

Martin Aumüller

Curriculum Vitae: June, 2018

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Algorithms Group
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Denmark
Birth: January 12th, 1986 in Gera, Germany
Citizenship: Germany
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Areas of interest

Broad interests: algorithms and data structures, algorithm engineering
Specific interests:

- design of randomized algorithms for massive data sets
- analysis of algorithms
- efficient hash functions
- algorithm engineering for sorting & similarity search algorithms

Academic positions

from August 2018	Assistant Professor in Computer Science at IT University of Copenhagen
Sep. 2017–current	Affiliated with BARC (Basic Algorithms Research Center in Copenhagen), http://barc.ku.dk/ , as a postdoctoral researcher
Jan. 2016–current	Postdoctoral researcher in the ERC funded project “Scalable Similarity Search” of Prof. Rasmus Pagh at ITU Copenhagen
Apr. 2010–Dec. 2015	Research and Teaching Assistant at the Chair of Complexity Theory and Efficient Algorithms (headed by Prof. Martin Dietzfelbinger), Ilmenau University of Technology

Previous working experience

Jan. 2010	Student Research Assistant at the Institute of Sociology at the Friedrich-Schiller-Universität Jena.
Mar. 2009–Jul. 2009	Software Developer at Opera Software ASA in Linköping, Sweden.
Oct. 2008–Feb. 2009	Internship Software Developer at Opera Software ASA.
Oct. 2005–Sep. 2008	Various positions as a Student Research Assistant at TU Ilmenau.

Education

- Apr. 2010–Jun. 2015 Dr. rer. nat. in Theoretical Computer Science (equivalent to a Ph.D.),
Ilmenau, University of Technology,
Dissertation: On the Analysis of Two Fundamental Randomized Algorithms: Multi-Pivot Quicksort and Efficient Hash Functions,
Reviewer: Martin Dietzfelbinger, Rasmus Pagh, Philipp Woelfel.
Grade: summa cum laude (“graduated with highest honors”)
- Oct. 2004 – Mar. 2010 Dipl.-Inf. in Computer Science (equivalent to a Master’s degree),
Ilmenau, University of Technology,
Major: Computer Science, Minor: Mathematics,
Thesis: An Alternative Analysis of Cuckoo Hashing with a Stash and Realistic Hash Functions.
Grade: 1.2 (“graduated with distinction”)
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Research Key Metrics

- Citation count: 93*
- H-Index: 5*
- Orchid: <http://orcid.org/0000-0002-7212-6476>

(*according to <https://scholar.google.dk/citations?user=TNJYIYoAAAAJ>)

Publications

Journal publications

- 2016 M. Aumüller, M. Dietzfelbinger, P. Klaue, *How Good is Multi-Pivot Quicksort?*, ACM Transactions on Algorithms 13(1).
- 2015 M. Aumüller, M. Dietzfelbinger, *Optimal Partitioning for Dual-Pivot Quicksort*, ACM Transactions on Algorithms 12(2).
- 2014 M. Aumüller, M. Dietzfelbinger, P. Woelfel, *Explicit and Efficient Hash Families Suffice for Cuckoo Hashing with a Stash*, *Algorithmica* (70), 2014. Special Issue on Selected Papers from ESA 2012.

Journal submissions

- 2016 *Dual-Pivot Quicksort: Optimality, Analysis and Zeros of Associated Lattice Paths*, M. Aumüller, M. Dietzfelbinger, C. Heuberger, D. Krenn, H. Prodinger. Invited to a journal on Selected Papers of AofA'16. *Accepted for publication in Combinatorics, Probability and Computing*.
- 2016 *A Simple Hash Class with Strong Randomness Properties in Graphs and Hypergraphs*, M. Aumüller, M. Dietzfelbinger, P. Woelfel.

Peer-reviewed conference papers

- 2018 *Distance-sensitive Hashing*, M. Aumüller, T. Christiani, R. Pagh, F. Silvestri, PODS 2018
- 2017 *ANN-Benchmarks: A Benchmarking Tool for Approximate Nearest Neighbor Algorithms*, M. Aumüller, E. Bernhardsson, A. Faithfull, SISAP 2017, Invited to a special issue on selected papers in Information Systems
- 2017 T. D. Ahle, M. Aumüller, R. Pagh, *Parameter-free Locality Sensitive Hashing for Spherical Range Reporting*, SODA 2017
- 2016 M. Aumüller, M. Dietzfelbinger, C. Heuberger, D. Krenn, H. Prodinger. *Counting Zeros in Random Walks on the Integers and Analysis of Optimal Dual-Pivot Quicksort*, AofA 2016, 27th International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms, 2016.
- 2013 M. Aumüller, M. Dietzfelbinger, *Optimal Partitioning for Dual Pivot Quicksort*, ICALP 2013, 40th International Colloquium on Automata, Languages, and Programming, 2013.
- 2012 M. Aumüller, M. Dietzfelbinger, P. Woelfel, *Explicit and Efficient Hash Families Suffice for Cuckoo Hashing with a Stash*, ESA 2012, 20th Annual European Symposium on Algorithms, 2012.
- 2009 M. Aumüller, M. Dietzfelbinger, M. Rink, *Experimental Variations of a Theoretically Good Retrieval Data Structure*, ESA 2009, 17th Annual European Symposium on Algorithms, 2009.

Theses

- 2015 *On the Analysis of Two Fundamental Randomized Algorithms: Multi-Pivot Quicksort and Efficient Hash Functions*, Dissertation, TU Ilmenau.
- 2010 *An Alternative Analysis of Cuckoo Hashing with a Stash and Realistic Hash Functions*, Master's thesis, TU Ilmenau.
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Presentations

Peer-reviewed conference presentations

- 2018 *Distance-Sensitive Hashing*, PODS 2018, Houston, June 2018
- 2017 *Parameter-free Locality Sensitive Hashing for Spherical Range Reporting*, SODA 2017, Barcelona, January 2017
- 2013 *Optimal Partitioning for Dual Pivot Quicksort*, ICALP 2013, Riga, July 2013
- 2012 *Explicit and Efficient Hash Families Suffice for Cuckoo Hashing with a Stash*, ESA 2012, Ljubljana, September 2012

Invited presentations

- 2017 *Distance-sensitive Hashing*, Dagstuhl, Seminar 17181, May 2017
- 2016 *News on Multi-Pivot Quicksort*, Dagstuhl Seminar 16101, March 2016
- 2015 *Optimal Partitioning for Multi-Pivot Quicksort*, Algorithm seminar, ITU Copenhagen, October 2015
- 2015 *Strong Randomness Properties of (Hyper-)Graphs Generated by Simple Hash Functions*, Analysis of Algorithms 2015, Strobl, Austria, June 2015
- 2014 *Optimal Partitioning for Multi-Pivot Quicksort*, Dagstuhl Seminar 14091, February 2014
- 2011 *Strong Randomness Properties of Graphs and Hypergraphs Generated by Simple Hash Functions*, Research seminar, Ilmenau, December 2011

Workshop presentations

- 2016 *Multi-Pivot Quicksort: Comparison-Optimal Algorithms and Beyond*, ARCO'16, April 2016
- 2013 *Optimal Partitioning for Dual Pivot Quicksort*, 66. Theorietag der Fachgruppe Algorithmen und Komplexität, Hannover, Germany, June 2013
- 2010 *Cuckoo Hashing with a Stash and Realistic Hash Functions*, 60. Theorietag der Fachgruppe Algorithmen und Komplexität, Kiel, Germany, June 2010

Advising

IT University of Copenhagen

Master thesis advising

- V. Limbean “Audio Feature Extraction and Fingerprinting”, 2018
- N. Hass “Design and experimental evaluation of Multi-Pivot BlockQuickSort on Lomuto based partitioning”, 2017
- R. Dobre, C. Matrakou, R. Themsen, “Image similarity search using Locality Sensitive Hashing (LSH)”, 2016

Bachelor thesis advising

- F. Stauning, M Krøse “Implementing multi-pivot quicksort algorithms in C#”, 2018

Student project advising

- M. Rasmussen, N. Hass, “Investigating branch-free and equal-element aware multi-pivot quicksort variants”, 2016

TU Ilmenau

Master thesis advising

- P. Klaue, “Optimal Partitioning for Multi-Pivot Quicksort”, 2014

Bachelor thesis advising

- D. Knacker, “Theoretical Considerations in Route Planning Algorithms”, 2014
- A. Chemissof, “Performance Evaluation of Efficient Hashing Methods”, 2014
- A. Seifert, “Modern Algorithms for Route Planning”, 2012

Teaching

At ITU Copenhagen (as main instructor)

Autumn 2018	<i>Introduction to Programming</i> (undergraduate level)
Autumn 2018	<i>Applied Algorithms</i> (graduate level)
Spring 2018	<i>First-Year Project: Map of Denmark. Visualization, Navigation, Searching, and Route Planning</i> (undergraduate)
Autumn 2017	<i>Programming workshop</i> (graduate level)
Spring 2017	<i>Algorithm design project</i> (graduate level)
Autumn 2016	<i>Programming workshop</i> (graduate level)
Spring 2016	<i>Advanced algorithm seminar</i> (graduate level)

At TU Ilmenau (teaching in German)

2015	<i>Algorithms and Data Structures*</i> : tutorial Summer 2015
2010–2015	<i>Efficient Algorithms 2*</i> : tutorial Winter 2010–2015
2010–2015	<i>Project seminar</i> : supervised students writing literature papers on topics in algorithms, data structures and complexity theory (13 students supervised)
2010–2014	<i>Efficient Algorithms*</i> : main instructor in Summer 2012, tutorial Summer 2010–2014
2011, 2013	<i>Complexity Theory*</i> : tutorial Summer 2011 and 2013
2011–2012	<i>Approximation Algorithms*</i> : tutorial Winter 2011 and 2012
2010	<i>Computability and Complexity</i> : tutorial Winter 2010

As a student T.A.

2006–2007 tutorials for foreign students on introductory programming courses

(* indicates that around 20% of lectures were given as a replacement for the official teacher)

Awards and Prizes

Prizes

Oct. 2015 Awarded “Lehrpreis 2015” from Technische Universität Ilmenau
(one out of ten university-wide awards for excellent teaching)

Oct. 2013 Awarded “Lehrpreis 2013” from Technische Universität Ilmenau

*Awards**

Dec. 2014 2 Awards: “best tutorial” (“Efficient Algorithms” & “Efficient Algorithms 2”)

Dec. 2012 3 Awards: “best lecture” (“Efficient Algorithms”) and “best tutorial” (“Efficient Algorithms” & “Efficient Algorithms 2”)

Dec. 2011 1 Award: “best tutorial” (“Efficient Algorithms”)

(* teaching awards based on mandatory faculty-wide student evaluations)

Affiliations

- Association for Computing Machinery, since 2016
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Professional Service

- PC Service: SEA 2018, ESA 2018 (Track B)
 - Reviewer: WADS 2011, ICALP 2013, ESA 2013, Information Processing Letters, CSR 2016, MFCS 2016, STOC 2017, PODS 2017, Algorithmica 2017, WADS 2017, SODA 2018, ANALCO 2018, Software: Practice and Experience, PPOPP 2018.
 - Coordinator: 2017, Dagstuhl Seminar 17181, “Theory and Applications of Hashing”
 - Organizer: ARCO 2018, IT University of Copenhagen
 - Co-organizer: 69. Workshop über Algorithmen und Komplexität at TU Ilmenau, 2015
 - Local organizer: On a regular basis, I presented my research work and practical applications of algorithms at workshops for pupils and at open house days. Moreover, I organized and fund-raised the “summer festival” of the faculty in Ilmenau in 2015.
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Invited workshop participation

- Dagstuhl Seminars on “Data Structures and Advanced Models of Computation on Big Data” in 2014 & 2016
 - Analysis of Algorithms 2015, Strobl (by invitation only in odd years)
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Languages

- German (native), English (fluent), Danish (conversational)
 - Basic knowledge in Russian, Swedish, Japanese
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Additional Skills

Programming languages: Proficient in C++, Java, Python, Ruby, experienced in Javascript, PHP, SQL (Postgres)

Operation systems: GNU/Linux, Windows, Mac OS X