Thorben Tröbst — Curriculum Vitae

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Research Interests

My primary research interests lie in combinatorial optimization, approximation algorithms, mathematical programming, and graph algorithms as well as their applications to computational economics. My current projects are in the design of fast mechanisms for matching markets (w/ Vijay Vazirani, Ioannis Panageas, and William Overman) and in heuristics for complex vehicle routing problems (w/ Jens Vygen, Stephan Held, Dirk Müller, Vera Traub, Jannis Blauth, and Niklas Schlomberg).

Education

Ph.D., Computer Science **September 2019 – present**
University of California, Irvine *Irvine, CA, USA*

- Advisor: Vijay Vazirani
- 4.0/4.0 cumluative GPA

M.Sc., Mathematics **October 2017 – August 2019**
University of Bonn *Bonn, Germany*

- Focus areas: discrete mathematics and mathematical logic
- 4.0/4.0 cumulative GPA with distinction (*ausgezeichnet*)
- Master's thesis on theoretical aspects of vehicle routing and cycle covering problems

B.Sc., Mathematics **October 2014 – August 2017**
University of Bonn *Bonn, Germany*

- 3.9/4.0 cumulative GPA with distinction (*ausgezeichnet*)
- Bachelor's thesis on heuristics for vehicle routing problems with time windows and subtours

Publications

Manuscripts

- J. Garg, T. Tröbst, V. V. Vazirani, *One-sided Matching Markets with Endowments: Equilibria and Algorithms.* in review
- V. Traub and T. Tröbst. *A Fast* $(2+2/7)$*-Approximation for Capacitated Cycle Covering.* in review (journal version, for conference version see below)

Book Chapters

- Z. Huang and T. Tröbst. *Online Matching.* in F. Echenique, N. Immorlica, and V. V. Vazirani (eds), *Online and Matching-based Market Design*, Cambridge University Press, to appear in 2021

Conference Papers

- V. Traub and T. Tröbst. *A Fast* $(2+2/7)$*-Approximation for Capacitated Cycle Covering.* IPCO 2020

Theses

- T. Tröbst. *Capacitated Vehicle Routing and Cycle Covering Problems.* Master's Thesis, Research Institute for Discrete Mathematics, Bonn, 2019, http://www.ics.uci.edu/~ttrbst/ms_thesis.pdf

- T. Tröbst. *Vehicle Routing mit Subtouren und Zeitfenstern.* Bachelor's Thesis, Research Institute for Discrete Mathematics, Bonn, 2017, `http://www.ics.uci.edu/~ttrbst/bs_thesis.pdf`

Honors and Awards

Dean's Award **September 2019**
University of California, Irvine
- $10,000 award for "outstanding research potential"

Scholarship **November 2015 – August 2019**
German Academic Scholarship Foundation
- Merit-based national scholarship awarded to top 0.5% of German university students

Teaching

CS 163 / CS 265: Graph Algorithms **Winter 2021**
TA for David Eppstein *University of California, Irvine*

CS 290: Algorithms for Matching Markets II **Fall 2020**
Assisted with lectures for Vijay Vazirani *University of California, Irvine*

CS 295: Algorithms for Matching Markets **Fall 2019**
Assisted with lectures for Vijay Vazirani *University of California, Irvine*

Invited Talks

One-sided Matching Markets with Endowments **March 2021**
Simons Institute for the Theory of Computing *Berkeley, CA, USA*

Referee Work

Journals
- Mathematics of Operations Research
- Discrete Optimization
- Journal of Global Optimization
- Mathematical Programming

Conferences
- European Symposium on Algorithms (ESA 2020)
- Symposium on the Theory of Computing (STOC 2021)

Employment History

Student Assistant (SHK) **April 2016 – August 2017**
Scientific Assistant (WHF) **September 2017 – August 2019**
Research Institute for Discrete Mathematics *Bonn, Germany*
- Joined new vehicle routing project *BonnTour / Digital Delivery Graph* in collaboration with the Deutsche Post DHL Group
- Developed high performance vehicle routing software in C++ and Python
- Implemented performance critical components dealing with tour scheduling, parcel exchanges, clustering, post-optimization, and more

- Used techniques from computational geometry to implement robust and efficient handling of time dependent travel times (none of the industry leading solvers support this)
- Project now improves on industry standard tools in feature set, solution quality, and runtime (beat solvers by Google X and others by $\approx 10\%$ in DHL Freight competition)

Intern **October 2013**

Software Development Contractor **November 2013 – June 2015**

LD Didactic GmbH *Brühl, Germany*

- Developed Android app using Xamarin (C#) to display information from scientific measurement equipment together with another intern
- Implemented Bluetooth communication and physics simulation of the behavior of a real multimeter
- Ported a large existing Windows codebase to Android in order to support dozens of measurement devices
- App was presented at the 2014 didacta trade fair in Stuttgart, Germany

References

Vijay Vazirani **Ph.D. Advisor**

Distinguished Professor, Department of Computer Science *University of California, Irvine*

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Jens Vygen **M.Sc. and B.Sc. Advisor**

Professor (W3), Research Institute for Discrete Mathematics *University of Bonn*

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Stephan Held **M.Sc. and B.Sc. Co-Advisor**

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