

John Gunnar Carlsson

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Education:

Ph.D. in Computational Mathematics, August 2009

Stanford University, Stanford, CA

Advisor: Prof. Yinyu Ye; thesis: "Map segmentation algorithms for geographic resource allocation". *Describes several resource allocation problems in a geometric context, providing two new algorithms for dividing a service region into sub-regions with respect to an optimality criterion. Applications include vehicle routing, mobile surveillance, and congressional redistricting.*

A.B. in Mathematics and Music with honors, June 2005

Harvard University, Cambridge, MA

Research interests:

- Operations research, mathematical modeling, resource allocation, optimization, convex programming, transportation science, geometric algorithms, queueing theory
- Programming languages: MATLAB, Python, C, C++

Awards:

- Departmental teaching excellence award, 2007-2008, Institute for Computational and Mathematical Engineering, Stanford University
- NSF grant, Grant Opportunities for Academic Liaison with Industry (GOALI), "Region Partitioning", Abstract #0800151.
- Hoopes prize nominee for outstanding senior thesis, Harvard University, 2005

Experience:

Assistant Professor, August 2009 - Present

University of Minnesota, Twin Cities

Department of Mechanical Engineering

Division of Industrial and Systems Engineering

Research Assistant, May 2004 - August 2009

Stanford University/Boeing Company

- Developed REGIONPARTITION, a software tool for partitioning a geographic region with respect to an optimality criterion
- Developed IMVRP and MDVRP-TW, software packages for large-scale vehicle routing problems
- Maintained COPL, a software package for solving convex linear and quadratic optimization problems

Research Scientist, May 2007 - present
Cardinal Optimization, Palo Alto, CA

- Developed map segmentation software for routing vehicles in dynamic environments

Teaching Mentor, September 2008 - June 2009
Stanford University, Center for Teaching and Learning

- Provide guidance to new teaching assistants in improving teacher-student communication

Teaching Assistant, Fall 2006 - 2008
Stanford University

- Held weekly section for 4 hours on introductory freshman calculus
- Wrote course readers for freshman calculus, statistics, linear algebra, and partial differential equations

Research Assistant, October 2003 - June 2004
Harvard University

- Developed SOFIA, an AI tool allowing students and visitors to chat about calculus and related topics

Publications:

- "Finding equitable convex partitions of points in a polygon efficiently", with Benjamin Armbruster and Yinyu Ye. To appear, *ACM Transactions on Algorithms*.
- "On equitably partitioning a convex polygon", with Yinyu Ye. Submitted to *Computational Geometry*, April 2009.
- "Practical distributed vehicle routing for street-level map scanning", with Yinyu Ye. Submitted to *Transportation Science*, April 2009.
- "Robust Partitioning for Stochastic Multi-vehicle Routing", with Erick Delage and Yinyu Ye. Technical Report, The Boeing Company, April 2008.
- "Solving Intermodal Vehicle Routing Problems", with Dongdong Ge and Yinyu Ye. Technical report, The Boeing Company, August 2007.

Conference proceedings:

- "A geometric framework for resource allocation problems", with Yinyu Ye. To appear in *Proceedings of the 2009 NSF CMMI Research and Innovation Conference*, June 22-25, 2009, Honolulu, Hawaii.
- "Solving the min-max multi-depot vehicle routing problem", with Dongdong Ge and Yinyu Ye. *Proceedings of the 2007 Fields Institute Workshop on Global Optimization*.

Other work:

- "CME 100: Vector calculus for engineers", with Vadim Khayms. 60-page course reader for freshman engineers at Stanford University.
- "CME 104: Linear algebra and partial differential equations for engineers", with Vadim Khayms. 58-page course reader for freshman engineers at Stanford University.

- “CME 106: Probability and statistics for engineers”, with Vadim Khayms. 52-page course reader for freshman engineers at Stanford University.
- “SCRAWL, an optical music recognition system”. Senior honors thesis, Harvard University, 2005.
- Over 30 wikipedia articles on convex optimization:
<http://en.wikipedia.org/wiki/Special:Contributions/Johngcarlsson>

Invited talks:

- Session chair, INFORMS 2008, “Intelligent map segmentation and transportation”
- “Generalized convex equitable partitions and applications”, INFORMS 2008, Seattle, WA, 10/14/08
- “Distributed vehicle routing for street-level map scanning”, With Dongdong Ge and Yinyu Ye. INFORMS 2008, Washington, DC, 10/14/08
- “Solving the min-max multi-depot vehicle routing problem”, INFORMS 2007, Seattle, WA, 11/04/07
- “Efficient optimization by equitable convex partitions”, With Yinyu Ye. Smart Fields Consortium, Stanford Center for Computational Earth and Environmental Science (CEES), Stanford University.
- “Finding equitable convex partitions of points and applications”, With Benjamin Armbruster and Yinyu Ye. Departmental Seminar, Institute for Engineering and Operations Research, University of California, Berkeley, 12/03/07
- “Finding equitable convex partitions with resource allocation applications”, Stanford Symposium on Current Research in Engineering and Applied Math (SCREAM), Stanford University, 05/05/07
- “Solving the min-max multi-depot vehicle routing problem”, INFORMS 2007, Seattle, WA, 11/04/07

Activities:

- Freelance keyboardist with the Bhi Bhiman Group, Doug Ellington & New Urban Groove, Future Perfect, The Sunrize Blues, The Riot Squad