PD DR. STEFFEN BORGWARDT
Curriculum Vitae

Technische Universität München
Department of Mathematics
Boltzmannstr. 3
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born Dec. 2, 1982

EMPLOYMENT HISTORY

Sep. 2015 - today	**Privatdozent** Department of Mathematics, Technische Universität München
Aug. 2014 – Aug. 2015	**Visiting Assistant Professor** University of California, Davis
Oct. 2013 – Mar. 2014	**Acting Associate Professor** Institute for Mathematical Optimization Department of Mathematics, Technische Universität Braunschweig
Jan. 2013 – Sep. 2013, April 2014 – July 2014	**Akademischer Rat** Department of Mathematics, Technische Universität München
April 2012 – July 2013	**Leader of Research and Development Project 'ArborChange'** Project of the Bavarian State Ministry for Nutrition, Agriculture and Forests for the optimization of the cost-effective structure of forestry regions
Jan. 2011 – Mar. 2012	**Postdoctoral Research Associate** Chair for Applied Geometry and Discrete Mathematics Prof. Dr. Peter Gritzmann Department of Mathematics, Technische Universität München
Mar. 2007 – Dec. 2010	**Research and Teaching Assistant** Chair for Applied Geometry and Discrete Mathematics Prof. Dr. Peter Gritzmann Department of Mathematics, Technische Universität München
July 2004 – Aug. 2004	**Scientific Internship** at Axxom Software AG
Sep. 2003 – Mar. 2007	**Teaching Assistant** in Computer Science and Mathematics
July 2001 – Nov. 2001	**Military Service** at the Luftwaffe Roth

ACADEMIC DEGREES

May 2015	**Habilitation** 'Data Analysis through Polyhedral Theory' Technische Universität München
Dec. 2010	**Dr. rer. nat.** in **Mathematics** 'A Combinatorial Optimization Approach to Constrained Clustering'

	Advisor: Prof. Dr. Peter Gritzmann, Technische Universität München Grade: summa cum laude
Mar. 2007	**Diploma** in **Mathematics** **Diploma** in **Computer Science** 'Nearly Optimal Algorithms on Minimum Spanning Trees' Advisor: Prof. Dr. Ernst Mayr, Technische Universität München
July 2003	**Vordiplom** in Mathematics **Vordiplom** in Computer Science Universität Augsburg
July 2001	**Abitur** (A-Levels) Justus-von-Liebig-Gymnasium Neusäß Grade: 1.0 (~0.8) / A+ Skipped seventh grade

AWARDS AND GRANTS

Feb. 2014	**Feodor Lynen Research Scholarship** and **Humboldt Fellowship** 'Data Analysis through the Geometry of Transportation Polytopes' Host: Prof. Dr. Jesùs De Loera, University of California Davis
July 2013	**European Excellence in Practice Award 2013** 'Geometric clustering for the consolidation of farm- and woodland' Joint work with Prof. Dr. Andreas Brieden, Prof. Dr. Peter Gritzmann. Awarded by EURO, the Association of the European Operational Research Societies within IFORS
April 2012 – July 2013	**Research and Development Project 'ArborChange'** Project of the Bavarian State Ministry for Nutrition, Agriculture and Forests for the optimization of the cost-effective structure of forestry regions
Mar. 2009	**Expert Report** 'Automatic routing of harvest machines in the simulation of the virtual forest' for the Chair for Forest Work Science and Applied Computer Science, Technische Universität München
2011 – 2015	**Research Visits and Invited Talks** University of Edinburgh University of California Los Angeles University of North Carolina, Chapel Hill Deutscher Akademischer Austauschdienst (DAAD) Technion – Israel Institute of Technology, Haifa University of California Davis Max-Planck Institute Tübingen Technische Universität Dortmund Goethe-Universität Frankfurt Universität Hamburg

FULL BIBLIOGRAPHY

JOURNAL PAPERS

E. Anderes, S. Borgwardt, and J. Miller (2015) *Discrete Wasserstein Barycenters: Optimal Transport for Discrete Data*. Available on arxiv: 1507.07218

S. Borgwardt, A. Brieden, and P. Gritzmann (2015) *Geometrisches Clustering: Mathematik für die Flurverbesserung (Geometric clustering: Mathematics for land improvement)*. **Mitteilungen der DMV** 23/2015, pp. 82-90 (including front cover of journal)

S. Borgwardt, S. Onn (2015) *Efficient solutions for weight-balanced partitioning problems*. Available on arxiv: 1503.06877

S. Borgwardt, J. De Loera, E. Finhold, and J. Miller (2015) *The Hierarchy of Circuit Diameters for Transportation Polytopes*. **Discrete Applied Mathematics**, accepted. Available on arxiv: 1411.1701

S. Borgwardt, J. De Loera, E. Finhold (2014) *Edges vs Circuits: a Hierarchy of Diameters in Polyhedra.* Available on arxiv: 1409.7638

S. Borgwardt, E. Finhold, and R. Hemmecke (2014) *On the circuit diameter of dual transportation polyhedra***. SIAM Journal on Discrete Mathematics** 29:1, pp. 113-121

S. Borgwardt (2014) *On Soft Power Diagrams*. **Mathematical Modelling and Algorithms in Operations Research** 14:2, pp. 173-196

S. Borgwardt, E. Finhold, and R. Hemmecke (2015) *Quadratic diameter bounds for dual network flow polyhedra*. in minor revision for **Mathematical Programming**. Available on arXiv: 1408.4184

S. Borgwardt, S. Schaffner, M. Suda (2014) *Geometrische Kennzahlen für die forstfachliche Bewertung der Zersplitterung von Privatwaldarealen (Geometric measures for the assessment of fragmentation of private forest areas)*. **Forstarchiv** 06/14, pp. 188-196

S. Borgwardt, A. Brieden, and P. Gritzmann (2014) *Geometric clustering for the consolidation of farmland and woodland*. **Mathematical Intelligencer** 36:2, pp. 37-44 (including front cover of journal)

S. Borgwardt, F. Schmiedl (2014) *Threshold-based preprocessing for approximating the weighted dense k-subgraph problem*. **European Journal of Operational Research** 234, pp. 631-640

S. Borgwardt, A. Brieden, and P. Gritzmann (2014) *A balanced k-means algorithm for weighted point sets*. Available on arXiv:1307.4004

S. Borgwardt, A. Brieden, and P. Gritzmann (2013) *Mathematics in Agriculture and Forestry: Geometric Clustering for Land Consolidation.* **IFORS news**, Dec. 2013

S. Borgwardt (2013) *On the Diameter of Partition Polytopes and Vertex-Disjoint Cycle Cover*. **Mathematical Programming**, Series A 141:1, pp. 1-20

S. Borgwardt, A. Brieden, and P. Gritzmann (2011) *Constrained Minimum-k-Star Clustering and its application to the consolidation of farmland*. **Operational Research** 11:1, pp. 1-17

IN PREPARATION

S. Borgwardt, A. Brieden, and P. Gritzmann (2015) *On gravity polytopes and the facility location problem*.

S. Borgwardt, J. De Loera, and B. Moazzez (2015) *Circuit linear programming*

S. Borgwardt, J. De Loera, E. Finhold, T. Stephen, and T. Yusun (2015) *On the Circuit Diameter Conjecture*

TECHNICAL, EXPERT AND SOFTWARE REPORTS

S. Borgwardt, A. Malkis, and Y. Nagashima (2014) *On the Diameter of Multithreaded Programs: The Basic Case*. Technical report

S. Borgwardt (2013) *Das Programm ArborTec – ArborChange mit ArborEval und ArborOpt*. Public report for the software engineered in project ArborChange of the Bavarian State Ministry for Nutrition, Agriculture and Forests. www-m9.ma.tum.de/foswiki/pub/Projekte/VLE/ArborTec.pdf

K. Borgwardt, S. Borgwardt, A. Feragen, N. Shervashidze (2011) *Balanced kernel k-means for comparing large graphs with landmarks*. Technical report

S. Borgwardt, P. Gritzmann (2009) *Automatisches Routing der Erntemaschinen in der Holzerntesimulation des Virtuellen Walds*. Expert report for the Lehrstuhl für Forstliche Arbeitswissenschaft und Angewandte Informatik, Technische Universität München

THESES

Steffen Borgwardt (2015) *Data Analysis through Polyhedral Theory*, Habilitation thesis

Steffen Borgwardt (2010) *A Combinatorial Optimization Approach to Constrained Clustering*, Ph.D. thesis

Steffen Borgwardt (2007) *Nearly Optimal Algorithms on Minimum Spanning Trees*, diploma thesis in computer science and diploma thesis in mathematics

TEACHING

2014 – 2015	*Introduction to Discrete Mathematics*, TU München, Lecture
UC Davis	*Linear Algebra*, UC Davis, Lecture
TU München	*Mathematics and Computers*, UC Davis, Lecture
2013 – 2014	*Linear Optimization*, TU Braunschweig, Lecture
TU Braunschweig	*Discrete Optimization*, TU Braunschweig, Lecture
TU München	*Computational Complexity in Optimization*, TU München, Lead TA
ISM München	*Game Theory 1*, TU München, Seminar
	Game Theory 2, TU München, Seminar
	Mathematics 1, Int. School of Management München, Lecture
2007 – 2013	*Algebraic and Geometric Techniques for Optimization*, Lead TA
TU München	*Discrete Mathematics in Data Analysis*, Seminar
	Combinatorial Optimization, Lead TA
	Mathematical Methods for the Business Sciences 2, TA
	Applied Discrete Mathematics, Lead TA
	Selected Topics from Combinatorial Optimization, Seminar
	Mathematics 2 for Electrical Engineering, TA
	Mathematics 1 for Electrical Engineering, TA
	Optimization 3, Lead TA
	Optimization 2, Lead TA and Programming Course
	Optimization 1, Lead TA and Programming Course

SUPERVISED BACHELOR AND MASTER THESES

2013 – 2015	*On the computation of optimal soft power diagrams,* Alexander Kampmeier
	l_p-norm Voronoi diagrams, Michael Heptner
	Support vector machines and the kernel trick, Philipp Fröhlich
	On the best number of clusters, Gabriel Anzer
2011 – 2012	*Norm maximization over gravity polytopes*, Andrej Winokurow
	Hierarchical clustering, Philipp Krenz
	Clustering with instance-level constraints, Christoph Bolkart
	Zellzerlegungen und Least-Squares Assignments für die aquatische Ökologie, Martin Zach
2008 – 2010	*Hierarchische Clustering-Verfahren*, Gabriel Guckenbiehl
	Cluster categorization of sediments in aquatic ecology, Jakob Engel
	Packing and covering of scaled polytopal unit balls, Felix Schmiedl
	Shaped partitioning, Andreas Lechner
	Clusterings, Voronoi diagrams and separability, Martin Meinel

PROFESSIONAL ACTIVITIES

2015	Moderation for the 26th undergraduate student conference, UC Davis
2014	Organizing committee of the Colloquium in Honor of the 60th Birthday of Peter Gritzmann
	Organizing committee of the ECCO-CO 2014 – European Chapter on Combinatorial Optimization
	IFORS 2014, Barcelona, organizer of stream ‘Geometric Clustering’

2013	EURO 2013, Rome, organizer of stream ‘Geometric Clustering’
Since 2012	Reviewer for journals and organizations such as American Mathematical Society, NSA Mathematical Sciences Program National Science Foundation Mathematical Programming ACM Transactions on Algorithms Discrete Optimization Optimization Methods and Software Mathematical Modelling and Algorithms in Operations Research Discrete Applied Mathematics (and about 10 more)

INVITED TALKS AND RESEARCH VISITS

2015	DMV-Jahrestagung 2015, Hamburg
	ISMP 2015, Pittsburgh
	Workshop ‘Paths, Pivots, and Practice: The Power of Optimization’, Montreal
	Research visit to UC Los Angeles, May 2015 invited by Prof. Dr. Igor Pak Lecture ‘Edges vs. Circuits’
2014	Research visit to the Universität Hamburg, May 2014, invited by Prof. Dr. Ulrike von Luxburg Lecture ‘Geometrisches Clustering für die Flurbereinigung’
	IFORS 2014, Barcelona, organization of stream ‘Geometric Clustering’
	Research visit to the Technion, Haifa, April 2014, invited by Prof. Dr. Shmuel Onn Lecture ‘Geometric Clustering for Land Consolidation’
2013	Research visit to the University of California, Davis, Aug. 2013, invited by Prof. Dr. Jesùs De Loera Lecture series ‘On the Geometry of Constrained Clustering’
	EURO 2013, Rome, organization of stream ‘Geometric Clustering’
2012	ISMP 2012, Berlin
	EURO 2012, Vilnius, co-organization of stream and talk
	ECCO 2012, Antalya
2011	Research visit to the Max-Planck Institute for Intelligent Systems, Tübingen, Oct. 2011, invited by Prof. Dr. Bernhard Schölkopf Lecture ‘Gravity Polytopes and Power Diagrams’

2010	EURO 2010, Lissabon
	DMV-Jahrestagung 2010, München
2009	Euro 2009, Bonn

PARTICIPATION IN INTERDISCIPLINARY WORKSHOPS

2015	Bay Area Optimization Meeting, UC Berkeley
2014	AMS 2014 Fall Western Sectional Meeting, San Francisco
	Workshop on ‚Algorithmic Spectral Graph Theory' Simons Institute for the Theory of Computing, UC Berkeley
2012 - 2013	Nine interdisciplinary workshops for project 'Arborchange'
2012	Workshop on ‚Möglichkeiten und Grenzen von Softwareunterstützung in der forstlichen Beratung bei besitzzersplitterten Ausgangssituationen', Amt für ländliche Entwicklung und Forsten Schweinfurt, invited talk
2010	Workshop on ‚Grundlagen und aktuelle Ansätze der Touren- und Fahrtenplanung mit extern verursachten Unterbrechungen', Universität für Bodenkultur Wien, co-organization and invited talk
2009	Kickoff-Meeting Synbreed – Synergistic Plant and Animal Breeding, Network of excellence for interdisciplinary, genome based research in plant and animal breeding, Freising
	13. Forstlicher Unternehmertag des Clusters Holz und Forst Bayern, Freising
	11. Münchner Tage der Bodenordnung und Landentwicklung, on ‚Gebot der Stunde: (Neue) Wertschöpfung im ländlichen Raum, Zweckoptimismus oder reale Chance?', München
2008	Block course on 'Complexity of Geometric Problems', part of the graduate school 'Methods for Discrete Structures', FU Berlin