Alexandr Andoni

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Experience

Microsoft Research — Mountain View, CA

2010–present — Researcher. Interests: algorithms for massive datasets, data streams, sublinear algorithms, high-dimensional computational geometry, metric embeddings, theoretical machine learning.

Princeton U./Center for Computational Intractability — Princeton, NJ

2009–'10 — Postdoctoral researcher. Hosts: Sanjeev Arora and Assaf Naor (NYU).

Microsoft Research — Mountain View, CA

Summer'08 — Research intern. Mentors: Udi Wieder and Rina Panigrahy. Research on streaming algorithms.

IBM Almaden Research Center, Theory Group — San Jose, CA

Summer'07, Summer'06 — Research intern. Mentors: Robert Krauthgamer and Ken Clarkson. Research on high-dimensional computational geometry.

Google Inc. — Mountain View, CA

Summer'05 — Summer Intern (software engineer).

Palo Alto Research Center, Computer Science Lab — Palo Alto, CA

Summer'04 — Research intern. Mentor: Jessica Staddon, manager of the Security Group. Research on broadcast encryption.

Microsoft Corporation — Redmond, WA

Summer'03 — Software Design Engineer intern in the Security Group.

MIT, CSAIL — Cambridge, MA

Spring'04 — Undergraduate researcher for Piotr Indyk. Designed and implemented E^{2}LSH, a software package for the high dimensional nearest neighbor problem. See `http://web.mit.edu/andoni/www/LSH`.

June'02 — Undergraduate researcher for Piotr Indyk. Research on high-dimensional computational geometry.

2001–'02 — Undergraduate researcher for Martin Rinard. Co-supervised by Darko Marinov and Sarfraz Khurshid. Research on automated software testing.

Education

Massachusetts Institute of Technology — Cambridge, MA

2005–'09 — PhD in Computer Science. Research adviser: Piotr Indyk.
Thesis title: *Nearest Neighbor Search: the Old, the New, and the Impossible*. Committee: Piotr Indyk, Robert Krauthgamer, and Ronitt Rubinfeld.

2004–'05 — Master of Engineering in Electrical Engineering and Computer Science.
Thesis title: *Approximate Nearest Neighbor Problem in High Dimensions*. Supervised by Piotr Indyk.

2001–'04 Bachelor of Science degree in Computer Science and Engineering, and Bachelor of Science degree in Mathematics. Departmental GPA: 5.0/5.0. Overall GPA: 4.9/5.0.

Politehnica University of Bucharest — Bucharest, Romania

1999–'01 Department of Computer Science and Automated Control. GPA: 9.89/10.0. Transferred to MIT.

Teaching

MADALGO Center for Massive Data Algorithmics — Aarhus, Denmark

August'11 Taught lectures on "Embedding and Sketching" during the MADALGO & CTIC Summer School on "High-Dimensional Geometric Computing".

MIT, EECS Department — Cambridge, MA

Fall'07 Teaching Assistant (Head TA) for 6.046, *Introduction to Algorithms*, taught by Ronitt Rubinfeld and Madhu Sudan. My duties included leading recitations and review sessions, holding office hours, creating problems sets and exams, as well as helping with the class administration.

Spring'07 Guest lecturer at 6.851, *Advanced Data Structures*, taught by Erik Demaine. Gave a lecture on high-dimensional nearest neighbors and the Locality-Sensitive Hashing.

Fall'04 Teaching Assistant for 6.854, *Advanced Algorithms*, taught by David Karger. My duties included holding office hours, creating problem sets, grading solutions, teaching one lecture.

Oct'04–Sep'06 Coach of MIT's team for the ACM International Collegiate Programming Contest (in a committee of 2–4 coaches). Organizing team selection and practice contests, advising the team.

National Center for Information Technology (CNTI) — Chişinău, Moldova

Oct'98–Feb'99, Aug'99, Aug'00 Coach of Moldova's team for International Olympiads in Informatics (usually in a committee of 2-3 coaches). Gave lectures and organized training contests.

Honors and Awards

- MIT George M. Sprowls honorable mention for the best PhD thesis in Computer Science. 2010.
- MIT Presidential Fellowship (awarded to 125 first-year PhD students at MIT). 2005.
- National Honor Societies: Phi Beta Kappa, Tau Beta Pi, Eta Kappa Nu (member of).
- MIT ACM/IEEE Programming Competition (6.370): Third place. Designed and implemented autonomous control for virtual robots in a simulated world (in a team of three). Jan'03.
- Letter of Commendation in 6.001 (Structure and Interpretation of Computer Programs). 2001.
- Excellence scholarship of the Politehnica University of Bucharest (awarded to the best 2 to 5 students from a department). 2000.
- ACM Southeastern Europe Programming Contest: First place (in a team of three). Oct'00.
- Silver Medal at IOI'99 (International Olympiad in Informatics), Turkey. Oct'99.
- Silver Medal at IOI'98, Portugal. Sep'98.
- Bronze Medal at IOI'97, Republic of South Africa. Dec'97.
- Moldova's National Olympiads in Informatics: first place each year during 1995–1999.
- Romania's National Olympiads in Informatics: first-degree prize each year during 1995–1999.
- Belarus's National Olympiad in Informatics: first place in 1999.

- Moldova's National Olympiad in Mathematics: first place in 1999.

Refereed Publications

- **Width of Points in the Streaming Model** (with Huy L. Nguyen).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2012.
- **Streaming Algorithms via Precision Sampling** (with Robert Krauthgamer, Krzysztof Onak).
  In *Proceedings of the Symposium on Foundations of Computer Science* **(FOCS)**, 2011.
- **Near Linear Lower Bounds for Dimension Reduction in L1** (with Moses Charikar, Ofer Neiman, Huy L. Nguyen).
  In *Proceedings of the Symposium on Foundations of Computer Science* **(FOCS)**, 2011.
- **Polylogarithmic Approximation to Edit Distance and Asymmetric Query Complexity** (with Robert Krauthgamer, Krzysztof Onak).
  In *Proceedings of the Symposium on Foundations of Computer Science* **(FOCS)**, 2010.
- **Global Alignment of Molecular Sequences via Ancestral State Reconstruction** (with Constantinos Daskalakis, Avinatan Hassidim, Sebastien Roch).
  In *Innovations in Computer Science* **(ICS)**, 2010.
- **Lower bounds for Edit Distance and Product Metrics via Poincare-Type Inequalities** (with T.S. Jayram, Mihai Pătraşcu).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2010.
- **Near-Tight Bounds for Testing Ulam Distance** (with Huy L. Nguyen).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2010.
- **Efficient sketches for Earth-Mover Distance, with applications** (with Khanh Do Ba, Piotr Indyk, David Woodruff).
  In *Proceedings of the Symposium on Foundations of Computer Science* **(FOCS)**, 2009.
- **External Sampling** (with Piotr Indyk, Krzysztof Onak, Ronitt Rubinfeld).
  In *International Colloquium on Automata, Languages and Programming* **(ICALP)**, 2009.
- **Approximating Edit Distance in Near-Linear Time** (with Krzysztof Onak).
  In *Symposium on Theory of Computation* **(STOC)**, 2009; accepted to **SIAM J. Comp.** (special issue).
- **Approximate Line Nearest Neighbor in High Dimensions** (with Piotr Indyk, Robert Krauthgamer, Huy L. Nguyen).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2009.
- **Overcoming the L1 Non-Embeddability Barrier: Algorithms for Product Metrics** (with Piotr Indyk, Robert Krauthgamer).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2009.
- **Hardness of Nearest Neighbor under ℓ_∞** (with Dorian Croitoru, Mihai Pătraşcu).
  In *Proceedings of the Symposium on Foundations of Computer Science* **(FOCS)**, 2008.
- **The Smoothed Complexity of Edit Distance** (with Robert Krauthgamer).
  In *International Colloquium on Automata, Languages and Programming* **(ICALP)**, 2008.
- **Near-Optimal Hashing Algorithms for Approximate Nearest Neighbor in High Dimensions** (with Piotr Indyk).
  In *Communications of the ACM* **(CACM)**, vol. 51, no. 1, 2008, pp. 117–122.
- **Earth Mover Distance over High-Dimensional Spaces** (with Piotr Indyk, Robert Krauthgamer).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2008.
- **The Computational Hardness of Estimating Edit Distance** (with Robert Krauthgamer).
  In **SIAM J. Comp.** *(FOCS'07 special issue)*, 2010; an extended abstract appeared in the Proceedings of the Symposium on Foundations of Computer Science **(FOCS)**, 2007.

- **Testing k-wise and Almost k-wise Independence** (with Noga Alon, Tali Kaufman, Kevin Matulef, Ronitt Rubinfeld, Ning Xie).
  In *Proceedings of the Symposium on Theory of Computation* **(STOC)**, 2007.
- **Locality-sensitive hashing using stable distributions** (with Mayur Datar, Nicole Immorlica, Piotr Indyk, Vahab Mirrokni).
  Book chapter in *Nearest Neighbor Methods in Learning and Vision: Theory and Practice*, T. Darrell and P. Indyk and G. Shakhnarovich (eds.), MIT Press, 2006.
- **Near-optimal Hashing Algorithms for Approximate Nearest Neighbor in High Dimensions** (with Piotr Indyk).
  In *Proceedings of the Symposium on Foundations of Computer Science* **(FOCS)**, 2006.
- **On Optimality of the Dimensionality Reduction Method** (with Piotr Indyk, Mihai Pătraşcu).
  In *Proceedings of the Symposium on Foundations of Computer Science* **(FOCS)**, 2006.
- **Efficient Algorithms for Substring Near Neighbor Problem** (with Piotr Indyk).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2006.
- **Graceful Service Degradation (or, How to Know your Payment is Late)** (with Jessica Staddon).
  In *Proceedings of the ACM Conference on Electronic Commerce* **(EC)**, 2005.
- **Lower Bounds for Embedding of Edit Distance into Normed Spaces** (with Michel Deza, Anupam Gupta, Piotr Indyk, Sofya Raskhodnikova).
  In *Proceedings of the Symposium on Discrete Algorithms* **(SODA)**, 2003.

Other Publications and Manuscripts

- **Better Bounds for Frequency Moments in Random-Order Streams** (with Andrew McGregor, Krzysztof Onak, Rina Panigrahy). CoRR abs/0808.2222, 2008.
- **Corrigendum to "Efficient similarity search and classification via rank aggregation" by Ronald Fagin, Ravi Kumar and D. Sivakumar (proc. SIGMOD'03)** (with Ronald Fagin, Ravi Kumar, Mihai Pătraşcu, D. Sivakumar).
  In *Proceedings of ACM SIGMOD Conference* **(SIGMOD)**, 2008.
- **An evaluation of exhaustive testing for data structures** (with Darko Marinov, Dumitru Daniliuc, Sarfraz Khurshid, Martin Rinard). *Technical Report MIT-LCS-TR-921, MIT CSAIL, Cambridge, MA*, 2003

Invited Talks

Excluding conference presentations.

- Workshop on Information Theory and Statistics for Large Alphabets, Banff, Canada. October 2011 (upcoming).
- Probabilistic Reasoning in Quantitative Geometry Workshop, MSRI, Berkeley, CA. September 2011.
- International Symposium on Mathmatical Foundations of Computer Science (invited speaker), Warsaw, Poland. August 2011.
- Synergies in Lower Bounds Workshop, MADALGO, Aarhus, Denmark. June 2011.
- Design and Analysis of Randomized and Approximation Algorithms, Dagstuhl, Germany. June 2011.
- Sublinear Algorithms Workshop, Bertinoro, Italy. May 2011.
- Workshop on Embeddings, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK. January 11.
- University of Washington, Seattle, WA. November 2010.
- Barriers in Computational Complexity Workshop II, Princeton, NJ. August 2010.

- AT&T Research, Florham Park, NJ. May 2010.
- NY Area Theory Day (Spring'10), Columbia, NY. May 2010.
- IBM T.J. Watson Research Center, Yorktown Heights, NY. December 2009.
- Courant Institute, NYU, New York, NY. November 2009.
- Center for Computational Intractability, Princeton, NJ. November 2009.
- Princeton University, Princeton, NJ. October 2009.
- Algorithms&Complexity Seminar, MIT, Cambridge, MA. May 2009.
- UC San Diego, La Jolla, CA. April 2009.
- DIMACS Workshop on Streaming, Coding, and Compressive Sensing: Unifying Theory and Common Applications to Sparse Signal/Data Analysis and Processing, Rutgers University, NJ. March 2009.
- Microsoft Research SVC, Mountain View, CA. March 2009.
- TTI-C, Chicago, IL. February 2009.
- CMU, Pittsburgh, PA. February 2009.
- Microsoft Research New England, Cambridge, MA. January 2009.
- Workshop on Mathematics of String Spaces and Algorithmic Applications, Banff, Canada. January 2009.
- Workshop on Quantitative and Computational Aspects of Metric Geometry, IPAM, UCLA, Los Angeles, CA. January 2009.
- University of Michigan, Ann Arbor, MI. December 2008.
- Courant Institute, NYU, New York, NY. November 2008.
- Workshop on Geometry and Algorithms, Princeton, NJ. October 2008.
- China Theory Week 2008, Tsinghua University, Beijing, China. September 2008.
- Weizmann Institute, Rehovot, Israel. September 2008.
- Workshop on Sublinear Algorithms, Dagstuhl, Germany. August 2008.
- Microsoft Research SVC, Mountain View, CA. May 2008.
- Brown University, Providence, RI. April 2008.
- Princeton University, Princeton, NJ. March 2008.
- Algorithms&Complexity Seminar, MIT, Cambridge, MA. March 2008.
- Université Libre de Bruxelles, Brussels, Belgium. January 2008.
- China Theory Week 2007, Tsinghua University, Beijing, China. (By proxy.) September 2007.
- IBM Almaden Research Center, San Jose, CA. May 2007.
- Penn State University, State College, PA. May 2007.
- Algorithms&Complexity Seminar, MIT, Cambridge, MA. March 2007.
- AT&T Research, Florham Park, NJ. September 2006.
- IBM Almaden Research Center, San Jose, CA. August 2006.
- Palo Alto Research Center, Palo Alto, CA. July 2005.
- DIMACS Workshop on Theft in E-Commerce: Content, Identity, and Service. April 2005.

Service

Program Committee member of ESA'12 experimental track (upcoming).

Member of NSF panel (spring 2011).

Program Committee member of STOC'11.

Program Committee member of CPM'11.

Co-organizer of the Workshop on Embeddings as part of the Discrete Analysis programme at the Isaac Newton Institute for Mathematical Sciences, Cambridge, UK. Jan'11.

Program Committee member of RANDOM'10.

Student organizer of the MIT Theory of Computation Colloquium. Jan'07–May'08.

Reviewing for: STOC, FOCS, SODA, SoCG, COLT, RANDOM, ALENEX, ESA, PODS, CIKM, RSA-CT; J. ACM, SICOMP, JoCG, Information & Computation, IEEE Info. Theory, IPL, Algorithmica, IEEE Trans. on Computers, TPAMI, Random Structures and Algorithms.