Jelani Nelson

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Education

Massachusetts Institute of Technology — Cambridge, MA

09/06–06/2011 PhD in Computer Science. GPA: 5.0/5.0.
Thesis title: Sketching and Streaming High-Dimensional Vectors. Research advisors: Prof. Erik D. Demaine and Prof. Piotr Indyk, Theory of Computation Group, CSAIL.

09/05–06/06 Master of Engineering in Electrical Engineering and Computer Science. GPA: 5.0/5.0.
Thesis title: External-Memory Search Trees with Fast Insertions. Research advisors: Dr. Bradley C. Kuszmaul and Prof. Charles E. Leiserson, Supertech Group, CSAIL.

09/01–06/05 Bachelor of Science degree in Computer Science and Engineering, and Bachelor of Science degree in Mathematics. GPA: 4.9/5.0.

Research Positions Held

08/11– **Mathematical Sciences Research Institute** — Berkeley, CA
Postdoctoral Researcher. Mentor: Prof. Adam Klivans. Fall 2011 Program on Quantitative Geometry.

05/10–08/10 **Microsoft Research** — Cambridge, MA
Research Intern. Mentor: Prof. Madhu Sudan. Dimensionality reduction and streaming algorithms.

05/09–07/09, 06/08–08/08 **IBM Almaden Research Center, Theory Group** — San Jose, CA
Research Intern. Mentors: Dr. David P. Woodruff, Dr. T.S. Jayram. Upper and lower bounds for streaming problems, amongst other things.

06/06–07/06 **Technion - Israel Institute of Technology, ToC Lab** — Haifa, Israel
Visiting Student. Mentor: Prof. Yuval Rabani. Research on approximation algorithms for graph labeling and other problems.

06/04–08/04 **Toshiba Research and Development Center** — Kawasaki, Japan
Research Intern. Mentor: Dr. Hideto Ogasawara. Developed the latest version of a tool used to estimate statistics related to software reliability based on data collected during software testing.

05/03–09/03 **MIT LCS Program Analysis Group** — Cambridge, MA
Undergraduate Researcher. Mentor: Prof. Michael D. Ernst. Contributed several features to a tool for dynamically detecting invariants over program points.

Other Experience

06/05–08/05 **Google Inc.** — Mountain View, CA
Software engineering intern on team responsible for detecting fraudulent behavior related to Google ads.

Teaching

AAiT, Addis Ababa University — **Addis Ababa, Ethiopia**

July 2011 — Developed materials for and taught a four-week course on algorithms and programming open to high school students across Addis Ababa. Eighty-three students completed the course. Course website: `http://www.addiscoder.com`.

MIT, EECS Department — **Cambridge, MA**

8/06–9/09 — One of three coaches of MIT's ACM International Collegiate Programming Contest team. Organized team selection contests and practices. Also co-organized BOSPRE 2006 with Harvard University and Fitchburg State College. BOSPRE is a preliminary ACM ICPC contest for universities in Northeast North America.

09/05–12/05 — Teaching Assistant for 6.042, "Mathematics for Computer Science". Responsibilities included grading, holding office hours, creating problems, and maintaining and modifying grading software.

Journal Paper

- Timothy Abbott, Michael A. Burr, Timothy M. Chan, Erik D. Demaine, Martin L. Demaine, John Hugg, Daniel M. Kane, Stefan Langerman, Jelani Nelson, Eynat Rafalin, Kathryn Seyboth, Vincent Yeung.
  Dynamic Ham-Sandwich Cuts in the Plane.
  Computational Geometry: Theory and Applications, 42(5): 419-428, 2009.

Conference Papers

- Daniel M. Kane, Jelani Nelson
  Sparser Johnson-Lindenstrauss Transforms.
  23rd Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), 2012.
- Daniel M. Kane, Raghu Meka, Jelani Nelson
  Almost Optimal Explicit Johnson-Lindenstrauss Transformations.
  15th International Workshop on Randomization and Computation (RANDOM), 2011.
- Daniel M. Kane, Jelani Nelson, Ely Porat, David P. Woodruff
  Fast Moment Estimation in Data Streams in Optimal Space.
  43rd Annual ACM Symposium on Theory of Computing (STOC), 2011.
- Ilias Diakonikolas, Daniel M. Kane, Jelani Nelson
  Bounded Independence Fools Degree-2 Threshold Functions.
  51st Annual IEEE Symposium on Foundations of Computer Science (FOCS), 2010.
- Daniel M. Kane, Jelani Nelson, David P. Woodruff
  An Optimal Algorithm for the Distinct Elements Problem.
  29th Annual ACM Symposium on Principles of Database Systems (PODS), 2010.
  PODS Best Paper Award and **IBM Research Pat Goldberg Memorial Best Paper Award**, invited and submitted to *Journal of the ACM*.
- Jelani Nelson, David P. Woodruff
  Fast Manhattan Sketches in Data Streams.
  29th Annual ACM Symposium on Principles of Database Systems (PODS), 2010.
- Daniel M. Kane, Jelani Nelson, David P. Woodruff
  On the Exact Space Complexity of Sketching and Streaming Small Norms.
  21st Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), 2010.
- Miklós Ajtai, Vitaly Feldman, Avinatan Hassidim, Jelani Nelson
  Sorting and Selection with Imprecise Comparisons.
  36th International Colloquium on Automata, Languages and Programming (ICALP), 2009.

- Nicholas J. A. Harvey, Jelani Nelson, Krzysztof Onak.
  Sketching and Streaming Entropy via Approximation Theory.
  49th Annual IEEE Symposium on Foundations of Computer Science (FOCS), 2008.
- Michael A. Bender, Martin Farach-Colton, Jeremy T. Fineman, Yonatan Fogel, Bradley C. Kuszmaul, Jelani Nelson.
  Cache-Oblivious Streaming B-trees.
  19th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2007.
- Timothy Abbott, Erik D. Demaine, Martin L. Demaine, Daniel M. Kane, Stefan Langerman, Jelani Nelson, Vincent Yeung
  Dynamic Ham-Sandwich Cuts of Convex Polygons in the Plane.
  17th Canadian Conference on Computational Geometry (CCCG), 2005.

Other Papers

- Daniel M. Kane, Jelani Nelson
  A Derandomized Sparse Johnson-Lindenstrauss Transform.
  Manuscript, *CoRR abs/1006.3585*.
- Jelani Nelson, David P. Woodruff
  A Near-Optimal Algorithm for L1-Difference.
  Manuscript, *CoRR abs/0904.2027*.
- Jelani Nelson.
  A Note on Set Cover Inapproximability Independent of Universe Size.
  Electronic Colloquium on Computational Complexity (ECCC), TR07-105, 2007.

Patents

- Jelani Nelson, David P. Woodruff *A Method for the Aggregate Contribution of Iceberg Queries*. Filed as Docket ARC920100066US1.
- Jelani Nelson, David P. Woodruff. *A Tool for Summarizing Internet-Traffic Patterns via Sketching the Manhattan Distance*. Filed as Docket ARC920090074US1.

Talks

- TEDxAddis, Addis Ababa, Ethiopia. Title: *Streaming Algorithms*. July 2011.
- Chinese University, Hong Kong. Title: *Sparser Johnson-Lindenstrauss Transforms*. June 2011.
- Workshop on Sublinear Algorithms, Bertinoro, Italy. Title: *Sparser Johnson-Lindenstrauss Transforms*. May 2011.
- Yale University, New Haven, CT. Title: *Sparser Johnson-Lindenstrauss Transforms*. April 2011.
- IBM Almaden Research Center, San Jose, CA. Title: *Sketching and Streaming Algorithms*. April 2011.
- Massachusetts Institute of Technology, Cambridge, MA. Title: *Sketching and Streaming Algorithms*. March 2011.
- Harvard University, Cambridge, MA. Title: *Sketching and Streaming Algorithms*. February 2011.
- Institute for Advanced Study, Princeton, NJ. Title: *Sparsifying and Derandomizing the Johnson-Lindenstrauss Transform*. January 2011.
- Microsoft Research, Redmond, WA. Title: *Optimal Moment Estimation in Data Streams*. January 2011.
- CMU, Pittsburgh, PA. Title: *Optimal Moment Estimation in Data Streams*. December 2010.
- Stanford University, California. Title: *Fast Moment Estimation in Data Streams*. November 2010.
- Stanford University, California. Title: *Optimal Moment Estimation in Data Streams*. November 2010.
- UC Berkeley, California. Title: *Applications of FT-mollification*. November 2010.

- Microsoft Research Silicon Valley, Mountain View, California. Title: *Applications of FT-mollification.* November 2010.
- Workshop on Massive Data Algorithmics, Snowbird, Utah. Title: *An Optimal Algorithm for the Distinct Elements Problem.* June 2010.
- Workshop on Massive Data Algorithmics, Snowbird, Utah. Title: *Fast Manhattan Sketches in Data Streams.* June 2010.
- Technion, Haifa, Israel. Title: *Applications of FT-mollification.* May 2010.
- Hebrew University, Jerusalem, Israel. Title: *Applications of FT-mollification.* May 2010.
- Tel Aviv University, Tel Aviv, Israel. Title: *Applications of FT-mollification.* May 2010.
- Tel Aviv University, Tel Aviv, Israel. Title: *An Optimal Algorithm for the Distinct Elements Problem.* May 2010.
- Weizmann Institute, Rehovot, Israel. Title: *Applications of FT-mollification.* May 2010.
- Stringology Workshop, Tel Aviv, Israel. Title: *A Space-Optimal Streaming Algorithm for Sketching Small Moments.* May 2010.
- University of Maryland, College Park, MD. Title: *Applications of FT-mollification.* March 2010.
- Workshop on Algorithms for Processing Massive Data Sets, IIT Kanpur, India. Title: *A Space-Optimal Streaming Algorithm for Sketching Small Moments.* December 2009.
- Microsoft Research New England, Cambridge, MA. Weekly reading group. Title: *Bounded Independence Fools Degree-2 Threshold Functions.* December 2009.
- University of Michigan, Ann Arbor, MI. Title: *A Space-Optimal Streaming Algorithm for Sketching Small Moments.* October 2009.
- Tsinghua University, Beijing, China. China Theory Week. Title: *A Space-Optimal Streaming Algorithm for Sketching Small Moments.* September 2009.
- California Institute of Technology, Los Angeles, CA. Title: *A Space-Optimal Streaming Algorithm for Sketching Small Moments.* August 2009.
- University of California, Los Angeles, CA. Title: *A Space-Optimal Streaming Algorithm for Sketching Small Moments.* August 2009.
- IBM Almaden Research Center, San Jose, CA. Title: *Revisiting Norm Estimation in Data Streams.* June 2009.
- IT University of Copenhagen, Copenhagen, Denmark. Title: *Revisiting Norm Estimation in Data Streams.* April 2009.
- Center for Massive Data Algorithmics (MADALGO), Aarhus, Denmark. Title: *Revisiting Norm Estimation in Data Streams.* April 2009.
- MIT Algorithms and Complexity Seminar, Cambridge, MA. Title: *Revisiting Norm Estimation in Data Streams.* April 2009.
- DIMACS/DyDan Workshop on Streaming, Coding, and Compressive Sensing: Unifying Theory and Common Applications to Sparse Signal/Data Analysis and Processing, New Brunswick, NJ. Title: *Sketching and Streaming Entropy via Approximation Theory.* March 2009.
- MIT Algorithms and Complexity Seminar, Cambridge, MA. Title: *Sketching and Streaming Entropy via Approximation Theory.* September 2008.
- IBM Almaden Research Center, San Jose, CA. Title: *Sketching and Streaming Entropy via Approximation Theory.* June 2008.

Honors and Awards

- IBM Research Pat Goldberg Memorial Best Paper Award. 2010.
- Best Paper Award, ACM Symposium on Principles of Database Systems (PODS). 2010.
- Xerox Fellow. 2010–2011.
- National Defense Science and Engineering Graduate (NDSEG) Fellow. 2007–2010.
- Akamai Presidential Fellow. 2006–2007.
- Member of the Phi Beta Kappa, Tau Beta Pi, and Eta Kappa Nu honor societies.
- Google Code Jam Latin America, 10th place (algorithmic individual programming contest with over 4,000 registered competitors), Belo Horizonte, Brazil. 2007.
- Google Code Jam, Semi-finalist. 2004, 2006, 2008.

Service

External reviewer for FOCS, STOC, SODA, PODS, CCC, RANDOM, ESA, SPAA, MFCS, IPDPS, JACM, SICOMP, JCSS, Algorithmica, TALG, Information and Computation, IEEE Transactions on Signal Processing