

# Dávid Pál

## *Curriculum Vitae*

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## Objective

My interests are machine learning, algorithms, game theory and combinatorics.

## Academics

- January 2022 – May 2022 **Adjunct Professor at Tandon School of Engineering,  
New York University, New York, NY**  
Statistical and Computational Foundations of Machine Learning.
- Jul 2009 – Jun 2011 **Postdoctoral Fellow at Department of Computing Science,  
University of Alberta, Edmonton, AB, Canada**  
Advisor: Prof. Csaba Szepesvári  
I did research in online algorithms for machine learning and in statistics. I also worked on automated creation of schedules for nurses in the Canadian province of Alberta. The project was later spun off into a start-up of which I am a co-founder.
- Jan 2005 – May 2009 **Ph.D. in Computer Science, School of Computer Science,  
University of Waterloo, Waterloo, ON, Canada**  
Advisor: Prof. Shai Ben-David  
Ph.D. Thesis: Contributions to Unsupervised and Semi-Supervised Learning
- Sep 1999 – May 2004 **“Magister Degree” in Computer Science,  
Faculty of Mathematics, Physics and Informatics,  
Comenius University, Bratislava, Slovakia**  
Advisor: Prof. Martin Škoviera      Thesis: Steiner Colorings of Cubic Graphs

## Employment

- January 2021 – present      **Staff Machine Learning Engineer at Instacart, New York, NY**  
Ranking and monetization of sponsored products. I built pipeline for training click-through rate prediction models using Tensorflow. I co-authored two patents.
- May 2019 – December 2020      **Principal Applied Researcher at Expedia Group, New York, NY**  
Advertising bidding algorithms. I lead a team of 3 researchers. I built two libraries for solving large scale optimization problems using Apache Spark.
- Sep 2014 – May 2019      **Senior Research Scientist at Yahoo/Oath/Verizon Media Research, New York, NY**  
I built machine learning models that filter spam and phish emails. Many of the models were based on large scale clustering of emails. I designed and implemented the first version of the clustering algorithm. The work was done in Java, Scala, and Python. The system was patented. I also did theoretical research in machine learning, published at NIPS and ICML. I served as a reviewer for COLT, ALT, ICML and area chair for NIPS. I mentored 4 research interns.
- Sep 2011 – Sep 2014      **Software Engineer at Google, New York, NY**  
I was a backend engineer on the Google Ad Exchange team. I co-designed, co-authored a patent and implemented the “passback” ad auction algorithm, which—to this day—processes all the 100+ billion AdX impressions per day and generates revenue of tens of billions of dollars per year. I also worked on the data pipelines for reserve price optimization for AdX. The work was done in C++ and Python.
- Jul 2007 – Sep 2007      **Research Internship at Google, New York, NY**  
I co-designed an ad auction algorithm for AdWords that unifies GSP (generalized second price) and VCG (Vickrey-Clarke-Groves) auctions and proved mathematical theorems about it. The end result was an academic paper with description of the algorithm and its properties that Google later used.
- Jun 2004 – Dec 2004      **Programmer at Applied Software Consultants, Bratislava, Slovakia**  
I was a software engineer in a small family-run company that develops software for elementary schools and high schools. I worked on a desktop application that keeps track of students, their grades, etc. The work was done in C# and PHP.

## Technical Skills

- C, C++, C#, Python, Java, Scala, PHP, Perl, HTML, CSS, Maple, LaTeX

## Service

- Area chair of NIPS 2018, 2019
- Program Committee member of COLT 2017
- Reviewer for ICML 2016–2018; NIPS 2008–2014, 2016; COLT 2007, 2008, 2016, 2019–2023; AISTATS 2017–2018; STOC 2008; AAAI 2016; IJCAI 2016; ALT 2022, 2023.
- Organizer of the Internet Problem Solving Contest, <http://ipsc.ksp.sk/>, 2000 – 2004, 2007
- Organizer of correspondence seminars in mathematics and computer science for Slovak high school students 1999 – 2004.

## Awards

- co-author of a patent: “Distributed algorithm for solving the generalized knapsack problem” (Application no. 63/407,644)
- co-author of a patent: “Accounting for variable dimensions of content items when positioning content items in a user interface having slots for displaying content items” (US 20230109298 A1)
- co-author of a patent: “Message classification” (US 20180159808 A1)
- co-author of a patent: “Allocation of content inventory units” (US 20160364766 A1)
- co-author of a patent: “Passback auction” (US 20140316922 A1)
- David R. Cheriton Scholarship, 2007 – 2009
- COLT 2006 Best Student Paper Award
- 15th place in ACM ICPC 2000, Central European Region
- 14th place in ACM ICPC 1999, Central European Region
- Bronze Medal, Central European Olympiad in Informatics 1999
- Winner of Internet Problem Solving Contest 1999, High School Division
- Top 10 at Slovak National Olympiad in Informatics in 1997, 1998, 1999
- Top 10 at Slovak National Olympiad in Physics in 1999

## Personal

- Citizenship: Slovak Republic
- U.S. Visa status: Permanent Resident (Green Card)

## References

Maxim Sviridenko  
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## Publications

- [1] Alina Beygelzimer, Dávid Pál, Balázs Szörényi, Devanathan Thiruvenkatachari, Chen-Yu Wei, and Chicheng Zhang. Bandit multiclass linear classification: Efficient algorithms for the separable case. In Kamalika Chaudhuri and Ruslan Salakhutdinov, editors, *International Conference on Machine Learning, 9–15 June 2019, Long Beach, CA, USA, 2019*.
- [2] Alexander Golovnev, Dávid Pál, and Balázs Szörényi. The information-theoretic value of unlabeled data in semi-supervised learning. In Kamalika Chaudhuri and Ruslan Salakhutdinov, editors, *International Conference on Machine Learning, 9–15 June 2019, Long Beach, CA, USA, 2019*.
- [3] Satyen Kale, Zohar Karnin, Tengyuan Liang, and Dávid Pál. Adaptive feature selection: Computationally efficient online sparse linear regression under RIP. In Doina Precup and Yee Whye Teh, editors, *International Conference on Machine Learning, 6–11 August 2017, International Convention Centre, Sydney, Australia*, volume 70, pages 1780–1788, 2017.
- [4] Francesco Orabona and Dávid Pál. Scale-free online learning. *Theoretical Computer Science*, 2017. Available at <http://arxiv.org/abs/1601.01974>, DOI: <https://doi.org/10.1016/j.tcs.2017.11.021>.
- [5] Chansoo Lee, Satyen Kale, and Dávid Pál. Hardness of online sleeping combinatorial optimization problems. In D. D. Lee, M. Sugiyama, U. V. Luxburg, I. Guyon, and R. Garnett, editors, *Advances in Neural Information Processing Systems 29 (NIPS 2016)*, 2016.
- [6] Francesco Orabona and Dávid Pál. From coin-betting to parameter-free online learning. In D. D. Lee, M. Sugiyama, U. V. Luxburg, I. Guyon, and R. Garnett, editors, *Advances in Neural Information Processing Systems 29 (NIPS 2016)*, 2016.
- [7] Francesco Orabona and Dávid Pál. Open problem: Parameter-free and scale-free online algorithms. In Vitaly Feldman, Alexander Rakhlin, and Ohad Shamir, editors, *Proceedings of 29th Annual Conference on Learning Theory (COLT 2016)*, New York, NY, USA, 2016.
- [8] Francesco Orabona and Dávid Pál. Scale-free algorithms for online linear optimization. In Kamalika Chaudhuri, Claudio Gentile, and Sandra Zilles, editors, *Algorithmic Learning Theory, 26th International Conference, ALT 2015, Banff, AB, Canada, October 4-6, 2015*, pages 287–301, 2015.
- [9] Gábor Bartók, Dean Foster, Dávid Pál, Alexander Rakhlin, and Csaba Szepesvári. Partial monitoring – classification, regret bounds, and algorithms. *Mathematics of Operations Research*, 39(4):967–997, June 2014.
- [10] Yasin Abbasi Yadkori, Dávid Pál, and Csaba Szepesvári. Online-to-confidence-set conversions and application to sparse stochastic bandits. In Neil Lawrence and Mark Girolami, editors, *Proceedings of the 15th International Conference on Artificial Intelligence and Statistics (AISTATS 2012)*, La Palma, Canary Islands, Spain, pages 1–9, 2012.
- [11] Gábor Bartók, Dávid Pál, and Csaba Szepesvári. Minimax regret of finite partial-monitoring games in stochastic environments. In Sham M. Kakade and Ulrike von Luxburg, editors, *Proceedings of 24th Annual Conference on Learning Theory (COLT 2011)*, Budapest, Hungary, 2011.
- [12] Yasin Abbasi Yadkori, Dávid Pál, and Csaba Szepesvári. Improved algorithms for linear stochastic bandits. In J. Shawe-Taylor, R. S. Zemel, P. L. Bartlett, F. Pereira, and K. Q. Weinberger, editors, *Advances in Neural Information Processing Systems 24 (NIPS 2011)*, December 12-17, 2011, Granada, Spain, 2011.
- [13] Gábor Bartók, Dávid Pál, and Csaba Szepesvári. Toward a classification of partial monitoring games. In Marcus Hutter, Frank Stephan, Vladimir Vovk, and Thomas Zeugmann, editors, *ALT 2010, Canberra, Australia*, 2010.

- [14] Shai Ben-David, Tyler Lu, Teresa Luu, and Dávid Pál. Impossibility theorems for domain adaptation. In Yee Whye Teh and Mike Titterton, editors, *Proceedings of the 13th International Conference on Artificial Intelligence and Statistics (AISTATS 2010), Chia Laguna Resort, Sardinia, Italy*, volume 9, pages 129–136, 2010.
- [15] Tyler Lu, Dávid Pál, and Martin Pál. Contextual multi-armed bandits. In *Proceedings of the 13th International Conference on Artificial Intelligence and Statistics (AISTATS 2010), Chia Laguna Resort, Sardinia, Italy*, volume 9, pages 485–492, 2010.
- [16] Barnabas Poczós, Dávid Pál, and Csaba Szepesvári. Estimation of Rényi entropy and mutual information based on generalized nearest-neighbor graphs. In J. D. Lafferty, C. K. I. Williams, J. Shawe-Taylor, R. S. Zemel, and A. Culotta, editors, *Advances in Neural Information Processing Systems 23 (NIPS 2010), December 6-11, 2010, Vancouver, Canada*, 2010.
- [17] Gagan Aggarwal, S. Muthukrishnan, Dávid Pál, and Martin Pál. General auction mechanism for search advertising. In *Proceedings of 10th Annual Conference on World Wide Web (WWW 2009), Madrid, Spain*, pages 33–44, 2009.
- [18] Shai Ben-David, Tyler Lu, Dávid Pál, and Miroslava Sotáková. Learning low density separators. In David van Dyk and Max Welling, editors, *Proceedings of the 12th International Conference on Artificial Intelligence and Statistics (AISTATS 2009), Clearwater Beach, Florida USA*, volume 5, pages 25–32, 2009.
- [19] Shai Ben-David, Dávid Pál, and Shai Shalev-Shwartz. Agnostic online learning. In Sanjoy Dasgupta and Adam Klivans, editors, *Proceedings of 22nd Annual Conference on Learning Theory (COLT 2009), Montreal, Canada*, pages 33–44, 2009.
- [20] Dávid Pál. *Contributions to Unsupervised and Semi-Supervised Learning*. PhD thesis, University of Waterloo, 2009.
- [21] Shai Ben-David, Tyler Lu, and Dávid Pál. Does unlabeled data provably help? Worst-case analysis of the sample complexity of semi-supervised learning. In Rocco Servedio and Thong Zhang, editors, *Proceedings of 21st Annual Conference on Learning Theory (COLT 2008), Helsinki, Finland*, pages 33–44, 2008.
- [22] Shai Ben-David, Hans Ulrich Simon, and Dávid Pál. Stability of  $k$ -means clusterings. In Nader H. Bshouty and Claudio Gentile, editors, *Proceedings of 20th Annual Conference on Learning Theory (COLT 2007), San Diego, CA, USA*, pages 20–34. Springer, 2007.
- [23] Dávid Pál and Martin Škoviera. Colourings of cubic graphs by small Steiner triple systems. *Graphs and Combinatorics*, 23(2):217–228, 2007.
- [24] Shai Ben-David, Ulrike von Luxburg, and Dávid Pál. A sober look at clustering stability. In Gábor Lugosi and Hans Ulrich Simon, editors, *Proceedings of 19th Annual Conference on Learning Theory (COLT 2006), Pittsburg, PA, USA*, pages 5–19. Springer, 2006.