

# Abbas Mehrabian

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- APPOINTMENT
- ◇ **McGill University**: September 2017 – present (hosts: Luc Devroye and Louigi Addario-Berry).  
IVADO-Apogée-CFREF Fellow, January 2018 – present.  
CRM-ISM Postdoctoral Fellow, September – December 2017.
  - ◇ **University of California, Berkeley**: January 2017 – May 2017.  
Simons-Berkeley Research Fellow at the Simons Institute for the Theory of Computing.
  - ◇ University of British Columbia and Simon Fraser University: June 2015 – December 2016.  
PIMS-NSERC Postdoctoral Fellow (hosts: Nick Harvey in UBC and Petra Berenbrink in SFU).
- EDUCATION
- ◇ **University of Waterloo**, Canada: May 2011 – April 2015.  
PhD in Combinatorics and Optimization (supervised by Nick Wormald and Joseph Cheriyan).  
During the PhD, visited Monash University in Australia for nine months and worked with Nick Wormald.  
**Won the Governor General’s Gold Medal (best PhD thesis of the year at UWaterloo).**
  - ◇ University of Waterloo, Canada: September 2009 – April 2011.  
Master of Mathematics in Combinatorics and Optimization under supervision of Nick Wormald.
  - ◇ Sharif University of Technology, Tehran, Iran: September 2004 – August 2009.  
BSc in Computer Engineering and in Mathematics (two majors).
- AWARDS
- ◇ **Best paper award at the 2018 Conference on Neural Information Processing Systems**  
*Our paper ‘Nearly tight sample complexity bounds for learning mixtures of Gaussians via sample compression schemes’ won one of four best paper awards at the 2018 Conference on Neural Information Processing Systems (formerly known as NIPS, a leading machine learning and computational neuroscience conference), out of the 4856 submissions.*
  - ◇ **IVADO Fellow Postdoctoral Scholarship, 2018–2020**  
*\$90,000 per year for three years of research in data science.*
  - ◇ **Governor General’s Gold Medal for the PhD thesis, 2015.**  
*Awarded to the student who achieves the highest academic standing at the doctoral level. Only one UWaterloo PhD recipient received this medal in 2015.*
  - ◇ **Simons-Berkeley Research Fellowship, 2017**  
*Awarded by the Simons Institute for the Theory of Computing at UC Berkeley, where I participated in the programs **Foundations of Machine Learning** and **Pseudorandomness** (Spring 2017).*
  - ◇ **CRM-ISM Postdoctoral Fellowship, 2017**
  - ◇ **NSERC Postdoctoral Fellowship, 2015–2017**
  - ◇ **Vanier Canada Graduate Scholarship, 2013–2015**
  - ◇ **Gold Medal in Iranian National Mathematics Olympiad, 2003.**
- RESEARCH INTERESTS
- ◇ Bandit algorithms and online learning
  - ◇ Distribution learning and unsupervised learning
  - ◇ Statistical machine learning

In the past, I have worked in diverse areas such as probability theory, randomized algorithms, random matrices, random graphs, and graph theory; my focus has been on machine learning since 2016. For a detailed description of problems I have worked on, see <http://abbasmehrabian.com/research.htm>. For a list of publications, see below.

- SELECTED PAPERS
- ◇ Hassan Ashtiani, Shai Ben-David, Nick Harvey, Christopher Liaw, Abbas Mehrabian, and Yaniv Plan. Nearly-tight sample complexity bounds for learning mixtures of Gaussians via sample compression schemes. Accepted in the **Journal of the ACM**. Winner of a **best paper award at NeurIPS 2018**.
  - ◇ Peter L. Bartlett, Nick Harvey, Christopher Liaw, and Abbas Mehrabian. Nearly-tight VC-dimension and pseudodimension bounds for piecewise linear neural networks. **Journal of Machine Learning Research**, 20(63), 1–17, 2019. Extended abstract in **Conference On Learning Theory (COLT) 2017**.
- Full list of publications in reverse chronological order follows. All author names are in alphabetical order.
- SUBMITTED PAPERS (2)
- ◇ Hossein Esfandiari, Amin Karbasi, Abbas Mehrabian, and Vahab Mirrokni. Regret bounds for batched bandits. *arXiv preprint arXiv:1910.04959*. Submitted, February 2020.
  - ◇ Gábor Lugosi and Abbas Mehrabian. Multiplayer bandits without observing collision information. *arXiv preprint arXiv:1808.08416*. Submitted, August 2018.
- REFEREED CONFERENCE PROCEEDINGS (14)
- ◇ Abbas Mehrabian, Etienne Boursier, Emilie Kaufmann, and Vianney Perchet. A practical algorithm for multiplayer bandits when arm means vary among players. In Silvia Chiappa and Roberto Calandra, editors, *Proceedings of the Twenty Third International Conference on Artificial Intelligence and Statistics AISTATS*, volume 108 of *Proceedings of Machine Learning Research*, pages 1211–1221, Online, 26–28 Aug 2020. PMLR.
  - ◇ Audrey Durand, Branislav Kveton, Abbas Mehrabian, and Sharan Vaswani. Old dog learns new tricks: Randomized UCB for bandit problems. In Silvia Chiappa and Roberto Calandra, editors, *Proceedings of the Twenty Third International Conference on Artificial Intelligence and Statistics AISTATS*, volume 108 of *Proceedings of Machine Learning Research*, pages 1988–1998, Online, 26–28 Aug 2020. PMLR.
  - ◇ Hassan Ashtiani, Shai Ben-David, Nick Harvey, Christopher Liaw, Abbas Mehrabian, and Yaniv Plan. Nearly-tight sample complexity bounds for learning mixtures of Gaussians via sample compression schemes. Winner of a best paper award at *2018 Conference on Neural Information Processing Systems NeurIPS*.
  - ◇ Hassan Ashtiani, Shai Ben-David, and Abbas Mehrabian. Sample-efficient learning of mixtures. In Sheila A. McIlraith and Kilian Q. Weinberger, editors, *Proceedings of the Thirty-Second AAAI Conference on Artificial Intelligence, New Orleans, Louisiana, USA, February 2-7, 2018*. AAAI Press, 2018.
  - ◇ Nick Harvey, Christopher Liaw, and Abbas Mehrabian. Nearly-tight VC-dimension bounds for piecewise linear neural networks. In Satyen Kale and Ohad Shamir, editors, *Proceedings of the 2017 Conference on Learning Theory COLT*, volume 65 of *Proceedings of Machine Learning Research*, pages 1064–1068, Amsterdam, Netherlands, 07–10 Jul 2017. PMLR.
  - ◇ Omer Angel, Abbas Mehrabian, and Yuval Peres. The string of diamonds is tight for rumor spreading. In Klaus Jansen, José D. P. Rolim, David Williamson, and Santosh S. Vempala, editors, *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM 2017)*, volume 81 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 26:1–26:9, Dagstuhl, Germany, 2017. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.
  - ◇ Petra Berenbrink, Peter Kling, Christopher Liaw, and Abbas Mehrabian. Tight load balancing via randomized local search. In *2017 IEEE International conference on Parallel and Distributed Processing Symposium (IPDPS)*, pages 192–201. IEEE, 2017.
  - ◇ Jeannette Janssen and Abbas Mehrabian. Rumours spread slowly in a small world spatial network. In *Algorithms and models for the web graph (WAW '15)*, volume 9479 of *Lecture Notes in Comput. Sci.*, pages 107–118. Springer, Cham, 2015.
  - ◇ H. Acan, A. Collevocchio, A. Mehrabian, and N. Wormald. On the push&pull protocol for rumour spreading. In *Proceedings of the 2015 ACM Symposium on Principles of Distributed Computing, PODC '15*, pages 405–412, New York, NY, USA, 2015. ACM.
  - ◇ A. Mehrabian and N. Wormald. It’s a small world for random surfers. In K. Jansen, J. D. P. Rolim, N. R. Devanur, and C. Moore, editors, *Approximation, Randomization, and Combinatorial Optimization*.

- Algorithms and Techniques (APPROX/RANDOM '14)*, volume 28 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 857–871. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2014.
- ◇ A. Mehrabian and A. Pourmiri. Randomized rumor spreading in poorly connected small-world networks. In F. Kuhn, editor, *Distributed Computing (DISC '14)*, volume 8784 of *Lecture Notes in Computer Science*, pages 346–360. Springer Berlin Heidelberg, 2014.
  - ◇ S. Ehsani, M. Fazli, A. Mehrabian, S. Sadeghian Sadeghabad, M. Safari, M. Saghafian, and S. Shokat-Fadaee. On a bounded budget network creation game. In *Proceedings of the 23rd ACM symposium on Parallelism in algorithms and architectures*, SPAA '11, pages 207–214, New York, NY, USA, 2011. ACM.
  - ◇ S. Alamdari and A. Mehrabian. On a DAG partitioning problem. In A. Bonato and J. Janssen, editors, *Algorithms and Models for the Web Graph (WAW '12)*, volume 7323 of *Lecture Notes in Computer Science*, pages 17–28. Springer Berlin Heidelberg, 2012.
  - ◇ A. Mehrabian. A randomly embedded random graph is not a spanner. In *Proceedings of the 23rd Canadian Conference on Computational Geometry*, CCCG '11, pages 373–374, 2011.
- JOURNAL PUBLICATIONS (25)
- ◇ Hassan Ashtiani, Shai Ben-David, Nick Harvey, Christopher Liaw, Abbas Mehrabian, and Yaniv Plan. Nearly-tight sample complexity bounds for learning mixtures of Gaussians via sample compression schemes. Accepted in the **Journal of the ACM**. Extended abstract in *NeurIPS 2018*.
  - ◇ Luc Devroye, Abbas Mehrabian, and Tommy Reddad. The minimax learning rates of normal and Ising undirected graphical models. *Electron. J. Statist.*, 14(1):2338–2361, 2020.
  - ◇ Omer Angel, Abbas Mehrabian, and Yuval Peres. The string of diamonds is tight for rumor spreading. *Combinatorics, Probability and Computing*, 29(2), 190–199, 2020. Extended abstract in APPROX/RANDOM'17.
  - ◇ Peter L. Bartlett, Nick Harvey, Christopher Liaw, and Abbas Mehrabian. Nearly-tight VC-dimension and pseudodimension bounds for piecewise linear neural networks. **Journal of Machine Learning Research**, 20(63):1–17, 2019. Extended abstract in *Conference On Learning Theory (COLT) 2017*.
  - ◇ Luc Devroye, Vida Dujmović, Alan Frieze, Abbas Mehrabian, Pat Morin, and Bruce Reed. Notes on growing a tree in a graph, *Random Structures & Algorithms*, 55(2), 290–312, 2019.
  - ◇ Christopher Liaw, Abbas Mehrabian, Yaniv Plan, and Roman Vershynin. A simple tool for bounding the deviation of random matrices on geometric sets. In *Geometric Aspects of Functional Analysis*, volume 2169 of *Lecture Notes in Math.*, pages 277–299. Springer, Cham, 2017.
  - ◇ Jeannette Janssen and Abbas Mehrabian. Rumors spread slowly in a small-world spatial network. *SIAM Journal on Discrete Mathematics*, 31(4):2414–2428, 2017. Extended abstract in WAW 2015.
  - ◇ Abbas Mehrabian. Justifying the small-world phenomenon via random recursive trees. *Random Structures & Algorithms*, 50(2):201–224, 2017.
  - ◇ Hüseyin Acan, Andrea Collevecchio, Abbas Mehrabian, and Nick Wormald. On the push&pull protocol for rumor spreading. *SIAM J. Discrete Math.*, 31(2):647–668, 2017. Extended abstract in PODC'15.
  - ◇ Andrea Collevecchio, Abbas Mehrabian, and Nick Wormald. Longest paths in random Apollonian networks and largest  $r$ -ary subtrees of random  $d$ -ary recursive trees. *J. Appl. Probab.*, 53(3):846–856, 2016.
  - ◇ Abbas Mehrabian and Nick Wormald. It's a small world for random surfers. *Algorithmica*, 76(2):344–380, 2016. Extended abstract in APPROX/RANDOM 2014.
  - ◇ Abbas Mehrabian and Ali Pourmiri. Randomized rumor spreading in poorly connected small-world networks. *Random Structures & Algorithms*, 49(1):185–208, 2016. Conference version in DISC 2014.
  - ◇ Noga Alon and Abbas Mehrabian. Chasing a fast robber on planar graphs and random graphs. *Journal of Graph Theory*, 78(2):81–96, 2015.
  - ◇ S. Ehsani, S. ShokatFadaee, M. Fazli, A. Mehrabian, S. Sadeghabad, M. Safari, and M. Saghafian. A bounded budget network creation game. *ACM Transactions on Algorithms*, 11(4):34:1–34:25, 2015. Conference version in SPAA 2011.

- ◇ A. Mehrabian. The fast robber on interval and chordal graphs. *Discrete Applied Mathematics*, 180:188 – 193, 2015.
- ◇ S. Akbari, A. Daemi, O. Hatami, A. Javanmard, and A. Mehrabian. Nowhere-zero unoriented flows in Hamiltonian graphs. *Ars Combinatoria*, CXX:51–63, 2015.
- ◇ E. Ebrahimzadeh, L. Farczadi, P. Gao, A. Mehrabian, C. M. Sato, N. Wormald, and J. Zung. On longest paths and diameter in random Apollonian networks. *Random Structures & Algorithms*, 45(4):703–725, 2014.
- ◇ A. Mehrabian, D. Mitsche, and P. Prałat. On the maximum density of graphs with unique-path labelings. *SIAM Journal on Discrete Mathematics*, 27(3):1228–1233, 2013.
- ◇ A. Mehrabian and N. Wormald. On the stretch factor of randomly embedded random graphs. *Discrete & Computational Geometry*, 49(3):647–658, 2013.
- ◇ A. Mehrabian. Cops and robber game with a fast robber on expander graphs and random graphs. *Annals of Combinatorics*, 16(4):829–846, 2012.
- ◇ A. Mehrabian. On the density of nearly regular graphs with a good edge-labeling. *SIAM Journal on Discrete Mathematics*, 26(3):1265–1268, 2012.
- ◇ Noga Alon and Abbas Mehrabian. On a generalization of Meyniel’s conjecture on the Cops and Robbers game. *Electronic Journal of Combinatorics*, 18(1):Paper 19, 7 pages, 2011.
- ◇ A. Mehrabian. Lower bounds for the cop number when the robber is fast. *Combinatorics, Probability and Computing*, 20(4):617–621, 2011.
- ◇ A. Mehrabian. The capture time of grids. *Discrete Mathematics*, 311(1):102–105, 2011.
- ◇ S. Akbari, A. Daemi, O. Hatami, A. Javanmard, and A. Mehrabian. Zero-sum flows in regular graphs. *Graphs and Combinatorics*, 26(5):603–615, 2010.

SERVICE

- ◇ Organized the bandit algorithms reading group (February – August 2018), the probability lab seminars (Fall 2017) at McGill University, machine learning theory reading group (February – December 2016) at the University of British Columbia, expander graphs reading group (Spring – Fall 2012), concentration of random variables reading group (Fall 2011 – Winter 2012), and graph theory seminars (Spring 2011) at the University of Waterloo.
- ◇ Refereed articles for the following journals/conferences: Neural Networks, Bernoulli, ACM Transactions on Algorithms, Combinatorics, Probability and Computing, Journal of Graph Theory, Random Structures & Algorithms, Internet Mathematics, Discrete Mathematics, Discrete Applied Mathematics, Theoretical Computer Science, and Journal of Combinatorial Optimization/ICALP 2020, ISIT 2020, ICML 2019, NeurIPS 2018 and 2019, ICML 2019, COLT 2017 and 2019, STOC 2017 and 2018, FOCS 2017 and 2019, SODA 2012, 2013, 2016 and 2017, ICALP 2016, DISC 2014, APPROX 2014, and FUN 2012.
- ◇ Reviewed several articles and books for Zentralblatt MATH.

REFERENCES

- ◇ **Peter L. Bartlett**, Professor in Computer Science and Statistics, Associate Director of the Simons Institute for the Theory of Computing, University of California at Berkeley: [peter@berkeley.edu](mailto:peter@berkeley.edu).
- ◇ **Luc Devroye**, Professor in Computer Science, McGill University: [luc@cs.mcgill.ca](mailto:luc@cs.mcgill.ca).
- ◇ **Nick Harvey**, Associate Professor in Computer Science, Canada Research Chair in Algorithm Design, University of British Columbia: [nickhar@cs.ubc.ca](mailto:nickhar@cs.ubc.ca).
- ◇ **Gábor Lugosi**, ICREA Research Professor in Economics and Business, Pompeu Fabra University, Research Professor in the Barcelona Graduate School of Economics, [gabor.lugosi@gmail.com](mailto:gabor.lugosi@gmail.com).
- ◇ **Nick Wormald**, Fellow of the Australian Academy of Science, Professor and Australian Laureate Fellow in Mathematics, Monash University: [nick.wormald@monash.edu](mailto:nick.wormald@monash.edu).