Mutzel. *Weisfeiler and Leman Go Sparse: Towards Scalable Higher-order Graph Neural Networks*, Neural Information Processing Systems (NeurIPS) 2020,
- [2] Matthias Fey, Jan E. Lenssen, Christopher Morris, Jonathan Masci, Nils M. Kriege. *Deep Graph Matching Consensus*, Conference on Learning Representations (ICLR) 2020.

- [3] Lutz Oettershagen, Nils Kriege, Christopher Morris, Petra Mutzel. *Temporal Graph Kernels for Classifying Dissemination Processes*, SIAM International Conference on Data Mining (SDM) 2020.
- [4] Christopher Morris, Martin Ritzert, Matthias Fey, William L. Hamilton, Jan Eric Lenssen, Gaurav Rattan, Martin Grohe. *Weisfeiler and Leman Go Neural: Higher-order Graph Neural Networks*, AAAI Conference on Artificial Intelligence (AAAI) 2019.
- [5] Rex Ying, Jiaxuan You, Christopher Morris, Xiang Ren, William L. Hamilton, Jure Leskovec. *Hierarchical Graph Representation Learning with Differentiable Pooling*, Neural Information Processing Systems (NeurIPS) 2018, spotlight presentation.
- [6] Nils M. Kriege, Christopher Morris, Anja Rey, Christian Sohler. *A Property Testing Framework for the Theoretical Expressivity of Graph Kernels*, International Joint Conference on Artificial Intelligence (IJCAI) 2018.
- [7] Christopher Morris, Kristian Kersting, Petra Mutzel. *Glocalized Weisfeiler-Lehman Graph Kernels: Global-Local Feature Maps of Graphs*, IEEE International Conference on Data Mining (ICDM) 2017, full paper.
- [8] Christopher Morris, Nils M. Kriege. *Recent Advances in Kernel-Based Graph Classification*, European Conference on Machine Learning & Principles and Practice of Knowledge Discovery in Databases (ECML PKDD) 2017.
- [9] Christopher Morris, Nils M. Kriege, Kristian Kersting, Petra Mutzel. *Faster Kernels for Graphs with Continuous Attributes via Hashing*, IEEE International Conference on Data Mining (ICDM) 2016.

### **Journal Articles**

- [10] Lutz Oettershagen, Nils M. Kriege, Christopher Morris, and Petra Mutzel *Classifying Dissemination Processes in Temporal Graphs*, *Big Data*, 2020.
- [11] Nils M. Kriege, Fredrik D. Johansson, Christopher Morris. *A Survey on Graph Kernels*, *Applied Network Science*, 2020.
- [12] Nils M. Kriege, Marion Neumann, Christopher Morris, Kristian Kersting, Petra Mutzel. *A Unifying View of Explicit and Implicit Feature Maps for Structured Data: Systematic Studies of Graph Kernels*, *Data Mining and Knowledge Discovery*, 2019.
- [13] Fritz Bökler, Mathias Ehrgott, Christopher Morris, Petra Mutzel. *Output-sensitive Complexity of Multiobjective Combinatorial Optimization*, *Journal of Multicriteria Decision Analysis*, 2017.

## Workshop Papers (Peer-reviewed)

- [14] Weisfeiler and Leman go sparse: Towards scalable higher-order graph embeddings. Christopher Morris, Gaurav Rattan, Petra Mutzel, Graph Representation Learning and Beyond (GRL+, ICML 2020).
- [15] TUDataset: A collection of benchmark datasets for learning with graphs. Christopher Morris, Nils M. Kriege, Franka Bause Kristian Kersting, Petra Mutzel, Marion Neumann, Graph Representation Learning and Beyond (GRL+, ICML 2020).
- [16] Rex Ying, Jiaxuan You, Christopher Morris, Xiang Ren, William L. Hamilton, Jure Leskovec. *Hierarchical Graph Representation Learning with Differentiable Pooling*, KDD Deep Learning Day 2018.

## Thesis

- [17] Christopher Morris. *Learning with Graphs: Kernel and Neural Approaches*, PhD thesis, TU Dortmund University, 2019.
- [18] Christopher Morris. *Enumeration Complexity of Multicriteria Linear Optimization*, MSc thesis, TU Dortmund University, 2015.

## Academic Honors

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|------|---|
| 2020 | Dissertation award of TU Dortmund University (awarded for best Computer Science PhD thesis in 2020)                                 |
| 2020 | Nominated (by TU Dortmund University) for the dissertation award of the German computer science association (GI Dissertationspreis) |

## Invited Talks

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|---------|---|
| 11/2020 | INFORMS Annual Meeting, <i>Limits Of Graphs Neural Networks For Combinatorial Optimization</i>                  |
| 10/2019 | IBM Research, Zürich, <i>Graph Classification: Kernel and Neural Approaches</i>                                 |
| 05/2019 | NEC Research, Heidelberg, <i>Graph Classification: Kernel and Neural Approaches</i>                             |
| 03/2018 | Stanford, SNAP, Infolab, <i>Learning Higher-order Graph Embeddings: Theory and Practice</i>                     |
| 07/2017 | RWTH Aachen, Chair of Logic and the Theory of Discrete Systems, <i>Graph Classification: Kernels and Beyond</i> |

## Teaching

Supervised eight bachelor and master thesis, one intern

Proseminar *Graph Algorithms*  
Seminar *Algorithm Engineering*  
Seminar *Algorithm Engineering*  
Student project group *Algorithm Engineering for Graph Data Mining*, Seminar *Algorithms Unplugged*  
Seminar *Algorithm Engineering*, Seminar *Graph Mining*  
Seminar *Algorithm Engineering*  
Programming tutorials for engineering students, teaching assistant for a course on theoretical computer science

## Service to the Profession

Co-organizer of the Dagstuhl seminar *Graph Embeddings: Theory and Practice* (2021)

Program committee member for IJCAI 2019, NeurIPS 2019, AAAI 2020, ICML 2020, IJCAI 2020, ECML-PKDD 2020, NeurIPS 2020, ICLR 2021, AAAI 2021

Program committee member for *Representation Learning on Graphs and Manifolds* (ICLR 2019 workshop), *Learning and Reasoning with Graph-Structured Data* (ICML 2019 workshop), *Graph Representation Learning* (NeurIPS 2019 workshop), *Graph Representation Learning and Beyond* (ICML 2020 workshop), *Graphs and more Complex Structures for Learning and Reasoning* (AAAI 2021 workshop)

(Sub-)Reviewer for WALCOM 2017, ISAAC 2018, ALENEX 2019, ESA 2018, ICALP 2020

Occasional reviews for IEEE Transactions on Pattern Analysis and Machine Intelligence (2× 2020), Journal of Machine Learning Research (2020), ACM Transactions on Knowledge Discovery from Data (2019), IEEE Transactions on Cybernetics (2020), IEEE Transactions on Mobile Computing (2020)

Initiator of [www.graphlearning.io](http://www.graphlearning.io), a large collection of benchmark datasets for graph classification and regression

Member of the appeal commission for the professorship *Data Mining* (TU Dortmund University, 2017)

## Other

**Computational Skills** Python, C++,  $\text{\LaTeX}$ , Scikit-learn, NumPy, PyTorch, PyTorch Geometric  
**Languages** German (native), English (fluent)  
**Citizenship** German and British

## Referees

Prof. Petra Mutzel  
Computational Analytics,

Department of Computer Science,  
University of Bonn  
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Prof. Kristian Kersting  
Machine Learning Group,  
Department of Computer Science,  
TU Darmstadt  
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