Bastian Alexander Rieck

Curriculum vitæ

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Research interests

I want to understand complex high-dimensional data sets—either unstructured ones such as point clouds or structured ones such as graphs or time series—by developing novel machine learning algorithms. While I am particularly interested in further advancing the field of *topological machine learning*, I am also intrigued by *kernel methods* and *significant pattern mining*. Moreover, I am fascinated by applying these techniques—and others—to challenging problems in *personalised medicine*.

Keywords: Topological data analysis, Machine learning, Kernel methods, Data science, Scientific visualization, Significant pattern mining, Time series analysis

Academic positions

01/2020– **Senior assistant** in the *Machine Learning and Computational Biology Lab* of Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland.

Next to continuing my research (see below), I am also entrusted with more teaching and supervision responsibilities.

01/2018–12/2019 **Postdoctoral researcher** in the *Machine Learning and Computational Biology Lab* of Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland.

I am developing novel machine learning algorithms in the field of personalised medicine, with a particular focus on detecting the onset of *sepsis* early. Moreover, I am spearheading research in the field of *topological machine learning*, focusing on (i) improving our understanding of deep neural networks, and (ii) enhancing the classification performance of algorithms by including topological features.

I am also teaching classes and developing exercises for the courses 'Data Mining I' and 'Data Mining II' (forthcoming).

11/2017–12/2017 **Researcher** in the *Visual Computing* research group of Prof. Dr. sc. Filip Sadlo, Heidelberg University, Germany.

I developed novel scientific visualisation approaches for analysing 4D vector fields and molecular dynamics simulations. In addition, I used this brief period to wrap up projects and collaborations.

01/2015–10/2017 **Research assistant** in the *Visual Information Analysis* research group of Prof. Dr. Heike Leitte, Kaiserslautern University, Germany.

I continued my Ph.D. research in the field of topology-based visualisation methods and topological data analysis. Towards the end of my Ph.D., I shifted my research focus to *topological machine learning*.

07/2011–12/2014 **Research assistant** in the *Computer Graphics and Visualization* research group of Prof. Dr. Heike Leitte, Heidelberg University, Germany.

I developed novel topology-based algorithms for understanding and visualising complex multivariate data sets. In October 2011, I formally joined the group as a Ph.D. student.

Education

2011–2017 **Ph.D.** in Computer Science at Heidelberg University, Germany, final grade **1.0** (*summa cum laude*)
Persistent Homology in Multivariate Data Visualization
Advisers: Prof. Dr. Heike Leitte, Prof. Dr. Michael Gertz

2005–2011 M.Sc.[1] in Mathematics at Heidelberg University, Germany, final grade **1.0** (*with distinction*)
Smoothness Analysis of Subdivision Algorithms
Advisers: Prof. Dr. Heike Leitte, Dr. Susanne Krömker

[1] The German degree *Diplom* is equivalent to a master's degree. It has now been superseded.

Grants

2019 Received a **100,000 CHF** *Spark* grant from SNSF[2] for a one-year project. The project's title is *TOPAZ: Topology of Alzheimer's*, and I am serving as its **Principal Investigator**.

Honours & awards

2019 Outstanding reviewer for the ECML PKDD[3] 2019 Journal Track
Outstanding reviewer (among the top 400 reviewers) for NeurIPS[4] 2019
Outstanding reviewer (top 5%) for ICML[5] 2019

2018 Outstanding reviewer (among the top 200 reviewers) for NeurIPS 2018
Outstanding reviewer (among the top 100 reviewers) for ICML 2018

2017 Award for the best extended abstract at TopoInVis[6] 2017

10/2011–10/2014 Research scholarship, Heidelberg Graduate School of Mathematical and Computational Methods for the Sciences (HGS MathComp), Heidelberg University, Germany

Publications

In the following list of publications, equal contributions by several authors are indicated using a superscript 'dagger' symbol, i.e. †, while joint supervision is denoted using a superscript 'double dagger', or diesis, i.e. ‡. All publications, except the ones marked as 'Submitted' or 'Preprints', underwent peer-review. Ph.D. students that I supervised for a specific project are underlined.

Conference & journal publications

In press

1. Stephanie L. Hyland†, Martin Faltys†, Matthias Hüser†, Xinrui Lyu†, Thomas Gumbsch†, Cristóbal Esteban, Christian Bock, Max Horn, Michael Moor, **Bastian Rieck**, Marc Zimmermann, Dean Bodenham, Karsten Borgwardt‡, Gunnar Rätsch‡, and Tobias M. Merz‡. *Machine Learning for Early Prediction of Circulatory Failure in the Intensive Care Unit*. To appear in Nature Medicine.
2. Caroline Weis, Max Horn, **Bastian Rieck**, and Karsten Borgwardt. *Sparse Representations for MALDI-TOF Based Microbial Classification*. To appear in the Proceedings of the 14th Machine Learning in Computational Biology (MLCB) Meeting.
3. Christian Bock†, Matteo Togninalli†, Elisabetta Ghisu, Thomas Gumbsch, **Bastian Rieck**, and Karsten Borgwardt. *A Wasserstein Subsequence Kernel for Time Series*. To appear in the Proceedings of the 19th IEEE International Conference on Data Mining (ICDM).

2019
4. Matteo Togninalli†, Elisabetta Ghisu†, Felipe Llinares-López, **Bastian Rieck**, and Karsten Borgwardt. *Wasserstein Weisfeiler–Lehman Graph Kernels*. Advances in Neural Information Processing Systems 32, pp. 6436–6446, 2019. Accepted as a *spotlight* presentation at NeurIPS (**top 3%** of all submissions). Also available as arXiv:1906.01277.
5. Michael Moor, Max Horn, **Bastian Rieck**, Damian Roqueiro, and Karsten Borgwardt. *Early Recognition of Sepsis with Gaussian Process Temporal Convolutional Networks and Dynamic Time Warping*. Proceedings of the 4th Machine Learning for Healthcare Conference (MLHC), Volume 106 of Proceedings of Machine Learning Research, pp. 2–26, 2019. Also available as arXiv:1902.01659.
6. **Bastian Rieck**†, Christian Bock†, and Karsten Borgwardt. *A Persistent Weisfeiler–Lehman Procedure for Graph Classification*. Proceedings of the 36th International Conference on Machine Learning (ICML), Volume 97 of Proceedings of Machine Learning Research, pp. 5448–5458, 2019.

[2] Swiss National Science Foundation
[3] European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases
[4] Conference on Neural Information Processing Systems
[5] International Conference on Machine Learning
[6] Topology-Based Methods in Visualization

7. Boyan Zheng, **Bastian Rieck**, Heike Leitte, and Filip Sadlo. *Visualization of Equivalence in 2D Bivariate Fields*. Computer Graphics Forum, Volume 38, Issue 3, pp. 311–323, 2019.

8. **Bastian Rieck**†, Matteo Togninalli†, Christian Bock†, Michael Moor, Max Horn, Thomas Gumbsch, and Karsten Borgwardt. *Neural Persistence: A Complexity Measure for Deep Neural Networks Using Algebraic Topology*. Proceedings of the 7th International Conference on Learning Representations (ICLR), 2019. Also available as arXiv:1812.09764.

2018

9. Karsten Hanser, Ole Klein, **Bastian Rieck**, Boyan Zheng, Bettina Wiebe, Tobias Selz, Antoni Sagristà Sellés, Marian Piatkowski, Mária Lukácová, George Craig, Heike Leitte, and Filip Sadlo. *Visualization of Parameter Sensitivity of 2D Time-Dependent Flow*. In: Advances in Visual Computing (Proceedings of the 13th International Symposium on Visual Computing), pp. 359–370, Springer, 2018.

10. Christian Bock, Thomas Gumbsch, Michael Moor, **Bastian Rieck**, Damian Roqueiro, and Karsten Borgwardt. *Association Mapping in Biomedical Time Series via Statistically Significant Shapelet Mining*. Bioinformatics, Volume 34, Issue 13, pp. i438–i446, 2018.

11. Lutz Hofmann, **Bastian Rieck**, and Filip Sadlo. *Visualization of 4D Vector Field Topology*. Computer Graphics Forum, Volume 37, Issue 3, pp. 301–313, 2018.

12. Kai Sdeo, **Bastian Rieck**, and Filip Sadlo. *Visualization of Fullerene Fragmentation*. Short Paper Proceedings of the IEEE Pacific Visualization Symposium (PacificVis), pp. 111–115, 2018.

13. **Bastian Rieck**, Ulderico Fugacci, Jonas Lukasczyk, and Heike Leitte. *Clique Community Persistence: A Topological Visual Analysis Approach for Complex Networks*. IEEE Transactions on Visualization and Computer Graphics, Volume 24, Issue 1, pp. 822–831, 2018.

2016

14. **Bastian Rieck**, Heike Leitte. *Exploring and Comparing Clusterings of Multivariate Data Sets Using Persistent Homology*. Computer Graphics Forum, Volume 35, Issue 3, pp. 81–90, 2016.

2015

15. **Bastian Rieck**, Heike Leitte. *Persistent Homology for the Evaluation of Dimensionality Reduction Schemes*. Computer Graphics Forum, Volume 34, Issue 3, pp. 431–440, 2015.

2014

16. **Bastian Rieck**, Heike Leitte. *Structural Analysis of Multivariate Point Clouds using Simplicial Chains*, Computer Graphics Forum, Volume 33, Issue 8, pp. 28–37, 2014.

2013

17. Markus Forbriger, Hubert Mara, **Bastian Rieck**, Christoph Siart, and Olaf Wagener. *Der "Gesprengte Turm" am Heidelberger Schloss – Untersuchung eines Kulturdenkmals mithilfe hoch auflösender terrestrischer Laserscans*, Denkmalpflege in Baden-Württemberg, Nachrichtenblatt der Landesdenkmalpflege, Heft 3-2013, pp. 165–168, 2013.

18. **Bastian Rieck**, Hubert Mara, and Susanne Krömker. *Unwrapping Highly-Detailed 3D Meshes of Rotationally Symmetric Man-Mode Objects*, ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume II-5/W1, pp. 259–264, 2013.

2012

19. **Bastian Rieck**, Hubert Mara, and Heike Leitte. *Multivariate Data Analysis Using Persistence-Based Filtering and Topological Signatures*, IEEE Transactions on Visualization and Computer Graphics, Volume 18, Issue 12, pp. 2382–2391, 2012.

Workshop publications

2019

20. Christian Bock†, Matteo Togninalli†, Elisabetta Ghisu, Thomas Gumbsch, **Bastian Rieck**, and Karsten Borgwardt. *A Wasserstein Subsequence Kernel for Time Series*[7]. Optimal Transport & Machine Learning (OTML) Workshop at NeurIPS.

2017

21. **Bastian Rieck**, Filip Sadlo, and Heike Leitte. *Persistence Concepts for 2D Skeleton Evolution Analysis*. Workshop on Topology-Based Methods in Visualization (TopoInVis), Tokyo, Japan, 2017. Accepted for presentation. An extended version of this research is currently in press.

22. **Bastian Rieck**, Filip Sadlo, and Heike Leitte. *Hierarchies and Ranks for Persistence Pairs*. Workshop on Topology-Based Methods in Visualization (TopoInVis), Tokyo, Japan, 2017. Accepted for presentation. **Award** for the best extended abstract. An extended version of this research is currently in press.

2016

23. **Bastian Rieck**, Heike Leitte. *'Shall I compare thee to a network?'—Visualizing the Topological Structure of Shakespeare's Plays*. Workshop on Visualization for the Digital Humanities at IEEE Vis, 2016.

[7] An extension of the ICDM paper with more experiments, comparisons, and discussions.

2015 24. **Bastian Rieck**, Heike Leitte. *Comparing Dimensionality Reduction Methods Using Data Descriptor Landscapes*. Symposium on Visualization in Data Science at IEEE Vis, 2015.

25. **Bastian Rieck**, Heike Leitte. *Agreement Analysis of Quality Measures for Dimensionality Reduction*. Workshop on Topology-Based Methods in Visualization (TopoInVis), 2015. An extended version of this research appears as a book chapter in Topological Methods for Data Analysis and Visualization IV, pp. 103–117, Springer, 2017.

2014 26. **Bastian Rieck**, Heike Leitte. *Enhancing Comparative Model Analysis using Persistent Homology*. Workshop on Visualization for Predictive Analytics at IEEE Vis, 2014.

Book chapters

In press 27. **Bastian Rieck**, Filip Sadlo, and Heike Leitte. *Hierarchies and Ranks for Persistence Pairs*[8]. To appear as a book chapter in Topological Methods in Data Analysis and Visualization, Vol. V. Also available as arXiv:1907.13495.

28. **Bastian Rieck**, Filip Sadlo, and Heike Leitte. *Persistence Concepts for 2D Skeleton Evolution Analysis*[8]. To appear as a book chapter in Topological Methods in Data Analysis and Visualization, Vol. V. Also available as arXiv:1907.13486.

29. **Bastian Rieck**, Filip Sadlo, and Heike Leitte. *Topological Machine Learning with Persistence Indicator Functions*. To appear as a book chapter in Topological Methods in Data Analysis and Visualization, Vol. V. Also available as arXiv:1907.13496.

30. **Bastian Rieck**, Markus Banagl, Filip Sadlo, and Heike Leitte. *Persistent Intersection Homology for the Analysis of Discrete Data*. To appear as a book chapter in Topological Methods in Data Analysis and Visualization, Vol. V. Also available as arXiv:1907.13485.

2017 31. **Bastian Rieck**, Heike Leitte. *Agreement Analysis of Quality Measures for Dimensionality Reduction*. In: Topological Methods for Data Analysis and Visualization IV, pp. 103–117, Springer, 2017.

2016 32. Jens Fangerau, Burkhard Höckendorf, **Bastian Rieck**, Christian Heine, Joachim Wittbrodt, and Heike Leitte. *Interactive Similarity Analysis and Error Detection in Large Tree Collections*. In: Visualization in Medicine and Life Sciences III, pp. 287–307, Springer, 2016.

Preprints

2019 33. Max Horn, Michael Moor, Christian Bock, **Bastian Rieck**, and Karsten Borgwardt. *Set Functions for Time Series*. Preprint, arXiv:1909.12064.

34. Michael Moor[†], Max Horn[†], **Bastian Rieck**[‡], and Karsten Borgwardt[‡]. *Topological Autoencoders*. Preprint, arXiv:1906.00722.

Theses

2017 35. **Bastian Rieck**. *Persistent Homology in Multivariate Data Visualization*. Ph.D. thesis, Faculty of Mathematics and Computer Science, Heidelberg University, 2017.

2011 36. **Bastian Rieck**. *Smoothness Analysis of Subdivision Algorithms*. M.Sc. thesis[9], Faculty of Mathematics and Computer Science, Heidelberg University, 2011.

[8] An extension of work that was previously presented at the 2017 Workshop on Topology-Based Methods in Visualization (TopoInVis).

[9] Diplomarbeit

Invited talks

2020 *Introduction to Topology-Based Graph Classification*
Applied Machine Learning Days, AI & Topology Track, EPFL, Switzerland

2019 *Perspectives in Persistent Homology*
Keynote, Applications in Topological Data Analysis Workshop, ECML PKDD, Würzburg, Germany

2018 *Statistically Significant Shapelet Mining for Biomedical Time Series*
Research group Prof. Dr. Filip Sadlo, Heidelberg University, Germany

2017 *Persistent Homology for Data Analysis*
Research group Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland

2016 *Aspects of Human Perception*
Guest lecture, Interdisciplinary Centre for Scientific Computing, Heidelberg University, Germany

An Introduction to Persistent Homology
Public lecture, Heidelberg Chapter of SIAM[10], Heidelberg University, Germany

Ein Bild sagt mehr als tausend Worte: Graphische Darstellungen komplexer Daten
Public lecture, Heidelberg University

Persistent Homology for Multivariate Data Visualization
Research group Dr. Julien Tierny, Sorbonne Universités UPMC, Paris, France

2015 *Aspects of Human Perception*
Guest lecture, Interdisciplinary Centre for Scientific Computing, Heidelberg University, Germany

2014 *The Poincaré Conjecture and the Shape of the Universe*
Public lecture, Löwenrot Gymnasium[11], St. Leon-Rot, Germany

2013 *Weniger Klartext reden!*
Public lecture, Science Academy, Heidelberg University, Germany

2012 *The Poincaré Conjecture*
Public lecture, Science Academy, Heidelberg University, Germany

Conference & workshop talks

2019 *A Persistent Weisfeiler–Lehman Procedure for Graph Classification*
International Conference on Machine Learning (ICML), Long Beach, CA, USA

2018 *An Enchiridion for Topological Data Analysis*
Basel Postdoc Retreat, Klosters, Switzerland

2017 *Persistence Concepts for 2D Skeleton Evolution Analysis*
Workshop on Topology-Based Methods in Visualization (TopoInVis), Tokyo, Japan

Hierarchies and Ranks for Persistence Pairs
Workshop on Topology-Based Methods in Visualization (TopoInVis), Tokyo, Japan

2016 *'Shall I compare thee to a network?'—Visualizing the Topological Structure of Shakespeare's Plays*
Workshop on Visualization for the Digital Humanities at IEEE VIS, Baltimore, MD, USA

Exploring and Comparing Clusterings of Multivariate Data Sets using Persistent Homology
EuroVis, Groningen, Netherlands

2015 *Comparing Dimensionality Reduction Methods Using Data Descriptor Landscapes*
Symposium on Visualization in Data Science at IEEE Vis, Chicago, IL, USA

Structural Analysis of Multivariate Point Clouds
EuroVis, Cagliari, Italy

Persistent Homology for the Evaluation of Dimensionality Reduction Schemes
EuroVis, Cagliari, Italy

Analysis of Quality Measures for Dimensionality Reduction
Workshop on Topology-Based Methods in Visualization (TopoInVis), Annweiler, Germany

[10] Society for Industrial and Applied Mathematics
[11] A private German high school

2014 *Enhancing Comparative Model Analysis Using Persistent Homology*
IEEE Vis Workshop on Visualization for Predictive Analytics, Paris, France

2013 *Castle Meets Computer*
Digital Geoarchaeology, Heidelberg, Germany

2012 *Multivariate Data Analysis Using Persistence-Based Filtering and Topological Signatures*
IEEE VisWeek, Seattle, WA, USA

Internal talks

2019 *Path Signatures: Theory & Applications*
Research group Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland

A Persistent Weisfeiler–Lehman Procedure for Graph Classification
Research group Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland

2018 *Level Sets for Time Series Analysis*
Research group Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland

Neural Persistence: A Complexity Measure for Deep Neural Networks Using Algebraic Topology
Research group Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland

Time Series Analysis
Research group Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland

Persistent Homology and Networks
Research group Prof. Dr. Karsten Borgwardt, ETH Zurich, Switzerland

2017 *A Gentle Introduction to Gaussian Processes*
Research group Prof. Dr. Filip Sadlo, Heidelberg University, Germany

A Primer in VTK & Python
Research group Prof. Dr. Christoph Garth, Kaiserslautern University, Germany

Persistent Homology for Complex Network Analysis
Research group Prof. Dr. Filip Sadlo, Heidelberg University, Germany

Persistent Homology in Multivariate Data Visualization
Research group Prof. Dr. Filip Sadlo, Heidelberg University, Germany

2016 *Shakespearean Social Network Analysis using Topological Methods*
Research group Prof. Dr. Filip Sadlo, Heidelberg University, Germany

2015 *How to Present Research Results*
HGS MathComp Presentation Workshop, Heidelberg University, Germany

2014 *Persistent Homology for Similarity Analysis*
Research group Prof. Dr. Heike Leitte, Heidelberg University, Germany

2013 *C++11 Programming Concepts*
Research group Prof. Dr. Heike Leitte, Heidelberg University, Germany

Oh my god, it's full of data—A Biased & Incomplete Introduction to Visualization
HGS MathComp Fellows Seminar, Heidelberg University, Germany

2012 *Applied Algebraic Topology*
Research group Prof. Dr. Heike Leitte, Heidelberg University

Software

2018– `S3M`, a software package for statistically significant shapelet mining; ≈ 40 users

2017– `latex-mimosis`, a minimal & modern LaTeX package for writing a thesis; ≈ 700 users

2016– `Aleph`, a `C++` library for exploring uses of persistent homology; ≈ 50 users

Teaching experience

Unless otherwise noted, in each of the following courses, I have served as a teaching assistant, whose duties involved the creation and grading of exercises as well as as the development of exam questions. Moreover, I gave biweekly tutorial sessions to further discuss topics of the course. I also served as a **substitute lecturer** for each course. Additional duties and details are listed for each course individually.

2019 Course *Data Mining I*, ETH Zurich: I only served as a substitute lecturer

2018 Course *Data Mining I*, ETH Zurich

2017 Course *Scientific Visualisation*, Kaiserslautern University: I also gave coding tutorials & exercises

2014 Course *Algorithmische Geometrie*[12], Heidelberg University

2013 Course *Wissenschaftliche Visualisierung in den Natur- und Technikwissenschaften*[13], Heidelberg University

2012 Seminar *Spezielle Themen der Wissenschaftlichen Visualisierung*[14], Heidelberg University: I advised students in summarising and presenting current research papers. The seminar was organised by my Ph.D. adviser Prof. Dr. Heike Leitte.

Thesis co-supervision

2019 Philipp Nikolaus. *Graph Neural Tangent Kernels*
M.Sc. thesis, ETH Zurich (ongoing, graduation expected in April 2020)

Moritz Gück. *An Ant Colony Optimization Algorithm for Combinatorial Shapelet Mining*
Lab rotation, ETH Zurich

Leslie O'Bray. *Learning Vector Representations of Graphs Using Recurrent Neural Network Autoencoders*
M.Sc. thesis, ETH Zurich

2018 Jens Beyermann. *Analyse persistenter Homologie auf Graphen*
B.Sc. thesis, Heidelberg University

2017 Kai Sdeo. *Visualization of Laser-Induced Fullerene Fragmentation*
M.Sc. thesis, Heidelberg University

2015 Daniel Beyer. *Using Pathline Data Depth to Analyse Time-Dependent Vector Fields*
M.Sc. thesis, Heidelberg University

Karsten Hanser. *Visualisierung hochdimensionaler skalarer Felder mittels Graßmann-Mannigfaltigkeiten*
B.Sc. thesis, Heidelberg University

Jan Greulich. *Rekonstruktion von segmentierten Grenzschichten mittels B-Spline Fitting*
B.Sc. thesis, Heidelberg University

Markus Kurz. *Quality-based ranking of scatter plots for dimensionality reduction*
M.Sc. thesis, Heidelberg University

2013 Daniel Beyer. *Implementierung und Parameteruntersuchung zur Transferfunktionsbestimmung für Volumendaten mittels Segmentierung des Intensität-Gradient-Histogramms*
B.Sc. thesis, Heidelberg University

2012 Alexander Eck. *Clustering algorithms for cell cycle phase detection*
M.Sc. thesis, Heidelberg University

[12] Computational geometry
[13] Scientific visualisation in the natural and engineering sciences
[14] Special topics in scientific visualisation

Skills

Strong knowledge of `C++` and object-oriented programming, along with numerous well-known APIs (`Boost`, `STL`, `Qt`). Highly proficient in large-scale software development and maintenance. Experienced with graphics programming APIs and toolkits (`VTK`, `OpenGL`, `OpenSceneGraph`).

Strong knowledge of `Python` for data analysis (`numpy`, `scipy`, `scikit-learn`, plus `matplotlib`, `seaborn`) and working knowledge of deep learning frameworks (`TensorFlow`, `Keras`, and `PyTorch`).

Working knowledge of `R`, `JavaScript` (in particular `d3.js`), `Perl`, `Java`, `Prolog`, and `Haskell`.

Strong knowledge of digital typesetting languages (TEX, LATEX), as well as basic knowledge of markup languages (`HTML`, `CSS`).

In-depth knowledge of the `Git` revision control system and `CMake`.

Proficiency in all major operating systems (Windows, Linux, FreeBSD, MacOS X).

Excellent writing and public speaking skills.

Service to the community

Mentoring & committee memberships

2020 IJCAI-PRICAI[15] 2020 program committee

2019 MLCB[16] 2019 program committee

Mentor and reviewer for New in ML 2019, a forum for newcomers to ML

ECML PKDD 2019 journal track reviewing committee

ISMB[17]/ECCB[18] 2019 abstracts program committee

2018 EuroVis 2018 short papers program committee

Reviewing

I am a regular reviewer for conferences, journals, and workshops in my field. Previously, I have been reviewing for the following venues:

Bioinformatics	
ISMB	2018, 2019
MLCB	2019
OUP Bioinformatics	2018, 2019
Machine learning	
ECML PKDD	2019
ICLR[19]	2018, 2019
ICML	2018, 2019
JMLR[20]	2018, 2019
NeurIPS	2018, 2019
Visualisation	
EuroVis	2012, 2013, 2014, 2016, 2017, 2018
EuroVis Short Papers	2014, 2018
IEEE Vis	2012, 2013, 2015, 2016, 2017
TopoInVis	2017

I am also an external reviewer for IEEE Transactions on Signal Processing and IEEE Access. Please refer to my publons page for a more detailed and verified record of recent reviews.

[15] International Joint Conference on Artificial Intelligence – Pacific Rim International Conference on Artificial Intelligence
[16] Machine Learning in Computational Biology
[17] Intelligent Systems for Molecular Biology
[18] European Conference on Computational Biology
[20] International Conference on Learning Representations
[20] Journal of Machine Learning Research

Outreach & public speaking

2019 Created TDA in ML, a Slack community to discuss topological machine learning. As of today, there are more than 80 members discussing papers, preprints, and potential collaborations.

Participating in Skype a Scientist, an organisation that matches school classes and prison inmates with scientists to discuss their research.

Organised a workshop on Introduction to Machine Learning for Biology by creating slides and designing exercises.

Organised the hackathon CollaborationFest 2019 by scouting for an appropriate location, providing logistics and setting up networking equipment.

2016 Gave a public lecture on visualising complex data sets as part of the series *Akademische Mittagspause*[21]. The lecture is available as a video on YouTube.

2013–2015 As part of the annual Heidelberg Laureate Forum—a gathering of world-renowned computer scientists and mathematicians—I have been working with school classes and adults to discuss mathematical aspects of films shown in the *Heidelberg Laureate Forum Film Festival*.

Social media

Since 2006, I am running a personal blog. My posts typically deal with mathematical or technical subjects and I aim to explain complicated phenomena or techniques in an accessible manner. The blog enjoys a sizeable number of readers and my articles are featured on platforms such as Hacker News. Some example articles from 2019:

What is (Gaussian) curvature? (100,000 page views since July 2019)

A visual introduction to Morse theory (150,000 page views since May 2019)

What is a manifold? (530,000 page views since April 2019)

In total, the blog received over 3 million page views since 2017.

References

Prof. Dr. Karsten Borgwardt
Machine Learning and Computational Biology Lab
ETH Zurich
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Prof. Dr. Heike Leitte
Visual Information Analysis Group
Kaiserslautern University
leitte@cs.uni-kl.de

Prof. Dr. Roland Kwitt
Salzburg University
roland.kwitt@sbg.ac.at

Further references and credentials are available on request.

Last updated on 6th January 2020.

[21] This event, which can be loosely translated as *academic lunch break*, consists of a series of 15 min lectures to the general public about current research topics.