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Research Interests

Simulation and experimental methods for algorithm analysis; generation of random combinatorial objects; heuristics for NP-hard problems; algorithm design and analysis.

Education

PhD 1986 Carnegie Mellon University. Dissertation Title: *Experimental Analysis of Algorithms*.
Dissertation Adviser: J. L. Bentley.
MS 1983 Carnegie Mellon University.
BS 1981 Butler University, Indianapolis, IN. Graduated *summa cum laude* and with highest departmental honors.
Since July 2001. Professor of Computer Science, Amherst College. 1995-2001, Associate Professor of Computer Science. 1987-1995, Assistant Professor of Computer Science.

Publications

“An experimental study of bin packing,” *Proceedings of the 21st Annual Allerton Conference on Computing, Control, and Communication* (1983). With J. L. Bentley, D. S. Johnson, and F. T. Leighton.

“Some unexpected expected behavior results for bin packing,” *Proceedings of the 16th Annual ACM Symposium on Theory of Computing* (1984). With J. L. Bentley, D. S. Johnson, F. T. Leighton, and L. A. McGeoch.

“Amortized analysis of self-organizing sequential search heuristics,” *Communications of the ACM* Vol. 28 (April 1985), with J. L. Bentley. An early version appears as “Worst case analysis of self-organizing sequential search heuristics,” *Proceedings of the 20th Annual Allerton Conference on Computing, Control, and Communication* (1982).

Experimental Analysis of Algorithms. PhD dissertation, Department of Computer Science, Carnegie-Mellon University (August 1986). Available as Technical Report CMU-CS-87-124.

- “An experimental study of median-selection in Quicksort,” *Proceedings of the 24th Annual Allerton Conference on Computing, Control, and Communication* (1986).
- When are Best Fit and First Fit Optimal?* Technical Report CMU-CS-87-168, Department of Computer Science, Carnegie-Mellon University, Pittsburgh, PA (October 1987). With J. D. Tygar.
- DIMACS Implementation Challenge Workshop: Algorithms for Network Flows and Matching*, DIMACS Technical Report 92-4, January 1992. Editor, with D. S. Johnson.
- “Analyzing algorithms by simulation: variance reduction techniques and simulation speedups,” *Computing Surveys*, June 1992. Also published (in Japanese translation) in *bit*, Kyoritsu Shuppan Pub. Co. Ltd., Tokyo, 1994.
- “The Computer Science Sampler,” column appearing in *The American Mathematical Monthly*. Data Compression, May 1993; Zero-Knowledge Proofs, August-September 1993; Parallel Addition, November 1993; Does Anybody Really Know What Time It Is? May 1994; Veni, Divisi, Vici, May 1995.
- Network Flows and Matching: Proceedings of the First DIMACS Implementation Challenge*, DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Volume 12. American Mathematical Society, 1993. Editor, with D. S. Johnson.
- “All-pairs shortest paths and the essential subgraph,” *Algorithmica*, May 1995. An earlier version appeared as “Using the Short-Path Subgraph to Find Shortest Paths,” DIMACS Technical Report TR 91-30.
- “Optimal sampling strategies for Quicksort,” *Random Structures and Algorithms*, Vol. 7, No. 4, 1995. An earlier version appeared in *Proceedings of the 28th Annual Allerton Conference on Computing, Control, and Communication*, 1990. With J. D. Tygar.
- “Toward an experimental method for algorithm simulation” (feature article), *INFORMS Journal on Computing*, Vol. 8 No. 1, Winter 1995.
- “Challenges in algorithm simulation” (rejoinder), *INFORMS Journal on computing*, Vol. 8, No. 1, Winter 1995.
- “Research in the curriculum, and the Web” (position paper), *CSURVES: Computing Surveys Electronic Section*, Vol. 28, 1996.
- “Emerging opportunities for theoretical computer science,” *SIGACT News*, Vol. 28, 1997. Committee report, with A. Aho, D. S. Johnson, R. Karp, S. R. Kosaraju, D. Papadimitriou, and P. Pevzner.
- Proceedings of the Workshop on Algorithm Engineering and Experimentation (ALENEX99)*, Springer Verlag Lecture Notes in Computer Science, No. 1619, 1999. Editor, with M. T. Goodrich.

- “How to present a paper on experimental work with algorithms,” *SIGACT News*, Vol. 30, No. 4, December 1999. With Bernard M.E. Moret.
- “Experimental Analysis of Algorithms” (invited article), *Notices of the American Mathematical Society*, pp 304-311, March 2001.
- “Experimental Analysis of Optimization Algorithms,” a chapter in the *Handbook of Applied Optimization*, Oxford University Press, 2002. Panos M. Pardalos and Mauricio G. C. Resende, editors.
- “Using Finite Experiments to Study Asymptotic Performance,” in *Experimental Algorithmics: From Algorithm Design to Robust and Efficient Software*, Lecture Notes in Computer Science No. 2547, Springer-Verlag Publishers, 2001, R. Fleischer, B. Moret, and E. M. Schmidt, Editors. With P. Sanders, R. Fleischer, P. Cohen, and D. Precup.
- “How to find big-oh in your data set (and how not to),” presented at the Second International Symposium on Intelligent Data Analysis (IDA-97), LNCS, Birkbeck College, London, August 1997, with P. Cohen and D. Precup.
- “Experimental Analysis of Algorithms,” a chapter in the *Handbook of Global Optimization, Volume 2: Heuristic Approaches*, Kluwer Academic Publishers, 2002. Panos Pardalos and H. Edwin Romeijn, editors.
- Data Structures, Near Neighbor Searches, and Methodology: Proceedings of the Fifth and Sixth DIMACS Implementation Challenges*, Volume 59, DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Mathematical Association of America, 2002. Editor, with M. H. Goldwasser and D. S. Johnson.
- “A Bibliography of algorithm experimentation,” in *Data Structures, Near Neighbor Searches, and Methodology: Proceedings of the Fifth and Sixth DIMACS Implementation Challenges*, Volume 59, DIMACS Series in Discrete Mathematics and Theoretical Computer Science, MAA, 2002.
- “Experimental Algorithmics,” *Communications of the ACM*, 50 (11), November 2007.
- “Experimental Methods for Algorithm Analysis,” article in *The Encyclopedia of Algorithms*, Ming-Yang Kao, Ed, Springer Verlag, 2008.
- Experimental Algorithms*, Proceedings of the 7th International Workshop, WEA 2008. Springer Lecture Notes in Computer Science LNCS 5068, 2008. Editor.

Books In Progress

- Experimental Algorithmics*, a guide for researchers in experimental algorithmics.
- The Internet and the Foundations of Computer Science*, an introductory textbook.
- Awesome Programming Projects*, a project idea book for beginning programmers.