Alexandr Andoni

Title: Associate Professor, Dept. of Computer Science
Website: http://www.mit.edu/~andoni
Phone: 212 853 0685, Email: andoni@cs.columbia.edu

Research Interests

Theoretical Computer Science, with a particular focus on: algorithmic foundations of massive data, sublinear algorithms, high-dimensional computational geometry, and metric embeddings.

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.

Career History

Columbia University, Dept. of Computer Science — New York, NY

2015– Associate Professor. Member of the Data Science Institute.

UCB/Simons Institute for the Theory of Computing — Berkeley, CA

2014–'15 Visiting scientist.
Long-term participant in: Theoretical Foundations of Big Data Analysis (Fall'13), Algorithmic Spectral Graph Theory (Fall'14), Information Theory (Spring'15).

Microsoft Research Silicon Valley — Mountain View, CA

2010–'14 Researcher.

Princeton U/Center for Computational Intractability — Princeton, NJ

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

Microsoft Research Silicon Valley — Mountain View, CA

Summer'08 Research intern.

IBM Almaden Research Center — San Jose, CA

Summer'07, '06 Research intern.

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.

Microsoft Corporation — Redmond, WA

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

MIT, CSAIL — Cambridge, MA

Spring'04, June'02 — Undergraduate researcher for Piotr Indyk.

2001–'02 — Undergraduate researcher for Martin Rinard (co-supervised by Darko Marinov and Sarfraz Khurshid).

Teaching

Columbia University, Dept. of Computer Science — New York, NY

Spring'19 — COMS E6998-9 *Algorithms for Massive Data*. Enrollment: 42.

August'18 — Taught lectures on sublinear algorithmic tools at the *TRIPODS Bootcamp Lectures* (as co-organizer).

Spring'18 — CSOR 4231 *Analysis of Algorithms*. Enrollment: 119 (001 section) and 26 (H01 section). Evaluation of course overall quality: 4.64 mean, 4.6 mean. Evaluation of instruction overall quality: 4.57 mean, 4.6 mean.

Fall'17 — COMS E6998-5 *Algorithms through Geometric Lens*. Enrollment: 22. Evaluation of course overall quality: 4.75 mean. Evaluation of instruction overall quality: 4.88 mean.

Spring'17 — COMS W4995-3 *Advanced Algorithms*. Enrollment: 43. Evaluation of course overall quality: 4.62 mean. Evaluation of instruction overall quality: 4.71 mean.

Fall'16 — CSOR 4231 *Analysis of Algorithms*. Enrollment: 104. Evaluation of course overall quality: 4.47 mean. Evaluation of instruction overall quality: 4.50 mean.

Fall'15 — COMS 6998-9 *Algorithmic Techniques for Massive Data*. Enrollment: 20. Evaluation of course overall quality: 4.38 mean. Evaluation of instruction overall quality: 4.54 mean.

MADALGO Center for Massive Data Algorithmics — Aarhus, Denmark

August'15 — Taught lectures on sketching and nearest neighbor search during the *MADALGO Summer School on Streaming*. (By invitation.)

International school of Mathematics "Guido Stampacchia" — Erice, Italy

September'14 — Taught lectures on "Sampling in Graphs" at the *Graph Theory, Algorithms and Applications (3rd edition)* summer school. (By invitation.)

University of Copenhagen — Copenhagen, Denmark

July'14 — Taught lectures on high dimensional geometry at the *Summer School on Hashing: Theory and Practice*. (By invitation.)

Moscow State University — Moscow, Russia

August'13 — Taught lectures on "Sketching, Sampling, and other Sublinear Algorithms" at the *School on ALgorithms for MAssive DAta (ALMADA)*. (By invitation.)

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*. (By invitation.)

MIT, EECS Department — Cambridge, MA

Fall'07 — Teaching Assistant (Head TA) for 6.046, *Introduction to Algorithms*, taught by Ronitt Rubinfeld and Madhu Sudan.

Fall'04	Teaching Assistant for 6.854, *Advanced Algorithms*, taught by David Karger.
Oct'04–Sep'06	Coach of MIT's team for the ACM International Collegiate Programming Contest (in a committee of 2–4 coaches).

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.

Grants

Current:

- NSF TRIPODS. "TRIPODS: From Foundations to Practice of Data Science and Back ". Role: co-PI. Period: 3 years starting Sep'17. Total amount: $1,500,000. PI: John Wright, co-PIs: David Blei, Qiang Du, Daniel Hsu.
- Simons Foundation: Mathematics and Physical Sciences—Simons Collaboration on Algorithms and Geometry. Role: coPI. Period: 2 years starting Jul'16, and renewed futher 3 years. Total amount (for me): $80,000 per year, plus group postdoc support. Lead PI is Assaf Naor (Princeton), and other coPIs are Sanjeev Arora (Princeton), Tim Austin (NYU), Mark Braverman (Princeton), Jeff Cheeger (NYU), Subhash Khot (NYU), Bruce Kleiner (NYU), Ran Raz (Princeton), Oded Regev (NYU), Mike Saks (Rutgers), Amit Singer (Princeton), David Steurer (Cornell).
- NSF: CCF Algorithmic Foundations. "AF:Small: Nearest Neighbor Search in High Dimensional Spaces". Role: single PI. Period: 3 years starting Sep'16. Total amount: $449,959.
- Google: Faculty Research Award. "Data-Dependent Hashing for Near Neighbor Search: Bridging Theory and Practice". Role: single PI. Period: starting 2016 (no expiration). Total amount: $45,572.50 (gift).

Past:

- US-Israel BSF (Binational Science Foundation) grant. "Algorithms for Data Analysis under Sparsity Constraints". Role: consultant[1]. Period: 2011–2015. Total amount: $153,060; my portion was $0 (implicitly just covered my collaborative visits to Israel). Lead PI was Robert Krauthgamer (Weizmann Institute, Israel), and co-PI was Piotr Indyk (MIT).

Selected Honors and Awards

- Paper C5 was named a 2006 classic paper in the field of Theoretical Computer Science by Google Scholar (the most cited 2006 paper in the field).
- Google Faculty Research Award, 2016.
- Invitation to the inaugural "Breakthrough Research" section of the Communications of the ACM (C5).
- Special issue invitations: SODA'17, STOC'15, SODA'12, FOCS'10, STOC'09, FOCS'07.

Organizational Activities

- Co-organizer of the New York Area Theory Day (a day-long workshop twice a year), New York. Starting December'15.
- Co-organizer of the Columbia DSI/TRIPODS Deep Learning Workshop, New York, NY. Mar'19.
- Co-organizer of the "Fast Iterative Methods in Optimization" workshop in the "Bridging Continuous and Discrete Optimization" semester-long program at the Simons Institute for the Theory of Computing, Berkeley, CA. Oct'17.

[1] Role was equivalent to that of a co-PI; my then-employer restricted me from being a co-PI.

- Organizer of the Simons Collaboration on Algorithms & Geometry Meeting (day-long workshop) on "Dimension reduction and sketching", New York. Sep'17.
- Organizer of the Simons Collaboration on Algorithms & Geometry Meeting (day-long workshop) on "Graph Algorithms and Continuous Optimization", New York. Mar'17.
- Co-organizer of the FOCS'16 Workshop/Tutorial Day, New Brunswick, NJ. Oct'16.
- Co-organizer of the STOC'16 Workshop/Tutorial Day, Boston, MA. Jun'16.
- Co-organizer of the DIMACS Workshop on "Big Data through the Lens of Sublinear Algorithms", Rutgers, NJ. Aug'15.
- Co-organizer of the "Bertinoro Workshop on Sublinear Algorithms 2014", Italy. May'14.
- Co-organizer of the "Data Structures (in memory of Mihai Pătraşcu)" workshop at FOCS'12, New Brunswick, NJ. Oct'12.
- 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.

Service

Service to Columbia University:

- MS admissions committee, Spring'19–present;
- CU representative at DIMACS Executive Committee, Spring'19–present;
- Co-chair of the DSI's Center of Foundations of Data Science, Fall'18–present;
- CS adviser for Barnard undergraduates, Fall'17–Spring'18;
- Theory seminar organizer, Spring'15–Spring'18;
- PhD admissions committee, Spring'17–Spring'18;
- MS adviser for the Machine Learning track, Spring'16–Spring'18;
- Distinguished Lecture Series committee, Fall'16–Spring'18;
- Student nominations committee, Fall'15–Spring'18;
- Hiring committee for the CS department, Fall'15–Spring'16.

Outside Service:

- Program Committee member of: SODA'20 (upcoming), FOCS'19, COLT'19, SoCG'19, COLT'18, ICALP'18, FSTTCS'17, STOC'16, ESA'16, RANDOM'15, SODA'15, FOCS'13, MASSIVE'12, APPROX'12, ESA'12 (experimental track), CPM'11, STOC'11, RANDOM'10.
- *SIAM Journal of Computing (SICOMP)* guest editor for STOC'16 special issue.
- *Transactions on Algorithms (TALG)* guest editor for SODA'15 special issue.
- *Theory of Computing (Toc)* guest editor for APPROX/RANDOM'12 special issue.
- Panelist for: National Science Foundation (NSF), 5 panels.
- Reviewer for National Science Foundation (NSF), US-Israel Binational Science Foundation (BSF), ISF, Swiss National Science Foundation (SNSF).
- Reviewer for: STOC, FOCS, SODA, NIPS, ICML, AAAI, SoCG, CCC, COLT, ICALP, PODS, DISC, SWAT, RANDOM, ALENEX, ESA, CPM, CIKM, RSA-CT; J. ACM, SICOMP, JoCG, TALG, Information & Computation, IEEE Info. Theory, IPL, Algorithmica, IEEE Trans. on Computers, TPAMI, Random Structures and Algorithms.

Public outreach:

- Simons Foundation Lecture at the Simons Foundation, New York. May'17.

Selected Invited Talks

- Keynote talk at International Conference on Similarity Search and Applications (SISAP), Tokyo, Japan. October 2016.
- Invited talk at the *Highlights of Algorithms* conference, Paris, France. June 2016.
- "Big Data Boot Camp" lectures on "Algorithmic High-Dimensional Geometry", at the Simons Institute for the Theory of Computing, Berkeley, CA. September 2013.
- Keynote talk at International Symposium on Mathematical Foundations of Computer Science, Warsaw, Poland. August 2011.

Students and postdocs supervised

Postdocs:

- Ben Cousins (2018–2019);
- Sepideh Mahabadi (2017–2018; now research assistant professor at TTI Chicago);
- Ilya Razensheyn (Fall 2017; now researcher at Microsoft Research Redmond);

Students:

- Negev Shekel-Nosatzki (started Spring'18, co-supervised).
- Kiran Vodrahalli (started Fall'17, co-supervised).
- Peilin Zhong (started Fall'16, co-supervised);
- Sandip Sinha (started Fall'16, co-supervised);

Past interns (mentored at MSR Silicon Valley, 2011–2014):

- Ilya Razenshteyn, 2014 (junior fellow of the Simons Society of Fellows; now at Microsoft Research);
- Amirali Abdullah, 2013 (postdoc at U. Michigan, now at Qualtrics);
- Grigory Yaroslavtsev, 2012 (now faculty at University of Indiana);
- Huy L Nguyen, 2011 (now faculty at Northeastern University).

Student research projects, with academic units (at Columbia University):

- Collin Burns (undergraduate), Fall'18–present;
- Ruiqi Zhong (undergraduate), Fall'18 (starting PhD at UC Berkeley);
- Nishanth Mohan (MS), Spring'17–Fall'17;
- Flora M. Park (undergraduate), Fall'16–Spring'17;
- Negev Shekel-Nosatzki (MS), Spring'16 (results published as C40, joined as a PhD student).

Service on PhD thesis committee:

- Clement Cannone (Columbia University), defended in October'17; title: "Property Testing and Probability Distributions: New Techniques, New Models, and New Goals"; position: postdoc at Stanford University.
- Soren Dahlgaard (University of Copenhagen), defended in August'17; title: "Tabulation Hashing for Large-Scale Data Processing";
- Ilya Razenshteyn (MIT), defended in June'17; title: "High-Dimensional Similarity Search and Sketching: Algorithms and Hardness" (won the *MIT George W. Sprowls Award for the outstanding Ph.D. thesis*); position: postdoc at Columbia University (as a Simons Junior Fellow), then researcher at Microsoft Research;
- Timothy Naumovitz (Rutgers), defended in September'16; title: "Very efficient approximation algorithms to edit distance problems";

- Dimitris Paparas (Columbia University), defended in August'16; title: "On the Complexity of Market Equilibria and Revenue Maximization"; position: postdoc at the University of Wisconsin-Madison;
- Aaron Bernstein (Columbia University), thesis proposal in December'15, defended in June'16; title: "Dynamic Algorithms for Shortest Paths and Matching"; position: postdoc at the University of Copenhagen, then faculty at Rutgers;
- Amirali Abdullah (U of Utah), defended in August'15; title: "Bounds for nearest neighbor algorithms and embeddings"; positions: postdoc at U. Michigan, now at Qualtrics;

Service on other student committees:

- Ji Xu, PhD thesis proposal, April'19; title "Global and Local Analysis of Non-convex Optimization";
- Antonio Khalil Moretti, PhD thesis proposal, January'19; title: "Variational Methods for Inferring Spatial Statistics and Nonlinear Dynamical Systems";
- Mehmet Kerem Turkcan, defended MS thesis in December'16; title: "Topics in Landmarking and Elementwise Mapping";
- Jinyu Xie, candidacy exam and PhD thesis proposal.

Self-funded student visitors:

- Ilya Razenshteyn (PhD student at MIT), Spring'16 semester.

Publications: Book chapters & Surveys

B4. **Approximate Nearest Neighbor Search in High Dimensions**
by Alexandr Andoni, Piotr Indyk, Ilya Razenshteyn.
In Proceedings of the *International Congress of Mathematicians*, 2018.

B3. **Nearest neighbors in high-dimensional spaces**
by Alexandr Andoni, Piotr Indyk.
Book chapter in *Handbook of Discrete and Computational Geometry (3rd edition)*, Jacob E. Goodman, Joseph O'Rourke, and Csaba D. Tóth (eds), CRC Press LLC, 2017.

B2. **High-dimensional computational geometry**
by Alexandr Andoni.
Book chapter in *Handbook on Big Data*, Peter Buhlmann, Petros Drineas, Michael Kane, Mark van der Laan (eds.), CRC Press, 2016.

B1. **Locality-sensitive hashing using stable distributions**
Alexandr Andoni, 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.

Publications: conference proceedings

Co-authors are in alphabetical order. Co-authors are dashed when students, and are underlined when students/interns that were under my supervision in the past.

C50. **Attribute-efficient learning of monomials over highly-correlated variables**
by Alexandr Andoni, Rishabh Dudeja, Daniel Hsu, Kiran Vodrahalli.
In **ALT** *(International Conference on Algorithmic Learning Theory)*, 2019.

C49. **On Solving Linear Systems in Sublinear Time**
by Alexandr Andoni, Robert Krauthgamer, Yosef Pogrow.
In **ITCS** *(Innovations in Theoretical Computer Science)*, 2019.

C48. **Parallel Graph Connectivity in Log Diameter Rounds**
by Alexandr Andoni, Zhao Song, Clifford Stein, Zhengyu Wang, Peilin Zhong.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2018.

C47. **Holder Homeomorphisms and Approximate Nearest Neighbors**
by Alexandr Andoni, Assaf Naor, Aleksandar Nikolov, Ilya Razenshteyn, Erik Waingarten.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2018.

C46. **Subspace Embedding and Linear Regression with Orlicz Norm**
by Alexandr Andoni, Chengyu Lin, Ying Sheng, Peilin Zhong, Ruiqi Zhong.
In **ICML** *(International Conference on Machine Learning)*, 2018.

C45. **Data-Dependent Hashing via Nonlinear Spectral Gaps**
by Alexandr Andoni, Assaf Naor, Aleksandar Nikolov, Ilya Razenshteyn, Erik Waingarten.
In **STOC** *(Symposium on Theory of Computation)*, 2018.

C44. **Correspondence retrieval**
by Alexandr Andoni, Daniel Hsu, Kevin Shi, and Xiaorui Sun.
In **COLT** *(Conference On Learning Theory)*, 2017.

C43. **Approximate Near Neighbors for General Symmetric Norms**
by Alexandr Andoni, Huy L. Nguyen, Aleksandar Nikolov, Ilya Razenshteyn, Erik Waingarten.
In **STOC** *(Symposium on Theory of Computation)*, 2017.

C42. **High Frequency Moments via Max-Stability**
by Alexandr Andoni.
In **ICASSP** *(International Conference on Acoustics, Speech, and Signal Processing)*, special session on *Random Embeddings and Geometry-Preserving Dimensionality Reduction*, 2017.

C41. **Optimal Hashing-based Time-Space Trade-offs for Approximate Near Neighbors**
by Alexandr Andoni, Thijs Laarhoven, Ilya Razenshteyn, Erik Waingarten.
In **SODA** *(Symposium on Discrete Algorithms)*, 2017.
Invited to **T.Alg.** special issue.

C40. **LSH Forest: Practical Algorithms Made Theoretical**
by Alexandr Andoni, Ilya Razenshteyn, Negev Shekel–Nosatzki.
In **SODA** *(Symposium on Discrete Algorithms)*, 2017.

C39. **Impossibility of Sketching of the 3D Transportation Metric with Quadratic Cost**
by Alexandr Andoni, Assaf Naor, Ofer Neiman.
In **ICALP** *(International Colloquium on Automata, Languages and Programming)*, 2016.

C38. **Tight Lower Bounds for Data-Dependent Locality-Sensitive Hashing**
by Alexandr Andoni, Ilya Razenshteyn.
In **SoCG** *(International Symposium on Computational Geometry)*, 2016.

C37. **On Sketching Quadratic Forms**
by Alexandr Andoni, Jiecao Chen, Robert Krauthgamer, Bo Qin, David P. Woodruff, and Qin Zhang.
In **ITCS** *(Innovations in Theoretical Computer Science)*, 2016.

C36. **Interacting with Large Distributed Datasets Using Sketch**
by Mihai Budiu, Rebecca Isaacs, Derek Murray, Gordon Plotkin, Paul Barham, Samer Al-Kiswany, Yazan Boshmaf, Qingzhou Luo, Alexandr Andoni.
In Eurographics Symposium on Parallel Graphics and Visualization, 2016.

C35. **Practical and Optimal LSH for Angular Distance**
by Alexandr Andoni, Piotr Indyk, Thijs Laarhoven, Ilya Razenshteyn, and Ludwig Schmidt.
In **NIPS** *(Conference on Neural Information Processing Systems)*, 2015.

C34. **Optimal Data-Dependent Hashing for Approximate Near Neighbors**
by Alexandr Andoni, Ilya Razenshteyn.
In **STOC** *(Symposium on Theory of Computation)*, 2015.

C33. **Sketching and Embedding are Equivalent for Norms**
by Alexandr Andoni, Robert Krauthgamer and Ilya Razenshteyn.
In **STOC** *(Symposium on Theory of Computation)*, 2015.
Invited to **SICOMP** special issue (in submission).

C32. **Spectral Approaches to Nearest Neighbor Search**
by Amirali Abdullah, Alexandr Andoni, Ravi Kannan, Robert Krauthgamer.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2014.

C31. **Learning Polynomials with Neural Networks**
by Alexandr Andoni, Rina Panigrahy, Gregory Valiant, Li Zhang.
In **ICML** *(International Conference on Machine Learning)*, 2014.

C30. **Parallel Algorithms for Geometric Graph Problems**
by Alexandr Andoni, Aleksandar Nikolov, Krzysztof Onak, Grigory Yaroslavtsev.
In **STOC** *(Symposium on Theory of Computation)*, 2014.

C29. **Beyond Locality Sensitive Hashing**
by Alexandr Andoni, Piotr Indyk, Huy L. Nguyen, Ilya Razenshteyn.
In **SODA** *(Symposium on Discrete Algorithms)*, 2014.

C28. **Towards $(1+\epsilon)$-Approximate Flow Sparsifiers**
by Alexandr Andoni, Robert Krauthgamer, Anupam Gupta.
In **SODA** *(Symposium on Discrete Algorithms)*, 2014.

C27. **Learning Sparse Polynomial Functions**
by Alexandr Andoni, Rina Panigrahy, Gregory Valiant, Li Zhang.
In **SODA** *(Symposium on Discrete Algorithms)*, 2014.

C26. **Tight Lower Bound for Linear Sketches of Moments**
by Alexandr Andoni, Huy L. Nguyen, Yury Polyanskiy, Yihong Wu.
In **ICALP** *(International Colloquium on Automata, Languages and Programming)*, 2013.

C25. **Homomorphic Fingerprints under Misalignments: Sketching Edit and Shift Distances**
by Alexandr Andoni, Assaf Goldberger, Andew McGregor, Ely Porat.
In **STOC** *(Symposium on Theory of Computation)*, 2013.

C24. **Shift Finding in Sub-linear Time**
by Alexandr Andoni, Haitham Hassanieh, Piotr Indyk, Dina Katabi.
In **SODA** *(Symposium on Discrete Algorithms)*, 2013.

C23. **Eigenvalues of a Matrix in the Streaming Model**
by Alexandr Andoni, Huy L. Nguyen.
In **SODA** *(Symposium on Discrete Algorithms)*, 2013.

C22. **Width of Points in the Streaming Model**
by Alexandr Andoni, Huy L. Nguyen.
In **SODA** *(Symposium on Discrete Algorithms)*, 2012.
Invited to **T.Alg.** special issue (appears as J6).

C21. **Streaming Algorithms via Precision Sampling**
by Alexandr Andoni, Robert Krauthgamer, Krzysztof Onak.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2011.

C20. **Near Linear Lower Bounds for Dimension Reduction in L1**
by Alexandr Andoni, Moses Charikar, Ofer Neiman, Huy L. Nguyen.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2011.

C19. **Polylogarithmic Approximation to Edit Distance and Asymmetric Query Complexity**
by Alexandr Andoni, Robert Krauthgamer, Krzysztof Onak.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2010.
Invited to **SIAM J. Comp.** special issue (declined); full version as `arxiv.org/abs/1005.4033`.

C18. **Global Alignment of Molecular Sequences via Ancestral State Reconstruction**
by Alexandr Andoni, Constantinos Daskalakis, Avinatan Hassidim, Sebastien Roch.
In **ICS** *(Innovations in Computer Science)*, 2010.

C17. **Lower bounds for Edit Distance and Product Metrics via Poincare-Type Inequalities**
by Alexandr Andoni, T.S. Jayram, Mihai Pătraşcu.
In **SODA** *(Symposium on Discrete Algorithms)*, 2010.

C16. **Near-optimal Sublinear Time Algorithms for Ulam Distance**
by Alexandr Andoni, Huy L. Nguyen.
In **SODA** *(Symposium on Discrete Algorithms)*, 2010.

C15. **Efficient sketches for Earth-Mover Distance, with applications**
by Alexandr Andoni, Khanh Do Ba, Piotr Indyk, David Woodruff.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2009.

C14. **External Sampling**
by Alexandr Andoni, Piotr Indyk, Krzysztof Onak, Ronitt Rubinfeld.
In **ICALP** *(International Colloquium on Automata, Languages and Programming)*, 2009.

C13. **Approximating Edit Distance in Near-Linear Time**
by Alexandr Andoni, Krzysztof Onak.
In **STOC** *(Symposium on Theory of Computation)*, 2009.
Invited to **SIAM J. Comp.** special issue (appears as J5).

C12. **Approximate Line Nearest Neighbor in High Dimensions**
by Alexandr Andoni, Piotr Indyk, Robert Krauthgamer, Huy L. Nguyen.
In **SODA** *(Symposium on Discrete Algorithms)*, 2009.

C11. **Overcoming the L1 Non-Embeddability Barrier: Algorithms for Product Metrics**
by Alexandr Andoni, Piotr Indyk, Robert Krauthgamer.
In **SODA** *(Symposium on Discrete Algorithms)*, 2009.

C10. **Hardness of Nearest Neighbor under ℓ_∞**
by Alexandr Andoni, Dorian Croitoru, Mihai Pătraşcu.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2008.
Invited to **Discrete & Computational Geometry** (declined).

C9. **The Smoothed Complexity of Edit Distance**
by Alexandr Andoni, Robert Krauthgamer.
In **ICALP** *(International Colloquium on Automata, Languages and Programming)*, 2008.
Journal version appears as J4.

C8. **Earth Mover Distance over High-Dimensional Spaces**
by Alexandr Andoni, Piotr Indyk, Robert Krauthgamer.
In **SODA** *(Symposium on Discrete Algorithms)*, 2008.

C7. **The Computational Hardness of Estimating Edit Distance**
by Alexandr Andoni, Robert Krauthgamer.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2007.
Invited to **SIAM J. Comp.** special issue (appears as J2).

C6. **Testing k-wise and Almost k-wise Independence**
by Noga Alon, Alexandr Andoni, Tali Kaufman, Kevin Matulef, Ronitt Rubinfeld, Ning Xie.
In **STOC** *(Symposium on Theory of Computation)*, 2007.

C5. **Near-optimal Hashing Algorithms for Approximate Nearest Neighbor in High Dimensions**
by Alexandr Andoni, Piotr Indyk.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2006.
Invited to **C.ACM** Research Highlights (appears as J1).

C4. **On Optimality of the Dimensionality Reduction Method**
by Alexandr Andoni, Piotr Indyk, Mihai Pătraşcu.
In **FOCS** *(Symposium on Foundations of Computer Science)*, 2006.

C3. **Efficient Algorithms for Substring Near Neighbor Problem**
by Alexandr Andoni, Piotr Indyk.
In **SODA** *(Symposium on Discrete Algorithms)*, 2006.

C2. **Graceful Service Degradation (or, How to Know your Payment is Late)**
by Alexandr Andoni, Jessica Staddon.
In **EC** *(Conference on Electronic Commerce)*, 2005.

C1. **Lower Bounds for Embedding of Edit Distance into Normed Spaces**
by Alexandr Andoni, Michel Deza, Anupam Gupta, Piotr Indyk, Sofya Raskhodnikova.
In **SODA** *(Symposium on Discrete Algorithms)*, 2003.

Publications: journals

J7. **Universalité des espaces de Wasserstein à floconnage près (Eng. Snowflake Universality of Wasserstein Spaces)**
by Alexandr Andoni, Assaf Naor, Ofer Neiman.
Annales scientifiques de l'ENS (Eng. Scientific Annals of ENS), accepted, 2017.

J6. **Width of Points in the Streaming Model**
by Alexandr Andoni, Huy L. Nguyen.
T.Alg. (ACM Transactions on Algorithms, SODA special issue), 12(1):5, 2016.

J5. **Approximating Edit Distance in Near-Linear Time**
by Alexandr Andoni, Krzysztof Onak.
SICOMP (SIAM J. Comp., STOC special issue), 41(6):1635–1648, 2012.

J4. **The Smoothed Complexity of Edit Distance**
by Alexandr Andoni, Robert Krauthgamer.
T.Alg. (ACM Transactions on Algorithms), 8(4):44, 2012.

J3. **Global Alignment of Molecular Sequences via Ancestral State Reconstruction**
by Alexandr Andoni, Constantinos Daskalakis, Avinatan Hassidim, Sebastien Roch.
Stochastic Processes and their Applications, 122:3852–3874, 2012.

J2. **The Computational Hardness of Estimating Edit Distance**
by Alexandr Andoni, Robert Krauthgamer.
SICOMP (SIAM J. Comp., FOCS special issue), 39(6):2398-2429, 2010.

J1. **Near-optimal Hashing Algorithms for Approximate Nearest Neighbor in High Dimensions**
by Alexandr Andoni, Piotr Indyk.
CACM (Communications of the ACM), 51(1):117–122, 2008. .

Non-refereed Publications

M3. **Phylogenetic Reconstruction with Insertions and Deletions**
by Alexandr Andoni, Mark Braverman, Avinatan Hassidim.
Manuscript, available at `http://www.mit.edu/~andoni/papers/phylo.pdf`, 2010.

M2. **Corrigendum to "Efficient similarity search and classification via rank aggregation" by Ronald Fagin, Ravi Kumar and D. Sivakumar (proc. SIGMOD'03)**
by Alexandr Andoni, Ronald Fagin, Ravi Kumar, Mihai Pătraşcu, D. Sivakumar.
In **SIGMOD**, 2008.

M1. **An evaluation of exhaustive testing for data structures**
by Darko Marinov, Alexandr Andoni, Dumitru Daniliuc, Sarfraz Khurshid, Martin Rinard.
Technical Report MIT-LCS-TR-921, MIT CSAIL, Cambridge, MA, 2003.

Invited Talks

[since the graduation, excluding invited lectures listed in the *Teaching* section]

- *Upcoming:* May'19: tutorial (by invitation) at ICASSP'19 on "Sketching Tools for Big Data Signal Processing", Brighton, UK; May'19: invited talk at Bertinoro workshop on Fine-Grained Approximation Algorithms & Complexity, Bertinoro, Italy.
- Feb'19: invited talk at the *Information Theory and Applications Workshop*, UCSD, La Jolla. Title: "Two Party Distribution Testing: Communication and Security".
- Nov'18: invited talk at the *Sublinear Algorithms and Nearest-Neighbor Search workshop*, Simons Institute, UC Berkeley. Title: "Spectral Partitioning for Metrics (And NNs Too)".
- Nov'18: invited talk at the New York Colloquium on Algorithms and Complexity (NYCAC), New York. Title: "Spectral partitions for metrics & nearest neighbor search".
- Aug'18: invited talk at the *TRIPODS/DIMACS sponsored workshop on Optimization in Machine Learning*, Lehigh Univesity, PA. Title: "Spectral partitions for metrics & nearest neighbor search".
- Jun'18: invited tutorial at the *Sublinear Algorithms Bootcamp and Workshop*, Cambridge, MA. Title: "Sketching as a Tool for Fast Algorithm Design".
- Feb'17: invited seminar talk at the Center for Theoretical Neuroscience, Columbia University. Title: "Sketching for efficient data representation".
- Jan'17: invited talk at Spotify, New York. Title: "Data-dependent Hashing for Similarity Search".
- Dec'17: invited talk at the NIPS'17 workshop on *Optimal Transport and Machine Learning*, Los Angeles, CA. Title: "Optimal planar transport in near-linear time".
- Aug'17: invited seminar talk at the University of Copenhagen, Copenhagen, Denmark. Title: "Approximate Near Neighbors for General Symmetric Norms".
- May'17: invited talk at the AMS Spring Eastern Sectional Meeting, New York. Title: "Embeddings of Symmetric Normed Spaces with Applications".
- May'17: invited talk at the Dagstuhl workshop on *Theory and Applications of Hashing*, Dagstuhl, Germany. Title: "Beyond Locality-Sensitive Hashing".
- Apr'17: invited talk at the Midwest Theory Day, Bloomington, IN. Title: "Near Neighbor Search under General Symmetric Distances".
- Mar'17: invited seminar talk at the University of Pennsylvania, Philladelphia, PA. Title: "Sketching complexity of graph cuts".
- Feb'17: invited talk at the *Information Theory and Applications Workshop*, UCSD, La Jolla. Title: "Near neighbor search under general (symmetric) distances".
- Jan'17: invited seminar talk at the Institute for Advanced Studies, Princeton, NJ. Title: "Sketching and Embedding are Equivalent for Norms".
- Nov'16: invited talk at the New York Colloquium on Algorithms and Complexity (NYCAC), New York. Title: "Optimal Hashing for High-Dimensional Spaces".
- Nov'16: invited talk at the Dagstuhl workshop on *Structure and Hardness in P*, Dagstuhl, Germany. Title: "Optimal Hashing for High-Dimensional Spaces".
- Oct'16: invited seminar talk at MIT. Title: "Optimal Hashing for High-Dimensional Spaces".
- Apr'16: invited seminar talk at NYU. Title: "Parallel Algorithms for Geometric Graph Problems".
- Mar'16: invited tutorial at the *Nexus of Information and Computation Theories*, Institute Henri Poincare, Paris, France. Title: "Sketching and Embeddings".
- Mar'16: invited talk at the Dagstuhl workshop on *Data Structures and Advanced Models of Computation on Big Data*, Dagstuhl, Germany. Title: "Parallel Algorithms for Geometric Graph Problems".
- Feb'16: invited talk at the *Information Theory and Applications Workshop*, UCSD, La Jolla. Title: "Learning polynomials with neural networks".

- Jan'16: invited talk at the *Workshop on Multi-dimensional Proximity Problems*, University of Maryland. Title: "Data-dependent hashing for approximate near neighbors".
- Jan'16: invited talk at the *Sublinear Algorithms Workshop*, Johns Hopkins University. Title: "Sketching and Embedding are Equivalent".
- Dec'15: invited seminar talk at the University of Pennsylvania. Title: "Data-dependent hashing for nearest neighbor search".
- Dec'15: invited talk at the *Computational Complexity of Low-Polynomial Time Problems workshop*, Simons Institute, UC Berkeley. Title: "Optimal data-dependent hashing for nearest neighbor search".
- Oct'15: invited seminar talk at the Rutgers University. Title: "Data-dependent hashing for nearest neighbor search".
- Jun'15: invited talk at the workshop *Theory Day in Computer Science*, adjoint to the *Computability in Europe* conference, Bucharest, Romania. Title: "Nearest neighbor search".
- Jun'15: invited seminar talk at the Warsaw University, Poland. Title: "Data-dependent hashing for nearest neighbor search".
- Apr'15: invited talk at the TTI Chicago. Title: "Algorithmic design via efficient data representations".
- Apr'15: invited talk at the *BIRS Banff Unified Treatment of Dynamic Graph Workshop*, Banff, Canada. Title: "On Sketching Quadratic Forms".
- Mar'15: invited talk at Microsoft Research, Redmond. Title: "Algorithmic design via efficient data representations".
- Mar'15: invited talk at Boston University. Title: "Algorithmic design via efficient data representations".
- Mar'15: invited talk at ETH. Title: "Algorithmic design via efficient data representations".
- Mar'15: invited talk at University of Waterloo. Title: "Algorithmic design via efficient data representations".
- Mar'15: invited talk at EPFL. Title: "Algorithmic design via efficient data representations".
- Mar'15: invited talk at Toronto University. Title: "Algorithmic design via efficient data representations".
- Mar'15: invited talk at Columbia University. Title: "Algorithmic design via efficient data representations".
- Feb'15: invited talk at UC Berkeley. Title: "Algorithmic design via efficient data representations".
- Feb'15: invited talk at Gergia Tech. Title: "Algorithmic design via efficient data representations".
- Feb'15: invited talk at UIUC. Title: "Algorithmic design via efficient data representations".
- Feb'15: invited talk at the *Information Theory and Applications Workshop*, UCSD, La Jolla. Title: "Optimal Data-Dependent Hashing for Nearest Neighbors".
- Jan'15: invited talk at UCLA. Title: "Algorithmic design via efficient data representations".
- Jan'15: invited talk at UT Austin. Title: "Algorithmic design via efficient data representations".
- Dec'14: invited talk at the *Big Data Reunion Workshop*, Simons Institute, Berkeley. Title: "Spectral Approaches to Nearest Neighbor Search".
- Nov'14: invited talk at the Simons Institute, Berkeley. Title: "Learning Polynomials over Reals".
- Nov'14: invited talk at the Sandia National Labs. Title: "Similarity Search Algorithms".
- Oct'14: invited seminar talk at MIT. Title: "Sketching complexity of graph cuts".
- Jun'14: invited talk at the *Workshop on Algorithms for Modern Massive Data Sets*, Berkeley. Title: "Beyond Locality Sensitive Hashing".
- May'14: invited talk at the *Sublinear Algorithms Workshop*, Bertinoro, Italy. Title: "Parallel Algorithms for Geometric Graph Problems".

- May'14: invited talk at the University of Warwick. Title: "Parallel Algorithms for Geometric Graph Problems".
- May'14: invited lecture in *CS362: Algorithmic Frontiers: Effective Algorithms for Large [and Small] Data*, Stanford, CA.
- Feb'14: invited talk at the *Information Theory and Applications Workshop*, UCSD, La Jolla. Title: "Beyond Locality Sensitive Hashing".
- Feb'14: invited seminar talk at the UCSD. Title: "Parallel Algorithms for Geometric Graph Problems".
- Aug'13: invited talk at the *Real Analysis in Testing, Learning and Inapproximability Workshop*. Title: "Beyond Locality-Sensitive Hashing".
- Jun'13: invited speaker at the *Data Science Summit, by Aggregate Knowledge*, San Francisco, CA. Title: "Locality Sensitive Hashing".
- Feb'13: invited talk at the *Information Theory and Applications Workshop*, UCSD, La Jolla. Title: "Parallel Geometric Graph Algorithms".
- Oct'12: invited talk at the *Data Structures (in memory of Mihai Pătraşcu) workshop at FOCS'12*. Title: "Lower Bounds for High-Dimensional Nearest Neighbor".
- Jul'12: invited talk at the *Workshop on Algorithms for Data Streams*, Dortmund, Germany. Title: "Estimating Eigenvalues in the Streaming Model".
- Jun'12: invited speaker at the *Algorithmic Frontiers Workshop*, EPFL, Switzerland. Title: "Perspectives on Nearest Neighbor Search in High-Dimensional Spaces".
- May'12: invited talk at the *From Data to Knowledge Workshop*, UC Berkeley. Title: "Sublinear Algorithms from Precision Sampling".
- Oct'11: invited talk at the *BIRS Banff Workshop on Information Theory and Statistics for Large Alphabets*, Banff, Canada. Title: "Sublinear Algorithms via Precision Sampling".
- Sep'11: invited talk at the *Probabilistic Reasoning in Quantitative Geometry Workshop*, MSRI, Berkeley, CA. Title: "Near-Linear Lower Bound for Dimension Reduction in L1".
- Jun'11: invited talk at the *Synergies in Lower Bounds Workshop*, MADALGO, Aarhus, Denmark. Title: "Asymmetric Query Complexity for Edit Distance".
- Jun'11: invited talk at the *Design and Analysis of Randomized and Approximation Algorithms*, Dagstuhl, Germany. Title: "Sublinear Algorithms via Precision Sampling".
- Jun'11: invited talk at the *Computational Geometric Learning Workshop*, Paris, France. Title: "Nearest Neighbor Search in High-Dimensional Spaces".
- May'11: invited talk at the *Sublinear Algorithms Workshop*, Bertinoro, Italy. Title: "Sublinear Algorithms via Precision Sampling".
- Jan'11: invited talk at the *Workshop on Embeddings*, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.
- Nov'10: invited seminar talk at the University of Washington, Seattle, WA. Title: "Polylogarithmic Approximation to Edit Distance (or Asymmetric Query Complexity)".
- Aug'10: invited talk at the *Barriers in Computational Complexity Workshop II*, Princeton, NJ. Title: "Nearest Neighbor Search in High-Dimensional Spaces".
- May'10: invited talk at the AT&T Research, Florham Park, NJ.
- May'10: invited talk at the *NY Area Theory Day* (Spring'10), Columbia, NY. Title: "Polylogarithmic Approximation to Edit Distance (or Asymmetric Query Complexity)".
- Dec'09: invited talk at the IBM T.J. Watson Research Center, Yorktown Heights, NY. Title: "Beyond L1: Algorithms via Iterated Product Spaces".
- Nov'09: invited seminar talk at the Courant Institute, NYU, New York, NY. Title: "The Query Complexity of Edit Distance".

- Oct'09: invited seminar talk at the Princeton University, Princeton, NJ. Title: "The Computational Hardness of Estimating Edit Distance".