Aryeh Kontorovich **May 2023**

Curriculum Vitae and List of Publications

- **Personal Details**

Name:	Aryeh (Leonid) Kontorovich
Date of birth:	30/12/1978
Address at work:	Department of Computer Science Ben Gurion University of the Negev Beer-Sheva, 84105
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Web:	`http://www.cs.bgu.ac.il/~karyeh`

- **Education**

[1997-2001] B.A. Princeton University,
Mathematics, Applied and Computational Mathematics (with Honors).

[2002-2004] M.Sc. Carnegie Mellon University,
Computer Science.
Thesis title: "Variational Inference and Learning for a Unified Model of Syntax, Semantics and Morphology." Supervisor: Prof. John Lafferty.

[2004-2007] Ph.D. Carnegie Mellon University,
Computer Science.
Thesis title: "Measure Concentration of Strongly Mixing Processes with Applications."
Supervisor: Prof. John Lafferty.

- **Employment History**

[2020 – Present] Professor. Ben-Gurion University, Department of Computer Science, Beer-Sheva, Israel.

[2013 – 2020] Associate Professor. Ben-Gurion University, Department of Computer Science, Beer-Sheva, Israel.

[2009 – 2013] Senior Lecturer. Ben-Gurion University, Department of Computer Science, Beer-Sheva, Israel.

[2007-2009] Postdoctoral Fellow. Weizmann Institute of Science, Rehovot, Israel.

[2002-2007] Research assistant. Carnegie MellonUniversity, Pittsburgh, US.

[2001-2002] Visiting Research Fellow. Hebrew University, Jerusalem, Israel.

[1999-2000] Technical staff. Bell Labs, Murray Hill, NJ, US.

(a) Positions in academic administration

[2021 — Present] Elected to the Hiring and Promotion Committee, Department of Computer Science, Ben-Gurion University.

[2021 — 2022] Director, Data Science Research Center Ben-Gurion University.

[2020 — 2023] University program for statistical data science steering committee, Ben-Gurion University.

[2019 — 2020] Data Science Research Center steering committee, Ben-Gurion University.

[2018 — 2022] Open Days Chair. Ben-Gurion University, Department of Computer Science.

[2009 – 2018] Colloquia & Seminars Chair. Ben-Gurion University, Department of Computer Science.

[2015 – 2016] Department Treasurer. Ben-Gurion University, Department of Computer Science.

[2016 – 2017] Serving on the Curriculum Committee. Ben-Gurion University, Department of Computer Science.

[2017 – 2018] Chairing the Alumni Relations Committee. Ben-Gurion University, Department of Computer Science.

(b) Professional functions outside the academia

[2008] Technical Consultant. LNTS, Rehovot, Israel. Area: Natural Language Processing, Speech Recognition.

[2014] Visiting Scientist. Yahoo! Labs, New York, USA. Area: Machine Learning.

[2016-2017] Technical Consultant. Dokka, Tel Aviv, Israel. Area: Machine Learning.

[2017-Present] Advisory Board. Deltika Financial Services, Jerusalem, Israel. Area: Machine Learning.

[2016-Present] Advisory Board. Straterix, Tel Aviv, Israel. Area: Machine Learning.

(c) Editor or member of editorial board of scientific journals

[2013 – Present] Editorial board member of *Journal of Machine Learning Research*.

[2018 – Present] Serving (by invitation) on the Israel Council for Higher Education (CHE).

[2019 – 2021] Serving on the Algorithmic Learning Theory Steering committee.

[2020 – Present] Serving (by invitation) on the United States-Israel Binational Science Foundation (BSF) grants panel

[2021 – Present] Editorial board member of *Machine Learning Journal*.

- **Educational activities**

(a) Courses taught

[Fall 2009] "Automata and Formal Languages", BGU.
[Spring 2010] "Machine Learning Theory", BGU.
[Fall 2010] "Mini-Project: Sampling Techniques in MATLAB", BGU.
[Fall 2010] "Automata and Formal Languages", BGU.
[Spring 2011] "Machine Learning Theory", BGU.
[Spring 2011] "Mini-Project: Sampling Techniques in MATLAB", BGU.
[Fall 2011] "Automata and Formal Languages", BGU.
[Fall 2011] "Elements of Privacy and Computational Learning" (jointly with Kobbi Nissim), BGU.
[Fall 2011] "Advanced Topics in Privacy and Computational Learning" (jointly with Kobbi Nissim), BGU.
[Spring 2012] "Mini-Project: Sampling Techniques in MATLAB", BGU.
[Spring 2012] "Machine Learning", BGU.
[Spring 2012] "Automata and Formal Languages for IAF", BGU.
[Fall 2012] "Automata and Formal Languages", BGU.
[Fall 2012] "Advanced Seminar in Machine Learning", BGU.
[Spring 2013] "Machine Learning", BGU.
[Spring 2013] "Mini-Project: Sampling Techniques in MATLAB", BGU.
[Spring 2013] "Automata and Formal Languages for IAF", BGU.
[Fall 2013] "Automata and Formal Languages", BGU.
[Fall 2013] "Mini-Project: Sampling Techniques in MATLAB", BGU.
[Spring 2014] "Machine Learning", BGU.
[Spring 2014] "Mini-Project: Sampling Techniques in MATLAB", BGU.
[Spring 2014] "Automata and Formal Languages for IAF", BGU.
[Fall 2014] "Automata and Formal Languages", BGU.
[Fall 2014] "Machine Learning", BGU.
[Spring 2015] "Automata and Formal Languages for IAF"
[Spring 2015] "Introduction for Linear Programming"
[Spring 2015] "Mini-Project: Sampling Techniques in MATLAB"
[Spring 2016] "Advanced Seminar in Machine Learning"

[Fall 2016] "Automata and Formal Languages"
[Fall 2016] "Introduction to learning and analysis of big data"
[Spring 2017] "Advanced topics in machine learning II"
[Spring 2017] "Research Seminar"
[Fall 2018] "Automata and Formal Languages"
[Spring 2019] "Advanced topics in machine learning II"
[Spring 2019] "Advanced topics in machine learning: high dimensions"
[Fall 2019] "Optimization and theoretical aspects of deep learning"
[Fall 2019] "Selected chapters in high-dimensional statistics"
[Fall 2020] "Stochastic calculus with applications in learning"
[Fall 2020] "Selected chapters in statistical learning"

(b) Research students

- Ph.D. students
  1. Roi Weiss, Ph.D. defended Summer 2015.
  2. Yochai Twitto (co-advised with D. Berend), defended 2020.
  3. Geoffrey Wolfer, defended 2020.
  4. Menachem Sadigurschi, M.Sc. Started Spring 2016, switched to direct Ph.D. track, 2018. Expected completion date 2021.
  5. Idan Attias, M.Sc. started 2018, switched to direct Ph.D. track, 2020. Expected completion date 2023.
  6. Eran Kaufman (co-advised with L. Gottlieb, Ariel University), defended 2020.
  7. Aaron Koolyk, with Y. Rabani, started 2020.
  8. Matan Levi, started 2020.
- M.Sc. students
  1. Ido Aviram, M.Sc. defended May 2013.
  2. Gil Zohav (co-advised with D. Berend), M.Sc. defended May 2016.
  3. Eyal Gutflaish (co-advised with S. Sabato). M.Sc. Defended 2017.
  4. Yevgeni Korsunski, M.Sc. Defended 2017.
  5. Matan Levi, M.Sc. defended 2018.
  6. Yair Ashlagi, M.Sc. defended 2020.
  7. Moshe Noivirt, M.Sc. defended 2020.
  8. Hanan Zaichyk, M.Sc. defended 2020.
  9. Ariel Avidan, M.Sc. started 2019.
  10. Benjamin Berend, M.Sc. started 2019.
  11. Naor Radami, M.Sc. started 2019.
  12. Doron Cohen, M.Sc. started 2019.
  13. Ariel Elperin, M.Sc. defended 2021.
  14. Omer Kerem, M.Sc. started 2020.
  15. Dan Tsir Cohen, M.Sc. defended 2022.
  16. Moral Siani, M.Sc. started 2020.
  17. Tal Ohayon, M.Sc. defended 2022.
  18. Matan Adam Levi, M.Sc. started 2020.

- **Awards, citations, honors, fellowships**

(a) Honors, awards

[2019] Amazon Research Award: "Advanced Proximity-Based Learning Toolkit for SageMaker". 80000 USD unrestricted gift plus 20000 AWS credit.

[2019] Google award: 12000 USD unrestricted gift for "Adversarial Examples and Ways to Mitigate Them".

[2017] Toronto prize for excellence in research.

[2014] NIPS 2014 Outstanding Reviewer Award.

[2013] Yahoo! Faculty Research and Engagement award, 20000 USD unrestricted gift.

[2007] Distinguished Contribution Award, The 5th International Workshop on Mining and Learning with Graphs (MLG).

(b) Fellowships

[2012] Boston University Hariri Fellow.

- **Scientific publications**

(a) Refereed articles in scientific journals

1. H. Pratt, A. Polyakov, A. Kontorovich. "Evidence for Separate Processing in the Human Brainstem of Interaural Intensity and Temporal Disparities for Sound Lateralization." *Hearing Research* 108:1-8, 1997.
2. A. Kontorovich. "Uniquely Decodable n-gram Embeddings." *Theoretical Computer Science* 329(1-3):271-284, 2004.
3. A. Kontorovich, K. Ramanan. "Concentration Inequalities for Dependent Random Variables via the Martingale Method." *Annals of Probability* 36(6):2126-2158, 2008.
4. A. Kontorovich, C. Cortes, M. Mohri. "Kernel Methods for Learning Languages." **Invited** to *Theoretical Computer Science* 405:223-236, 2008.
5. A. Kontorovich. "Constructing processes with prescribed mixing coefficients." *Statistics and Probability Letters* 78:2910-2915, 2008.
6. A. Kontorovich and B. Nadler. "Universal Kernel-Based Learning with Applications to Regular Languages." **Invited** to *Journal of Machine Learning Research* 10:997-1031, 2009.
7. B. Nadler and A. Kontorovich. "Model Selection for Sinusoids in Noise: Statistical Analysis and a New Penalty Term." *IEEE Transactions on Signal Processing* 59(4):1333-1345, 2011.
8. A. Kontorovich. "Statistical estimation with bounded memory." *Statistics and Computing* 22(5):1155-1164, 2012.
9. L. Gottlieb, A. Kontorovich, E. Mossel. "VC bounds on the cardinality of nearly orthogonal function classes." *Discrete Mathematics* 312(10):1766-1775, 2012.
10. D. Berend, A. Kontorovich. "The Missing Mass Problem." *Statistics and Probability Letters* 82(6):1102-1110, 2012.
11. A. Kontorovich. "Obtaining Measure Concentration from Markov Contraction." *Markov Processes and Related Fields* 4:613-638, 2012.
12. L. Chekina, D. Gutfreund, A. Kontorovich, L. Rokach, B. Shapira. "Exploiting Label Dependencies for Improved Sample Complexity." *Machine Learning* 91(1):1-42, 2013.
13. A. Kontorovich. "An Explicit Bound on the Transportation Cost Distance." *Communications in Mathematical Analysis* 14(1):1-14, 2013.
14. A. Kontorovich. "An inequality involving the ℓ_1, ℓ_2, and ℓ_∞ norms." *Analysis and Applications* 11(6), 2013.
15. D. Berend, A. Kontorovich. "On the Concentration of the Missing Mass." *Electronic Communications in Probability* 18(3):1-7, 2013.
16. D. Berend, A. Kontorovich. "A Sharp Estimate of the Binomial Mean Absolute Deviation with Applications." *Statistics and Probability Letters* 83(4):1254-1259, 2013.
17. T. Becker, A. Greaves-Tunnell, A. Kontorovich, S. J. Miller, K. Shen. "Virus Dynamics on Starlike Graphs." *Journal of Nonlinear Systems and Applications* 4(1):53-63, 2013.
18. D. Angluin, J. Aspnes, S. Eisenstat, A. Kontorovich. "On the Learnability of Shuffle Ideals." *Journal of Machine Learning Research* 14:1513-1531, 2013.
19. A. Kontorovich and A. Brockwell. "A Strong Law of Large Numbers for Strongly Mixing Processes." *Communications in Statistics — Theory and Methods* 43(18):3777-3796, 2014.
20. A. Kontorovich, A. Trachtenberg. "Deciding unique decodability of bigram counts via finite automata." *Journal of Computer and System Sciences* 80(2):450-456, 2014.
21. D. Berend, P. Harremoës, A. Kontorovich. "Minimum KL-divergence on complements of L_1 balls." *IEEE Transactions on Information Theory* 60(6):3172-3177, 2014.
22. A. Kontorovich, Roi Weiss. "Uniform Chernoff and Dvoretzky-Kiefer-Wolfowitz-type inequalities for Markov chains and related processes," *Journal of Applied Probability* 51:1-14, 2014.
23. O. Asor, H. Duan, A. Kontorovich. "On the Additive Properties of the Fat-Shattering Dimension," *IEEE Transactions on Neural Networks and Learning Systems* 25(12):2309-2312, 2014.

24. L. Gottlieb, A. Kontorovich, R. Krauthgamer. "Efficient classification for metric data." *IEEE Transactions on Information Theory* 60(9):1-10, 2014.
25. D. Berend, A. Kontorovich. "A finite sample analysis of the Naive Bayes classifier." *Journal of Machine Learning Research.* 16(Aug):1519-1545, 2015.
26. D. Gordon, D. Hendler, A. Kontorovich, L. Rokach. "Local-Shapelets for Fast Classification of Spectrographic Measurements." *Expert Systems With Applications.* 42, 3150-3158, 2015.
27. D. Gutfreund, A. Kontorovich, R. Levy, M. Rosen-Zvi. "Boosting Conditional Probability Estimators." **Invited** to *Annals of Mathematics and Artificial Intelligence*, 1-16, 2015.
28. L. Gottlieb, A. Kontorovich, R. Krauthgamer. "Adaptive Metric Dimensionality Reduction." **Invited** to *Theoretical Computer Science*, 105-118, 2016.
29. D. Berend, A. Kontorovich. "The state complexity of random DFAs." *Theoretical Computer Science*, 102-108, 2016.
30. L. Gottlieb, A. Kontorovich, P. Nisnevitch. "Nearly optimal classification for semimetrics." *Journal of Machine Learning Research.* 18(37):1-22, 2017.
31. L. Gottlieb, A. Kontorovich, R. Krauthgamer. "Efficient Regression in Metric Spaces via Approximate Lipschitz Extension." *IEEE Transactions on Information Theory* 63(8):4838-4849, 2017.
32. D. Berend, A. Kontorovich, G. Zagdanski. "The expected missing mass under an entropy constraint." **Invited** to *Entropy* 19(7):315, 2017.
33. A. Kontorovich, S. Sabato, R. Urner. "Active Nearest-Neighbor Learning in Metric Spaces." *Journal of Machine Learning Research* 19:1-38, 2018.
34. L. Gottlieb, A. Kontorovich, P. Nisnevitch. "Near-optimal sample compression for nearest neighbors." *IEEE Transactions on Information Theory* 64(6):4120-4128, 2018.
35. A. Kontorovich, I. Pinelis. "Exact Lower Bounds for the Agnostic Probably-Approximately-Correct (PAC) Machine Learning Model." *Annals of Statistics* 47(5):2822-2854, 2019.
36. D. Hsu, A. Kontorovich, David Levin, Yuval Peres, C. Szepesvári, Geoffrey Wolfer. "Mixing Time Estimation in Reversible Markov Chains from a Single Sample Path." *Annals of Applied Probability* 29(4):2439-2480, 2019.
37. S. Hanneke, A. Kontorovich. "Optimality of SVM: Novel Proofs and Tighter Bounds." *Theoretical Computer Science* 796:99-113, 2019.
38. D. Berend, A. Kontorovich, L. Reyzin, T. Robinson. "On Biased Random Walks, Corrupted Intervals, and Learning Under Adversarial Design." *Annals of Mathematics and Artificial Intelligence*, 2020.
39. Geoffrey Wolfer, A. Kontorovich. "Statistical Estimation of Ergodic Markov Chain Kernel over Discrete State Space." *Bernoulli* 27(1):532-553, 2021.
40. S. Hanneke, A. Kontorovich, S. Sabato, R. Weiss. "Universal Bayes consistency in metric spaces." *Annals of Statistics* 49(4):2129-2150, 2021.
41. L. Gottlieb, A. Kontorovich. "Non-uniform packings." *Information Processing Letters* 2022.
42. L. Gottlieb, E. Kaufman, A. Kontorovich. "Apportioned margin approach for cost sensitive large margin classifiers." *Annals of Mathematics and Artificial Intelligence*, 2021.
43. L. Gottlieb, E. Kaufman, A. Kontorovich, G. Nivasch. "Learning convex polyhedra with margin." *IEEE Transactions on Information Theory* 2021.
44. M. Levi, I. Attias, A. Kontorovich. "Domain Invariant Adversarial Learning." *Transactions on Machine Learning Research* 2022.
45. L. Györfi, A. Kontorovich, Roi Weiss. "Tree density estimation," *IEEE Transactions on Information Theory*, 2022.
46. D. Cohen, A. Kontorovich, A. Koolyk, G. Wolfer. "Dimension-Free Empirical Entropy Estimation." to appear in *IEEE Transactions on Information Theory*, 2023.
47. G. Wolfer, A. Kontorovich. "Improved Estimation of Relaxation Time in Non-reversible Markov Chains." to appear in *Annals of Applied Probability* 2023+

(b) Refereed articles in peer-reviewed conference proceedings

1. A. Kontorovich, C. Cortes, M. Mohri. "Learning Linearly Separable Languages." *Algorithmic Learning Theory (ALT)*, 2006.
2. C. Cortes, A. Kontorovich, M. Mohri. "Learning Languages with Rational Kernels." *International Conference on Learning Theory (COLT)*, 2007.

3. A. Kontorovich. "A Universal Kernel for Learning Regular Languages." *The 5th International Workshop on Mining and Learning with Graphs (MLG)*, 2007, **distinguished contribution award**.
4. D. Angluin, D. Eisenstat, A. Kontorovich, L. Reyzin. "Lower Bounds on Learning Random Structures with Statistical Queries." *Algorithmic Learning Theory (ALT)*, 2010.
5. L. Gottlieb, A. Kontorovich, R. Krauthgamer. "Efficient classification for metric data." *International Conference on Learning Theory (COLT)*, 2010.
6. A. Kontorovich, D. Hendler, E. Menahem. "Metric Anomaly Detection via Asymmetric Risk Minimization." *Similarity-Based Pattern Analysis and Recognition (SIMBAD)*, 2011.
7. A. Kontorovich, A. Trachtenberg. "String reconciliation with unknown edit distance." *IEEE International Symposium on Information Theory (ISIT)*, 2012.
8. D. Angluin, J. Aspnes, A. Kontorovich. "On the Learnability of Shuffle Ideals." *Algorithmic Learning Theory (ALT)*, 2012.
9. L. Gottlieb, A. Kontorovich, R. Krauthgamer. "Efficient Regression in Metric Spaces via Approximate Lipschitz Extension." *Similarity-Based Pattern Analysis and Recognition (SIMBAD)*, 2013.
10. A. Filtser, J. Jin, A. Kontorovich, A. Trachtenberg. "Efficient determination of the unique decodability of a string." *IEEE International Symposium on Information Theory (ISIT)*, 2013.
11. A. Kontorovich, B. Nadler, R. Weiss. "On learning parametric-output HMMs." *International Conference on Machine Learning (ICML)*, 2013.
12. L. Gottlieb, A. Kontorovich, R. Krauthgamer. "Adaptive Metric Dimensionality Reduction." *Algorithmic Learning Theory (ALT)*, 2013.
13. C. R. Shalizi, A. Kontorovich. "Predictive PAC Learning and Process Decompositions." *Neural Information Processing Systems (NIPS)*, 2013.
14. A. Kontorovich, R. Weiss. "Maximum Margin Multiclass Nearest Neighbors." *International Conference on Machine Learning (ICML)*, 2014.
15. A. Kontorovich. "Concentration in unbounded metric spaces and algorithmic stability." *International Conference on Machine Learning (ICML)*, 2014.
16. L. Gottlieb, A. Kontorovich, P. Nisnevitch. "Near-optimal sample compression for nearest neighbors." *Neural Information Processing Systems (NIPS)*, 2014.
17. D. Berend, A. Kontorovich. "Consistency of weighted majority votes." *Neural Information Processing Systems (NIPS)*, 2014.
18. A. Kontorovich, R. Weiss. "A Bayes consistent 1-NN classifier." *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2015.
19. D. Hsu, A. Kontorovich, C. Szepesvári. "Mixing Time Estimation in Reversible Markov Chains from a Single Sample Path." *Neural Information Processing Systems (NIPS)*, 2015.
20. L. Gottlieb, A. Kontorovich, P. Nisnevitch. "Nearly optimal classification for semimetrics." *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2016.
21. A. Kontorovich, S. Sabato, R. Urner. "Active Nearest-Neighbor Learning in Metric Spaces." *Neural Information Processing Systems (NIPS)*, 2016.
22. A. Kontorovich, S. Sabato, R. Weiss. "Nearest-Neighbor Sample Compression: Efficiency, Consistency, Infinite Dimensions." *Neural Information Processing Systems (NIPS)*, 2017.
23. M. Levi, Y. Allouche, A. Kontorovich. "Advanced Analytics for Connected Cars Cyber Security." *IEEE Vehicular Technology Conference (VTC2018-Spring)*, 2018.
24. L. Gottlieb, E. Kaufman, A. Kontorovich, G. Nivasch. "Learning convex polytopes with margin." *Neural Information Processing Systems (NIPS)*, 2018.
25. E. Gutflaish, A. Kontorovich, S. Sabato, O. Biller, O. Sofer. "Temporal anomaly detection: calibrating the surprise." *Association for the Advancement of Artificial Intelligence (AAAI)*, 2019.
26. G. Wolfer, A. Kontorovich. "Minimax Learning of Ergodic Markov Chains." *Algorithmic Learning Theory (ALT)*, 2019.
27. S. Hanneke, A. Kontorovich. "A Sharp Lower Bound for Agnostic Learning with Sample Compression Schemes." *Algorithmic Learning Theory (ALT)*, 2019.
28. S. Hanneke, A. Kontorovich, M. Sadigurschi. "Sample Compression for Real-Valued Learners." *Algorithmic Learning Theory (ALT)*, 2019.
29. I. Attias, A. Kontorovich, Y. Mansour. "Improved generalization bounds for robust learning." *Algorithmic Learning Theory (ALT)*, 2019.
30. G. Wolfer, A. Kontorovich. "Estimating the Mixing Time of Ergodic Markov Chains." *International Conference on Learning Theory (COLT)*, 2019.

31. G. Wolfer, A. Kontorovich. "Minimax Testing of Identity to a Reference Ergodic Markov Chain." *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020.
32. K. Efremenko, A. Kontorovich, M. Noivirt. "Fast and Bayes-consistent nearest neighbors." *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020.
33. D. Cohen, A. Kontorovich, G. Wolfer. "Learning discrete distributions with infinite support." *Neural Information Processing Systems (NIPS)*, 2020.
34. S. Hanneke, A. Kontorovich. "Stable Sample Compression Schemes: New Applications and an Optimal SVM Margin Bound, **Best Paper Award**." *Algorithmic Learning Theory (ALT)*, 2021.
35. L. Gottlieb, E. Kaufman, A. Kontorovich, G. Nivasch, O. Pele. "Nested Barycentric Coordinate System as an Explicit Feature Map." *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2021.
36. Y. Ashlagi, L. Gottlieb, A. Kontorovich. "Functions with average smoothness: structure, algorithms, and learning COLT." *International Conference on Learning Theory (COLT)*, 2021.
37. D. Cohen, A. Kontorovich, A. Koolyk, G. Wolfer. "Dimension-Free Empirical Entropy Estimation." *Neural Information Processing Systems (NIPS)*, 2021.
38. D. Tsir Cohen, A. Kontorovich. "Learning with metric losses." *International Conference on Learning Theory (COLT)*, 2022.
39. A. Kontorovich, M. Sadigurschi, U. Stemmer. "Adaptive Data Analysis with Correlated Observations." *International Conference on Machine Learning (ICML)*, 2022.
40. D. Cohen, A. Kontorovich. "Local Glivenko-Cantelli." *International Conference on Learning Theory (COLT)*, 2022.

(c) Refereed Chapters in collective volumes

1. A. Kontorovich, M. Raginsky. "Concentration of measure without independence: a unified approach via the martingale method." **Invited** to *The IMA volumes in mathematics and its applications*, 2016.
2. A. Kontorovich, S. Kpotufe. "Nearest-Neighbor methods: A modern perspective." **Invited** to *Handbook of Machine Learning for Data Science*, 2022+.

(d) Articles submitted for publication

1. A. Kontorovich, I. Attias. "Fat-shattering dimension of k-fold maxima."
2. A. Biess, A. Kontorovich, Y. Makarychev, H. Zaichyk. "Regression via Kirszbraun Extension."

- **Lectures and presentations at meetings and invited seminars**

(a) Invited plenary lectures at conferences or meetings

1. January 2012. "An Explicit Bound on the Transportation Cost Distance." *Concentration Inequalities and their Applications*, Centre International de Rencontres Mathématiques (CIRM), Marseille, France.
2. September 2012. "Nearest Neighbors: Old and New." *Machine Learning Seminar*, IBM Research, Haifa, Israel.
3. June 2014. "Good Margins Make Good Neighbors." *Foundations of Learning Theory*, Barcelona, Spain.
4. May 2016. "Rethinking NN from scratch: faster, lighter, more general." Israeli Statistical Association, Ramat Gan, Israel.
5. October 2017. "Innovation on the wings of learning." Israel Aerospace Industries Innovation Day, Lod, Israel.
6. April 2021. "Functions with average smoothness: structure, algorithms, and learning." The Multifaceted Complexity of Machine Learning workshop, The Institute for Mathematical and Statistical Innovation (IMSI). Chicago, USA.
7. June 2023. "Local Glivenko-Cantelli (or: estimating the mean in infinite dimensions)." Israeli Statistical Association, Ramat Aviv, Israel.

(b) Presentations of papers at conferences or meetings

1. October 2006. A. Kontorovich, C. Cortes, M. Mohri. "Learning Linearly Separable Languages." *Algorithmic Learning Theory (ALT)*, Barcelona, Spain.

2. August 2007. "A Universal Kernel for Learning Regular Languages." *The 5th International Workshop on Mining and Learning with Graphs (MLG)*, Florence, Italy.
3. February 2011. "Efficient classification for metric data." Invited talk at *Information Theory and Applications*, San Diego, USA.
4. October 2012. D. Angluin, J. Aspnes, A. Kontorovich. "On the Learnability of Shuffle Ideals," *Algorithmic Learning Theory (ALT)*, Lyon, France.
5. February 2013. "A Reverse Pinsker Inequality." Invited talk at *Information Theory and Applications*, San Diego, USA.
6. October 2013. "Adaptive Metric Dimensionality Reduction." *Algorithmic Learning Theory (ALT)*, Singapore.
7. June 2014. "Concentration in unbounded metric spaces and algorithmic stability." *International Conference on Machine Learning (ICML)*, Beijing, China.
8. December 2014. "Near-optimal sample compression for nearest neighbors" and "Consistency of weighted majority votes." *Neural Information Processing Systems (NIPS)*, Montréal, Canada.
9. December 2015. "Mixing Time Estimation in Reversible Markov Chains from a Single Sample Path." *Neural Information Processing Systems (NIPS)*, Montréal, Canada.
10. February 2020. "Universal Bayes consistency in metric spaces." Invited talk at *Information Theory and Applications*, San Diego, USA.
11. September 2022. "Local Glivenko-Cantelli." Invited talk at *The Annual Meeting of the Israel Mathematical Union*, Beer Sheva, Israel.

- **Patents**

1. A. Kontorovich and A. Trachtenberg. Method and system for reconciling remote data. US 20140222760 A1. 2014.

- **Research grants**

[2010-2012] Deutsche Telekom, "Anomaly Detection and Early Warning System." 1,000,000 EURO (PIs: Yuval Elovici, Ehud Gudes, Danny Hendler, Aryeh Kontorovich, Lior Rokach and Yuval Shachar).

[2012-2015] Israel Science Foundation, "PAC learnability of regular languages." 369,398 NIS (Sole PI).

[2013-2014] EMC, "Learning storage behavior to optimize performance." 75,000 NIS (PIs: Aryeh Kontorovich, Eyal Shimony).

[2015-2019] Israel Science Foundation, "Efficient Learning in Metric Spaces." 1,280,000 NIS (PIs: Aryeh Kontorovich, Lee-Ad Gottlieb).

[2016-2017] IBM, "Information Load Reduction Techniques for Guardium." 208,400 NIS (PIs: Aryeh Kontorovich, Sivan Sabato).

[2016-2017] IBM, "Advanced analytics for connected car security." 256,000 NIS (Sole PI).

[2016-2017] Paypal, "Sample compression for nearest neighbor classifiers." 100,000 USD (Sole PI).

[2018-2021] BGU Cyber Security Research Center, "Cold Boot Attack Enhancements Based on a Novel Scalable Probabilistic Max Sat Solver." 400,000 USD (Sole PI).

[2019-2023] Israel Science Foundation, "Optimistic learning in metric spaces: beyond the worst case." 1,000,000 NIS (PIs: Aryeh Kontorovich, Lee-Ad Gottlieb).

[2019-2020] Ariel Cyber Innovation Center, "(Non)Metric Learning of malicious system." 80,000 NIS (PIs: Aryeh Kontorovich, Lee-Ad Gottlieb).

[2019-2020] Ben-Gurion University Data Science Center, "Nearest neighbor sample compression at large scales." 110,000 NIS (PIs: Aryeh Kontorovich, Rami Puzis).

[2022-2023] Ben-Gurion University Data Science Center, "Learning with Directed Information." 88,000 NIS (PIs: Aryeh Kontorovich, Haim Permuter).

- **Additional information**

(a) On Program Committee of

- *Neural Information Processing Systems (NIPS)*: 2009, 2013, 2014, 2015, 2016, 2017
- *International Conference on Pattern Recognition Applications and Methods (ICPRAM)*: 2013, 2014, 2015
- *International Conference on Machine Learning (ICML)*: 2007, 2012, 2013, 2014, 2015, 2016, 2017
- *International Conference on Artificial Intelligence and Statistics (AISTATS)*: 2009, 2011, 2013, 2014, 2016
- *International Colloquium on Grammatical Inference*: 2008

(b) Senior Program Committee, Area Chair, or equivalent

- *International Joint Conferences on Artificial Intelligence (IJCAI)*: 2013, 2015, 2019, 2020, 2021
- *International Conference on Artificial Intelligence and Statistics (AISTATS)*: 2015, 2017, 2019, 2021, 2022, 2023
- *Conference on Learning Theory (COLT)*: 2015, 2016, 2017, 2020, 2021, 2022, 2023
- *International Conference on Algorithmic Learning Theory (ALT)*: 2017, 2021, 2022, 2023
- *International Conference on Machine Learning (ICML)*: 2018, 2019, 2020, 2021, 2022, 2023
- *Neural Information Processing Systems (NIPS)*: 2018, 2019, 2020, 2021, 2022, 2023
- *Association for the Advancement of Artificial Intelligence (AAAI)*: 2023

(c) Program Chair, or equivalent

- *International Conference on Algorithmic Learning Theory (ALT)*: 2020

(d) Reviewer for

- *Israel Science Foundation* research proposal referee
- *Annals of Probability*
- *Annals of Applied Probability*
- *Annals of Statistics*
- *Artificial Intelligence*
- *Bernoulli*
- *Electronic Journal of Probability*
- *IEEE Information Theory Workshop*
- *IEEE Transactions on Information Theory*
- *IEEE Transactions on Signal Processing*
- *IEEE Transactions on Systems, Man, and Cybernetics: Part B*
- *Journal of Applied Probability*
- *Journal of Machine Learning Research*
- *Machine Learning Journal*
- *Neurocomputing*
- *Neural Processing Letters*
- *Operations Research*
- *Principles of Distributed Computing (PODC)*
- *Science in China, Series A: Mathematics*
- *Statistical Papers*
- *Statistics and Computing*
- *Theoretical Computer Science*