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Jacob D Abernethy

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- CURRENTLY** **Tenure-Track Assistant Professor at the University of Michigan**, Computer Science and Engineering Division (August 2013 - Present)
- POSTDOC** **Simons Postdoctoral Fellow at UPenn**, focus: Machine Learning, advised by Professor Michael Kearns; position supported by Simon's Foundation (October 2011 - August 2013)
- EDUCATION** **Graduate**
(**PhD - Computer Science**) UC Berkeley, Dept. of Computer Science (Fall 2006 - Fall 2011). Primary focus is algorithms in Machine Learning, Sequential Decision Making, Online Algorithms, Game Theory.
(**Masters - Computer Science**) Toyota Technological Institute at the University of Chicago (Fall 2004 - Spring 2006)
- Undergraduate**
(**Bachelor of Science - Mathematics**) Mass. Institute of Technology (Jan. 2001-June 2002)
Budapest Semesters in Mathematics (Spring 2000)
University of Massachusetts at Amherst (Fall '98 - Fall '99 and Fall 2000)
- RESEARCH** **Publications**
- **Fighting Bandits with a New Kind of Smoothness**, Abernethy, J., Lee, C., Tewari, A., *Proceedings of Neural Information Processing Systems 2015*
 - **A Market Framework for Eliciting Private Data**, Waggoner, B., Frongillo, R., Abernethy, J., *Proceedings of Neural Information Processing Systems 2015*
 - **Low-cost learning via active data procurement**, Abernethy, Chen, Y., Ho, C.J., Waggoner, B., *Proceedings of Economics and Computation 2015*
 - **Financialized methods for market-based multi-sensor fusion**, Abernethy, Johnson-Roberson, M., *Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems 2015*
 - **Price Discovery in Subgradient Combinatorial Auctions**, Abernethy, J., Lahaie, S., Telgarsky, M., *Auctions, Market Mechanisms, and Their Applications 2015 (and in submission to Mathematics of Operations Research)*
 - **Jamming Defense Against a Resource-Replenishing Adversary in Multi-channel Wireless Systems**, Wang, Q., Sheng, S., Abernethy, J., Liu, M., *Proceedings of the International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks, 2014*
 - **Information Aggregation in Exponential Family Markets**, Abernethy, J., Kuttly, S., Lahaie, S., Sami, S., *Proceedings of Economics and Computation 2014*
 - **A General Volume-Parameterized Market Making Framework**, Abernethy, J., Frongillo, R., Li, X., Wortman Vaughan, J., *Proceedings of Economics and Computation 2014*
 - **Learning with Perturbations via Gaussian Smoothing** Abernethy, J., Lee, C., Sinha, A., Tewari, A., *Proceedings of the Conference on Learning Theory 2014*
 - **Adaptive Market Making via Online Learning**, Abernethy, J. and Kale, S., *Proceedings of Neural Information Processing Systems 2013*
Invited for full oral presentation
 - **How to Hedge an Option Against an Adversary: Black-scholes Pricing is Minimax Optimal**, Abernethy, J., Bartlett, P., Frongillo, R., and Wibisono, A. *Proceedings of Neural Information Processing Systems 2013*
Invited for spotlight presentation
 - **Minimax Optimal Algorithms for Unconstrained Linear Optimization**, McMahan, B. and Abernethy, J. *Proceedings of Neural Information Processing Systems 2013*

- **Large-Scale Bandit Problems and KWIK Learning** Abernethy, J., Amin, K., Draief, M., Kearns, M., *Proceedings of the International Conference on Machine Learning 2013*
- **Minimax Option Pricing Meets Black-Scholes in the Limit**, Abernethy, J., Frongillo, R., Wibisono, A., *Proceedings of the Symposium on the Theory of Computation 2012*
- **A Characterization of Scoring Rules for Linear Properties** Abernethy, J. and Frongillo, R., *Proceedings of the Conference on Learning Theory 2012*
- **Efficient Market Making via Convex Optimization, and a Connection to Online Learning**, Abernethy, J., Chen, Y., Wortman Vaughan, J., *Accepted for Publication 6/2012, ACM Transactions on Economics and Computation*
- **Interior Point Methods for Full-Information and Bandit Online Learning** Abernethy, J., Hazan, E., Rakhlin, A., *Published 06/2012, IEEE Transactions on Information Theory*
- **A Collaborative Mechanism for Crowdsourcing Prediction Problems**, Abernethy, J. and Frongillo, R., *Proceedings of Neural Information Processing Systems 2011*
Invited for full oral presentation
- **An Optimization-Based Framework for Automated Market-Making**, Abernethy, J., Chen, Y., Wortman Vaughan, J., *Proceedings of Electronic Commerce 2011*
- **Blackwell Approachability and Low-Regret Learning are Equivalent**, Abernethy, J., Bartlett, P., Hazan, E., *Conference on Learning Theory 2011*
- **Repeated Games against Budgeted Adversaries**, Abernethy, J., Warmuth, M., *Neural Information Processing Systems, December 2010*
- **A Regularization Approach to Metrical Task Systems**, Abernethy, J., Bartlett, P., Buchbinder, N., Stanton, I., *Algorithmic Learning Theory, October 2010*
- **A Stochastic View of Optimal Regret through Minimax Duality**, Abernethy, J., Agarwal, A., Bartlett, P., Rakhlin, A., *Conference on Learning Theory, 2009*
- **Beating the Adaptive Bandit with High Probability**, Abernethy, J., Rakhlin, A., *Conference on Learning Theory, 2009*
- **Graph Regularization Methods for Web Spam Detection**, Abernethy, J., Chappelle, O., Castillo, C., *Machine Learning Journal, November 2009*
- **A New Approach to Collaborative Filtering: Operator Estimation with Spectral Regularization**, Abernethy, J., Bach, F., Evgeniou, T., Vert, J.P., *Journal of Machine Learning Research, March 2009*
- **Optimal Strategies from Random Walks** Abernethy, J., Yellin, J., Warmuth, M., *Conference on Learning Theory, 2008*
- **Competing in the Dark: An Efficient Algorithm for Bandit Linear Optimization** Abernethy, J., Hazan, E., Rakhlin, A., *Conference on Learning Theory, 2008*
Best Student Paper Award and 2008 Pat Goldberg Memorial Best Paper Award from IBM
- **Optimal Strategies and Minimax Lower Bounds for Online Convex Games** Abernethy, J., Bartlett, P., Tewari, A., Rakhlin, A. *Conference on Learning Theory, 2008*
- **WITCH: Web Spam Identification Through Content and Hyperlinks**, Abernethy, J., Chappelle, O., Castillo, C., *WWW2008, Workshop on Adversarial Information Retrieval*
- **Eliciting Consumer Preferences using Robust Adaptive Choice Questionnaires**, Abernethy, J., Evgeniou, T., Toubia, O., Vert, J.P., *IEEE Transactions on Knowledge and Data Discovery, 2007.*
- **Multitask Learning with Expert Advice.** Abernethy, J., Bartlett, P., Rakhlin, A., *Conference on Learning Theory, 2007.*
- **Online Discovery of Similarity Mappings.** Rakhlin, A., Abernethy, J., Bartlett, P., *International Conference on Machine Learning, 2007.*
- **Low-Rank Matrix Factorization with Attributes**, Bach, F., Abernethy, J., Vert, J.P., Evgeniou, T., *Technical Report, <http://arxiv.org/abs/cs.LG/0611124>*
- **Online Collaborative Filtering.** Abernethy, J., Cannini, K., Langford, J., Simma, A., *Technical Report.*
- **The Binning Algorithm and Continuous Experts.**, Abernethy, J., Langford, J., Warmuth, M., *Conference on Learning Theory 2006.*
- **OPEN PROBLEM: Does an Efficient Calibrated Forecasting Strategy Exist?**, Abernethy, J., Mannor, S., *Conference on Learning Theory 2011.*
- **OPEN PROBLEM: Can We Learn to Gamble Efficiently?**, Abernethy, J., *Conference on Learning Theory 2010.*

- **OPEN PROBLEM: Minimax Games with Bandits**, Abernethy, J., Warmuth, M., Conference on Learning Theory 2009.

- **OPEN PROBLEM: An Efficient Bandit Algorithm for \sqrt{T} -Regret in Online Multiclass Prediction?**, Abernethy, J., Rakhlin, A., Conference on Learning Theory 2008.

Selection of Recent Talks, Tutorials, Workshops

Tutorial: “Big Data and Machine Learning.” I was asked to give a series of lectures on Machine Learning at the *Big Data Summer Institute* at the University of Michigan over summer 2015.

Tutorial: “Prediction, Belief, and Markets” (with Jenn Wortman Vaughan)

1. Invited Presentation, AAAI Conference on AI – Bellevue, WA 7/2013
2. Invited Presentation, International Conference on Machine Learning – Edinburgh 6/2012
3. Invited Presentation, Conference on Knowledge and Data Discovery – Beijing 8/2012
4. Guest Lecturer, UC Berkeley course on Social and Information Networks – Berkeley 10/2012

Talk: “Prediction Markets and Learning from Crowds”

1. Invited Talk, NICTA – Canberra Australia 11/2011
2. Invited Talk, Kellogg School of Management, Workshop on the Problem of Prediction – Chicago 12/2011

Talk: “Minimax Option Pricing Meets Black-Scholes in the Limit”

1. Invited Talk, UCSD Computer Science – San Diego 4/2012
2. Invited Talk, Harvard EECS – Cambridge MA 5/2012
3. Invited Talk, MIT EECS – Cambridge MA 5/2012
4. Conference Talk, Symposium on the Theory of Computation – New York 5/2012
5. Invited Talk, Princeton CS – Princeton NJ 10/2012

Organized Workshops

1. “NIPS Workshop on Transactional Machine Learning and E-Commerce” (December 2014, Montreal). One-day workshop exploring interactions between the Machine Learning, E-Commerce and Economics communities. More information at <http://workshops.inf.ed.ac.uk/ml/nipstransactional/>.
2. “Markets, Mechanisms, and Multi-Agent Models” (July 2012, Edinburgh UK). One-day workshop examining the interaction of Machine Learning and Economics. Located at the International Conference on Machine Learning. More information at <http://goo.gl/JaidT>.

Short-term Positions

Tubemogul.com, (consultant) designing learning algorithms for video ad selection. (Summer 2010 to Spring 2011)

Microsoft Research New England, intern with Adam Kalai and Nina Balcan at MSR in Cambridge MA (Summer 2009)

Yahoo! Research, intern with Olivier Chapelle at Yahoo! Research Santa Clara. (Summer 2007)

Convexus Advisors, (consultant) algorithms and online portfolio selection strategies research for startup hedge fund. (Fall 2006 through Winter 2008)

OTHER WORK

Management and Development

- **Chief Data Quality Officer, Captricity.com**, developed algorithms and strategies for processing paper forms through Mechanical Turk into structured data (May-October 2011)

- **Co-Founder and Designer of MLcomp.org** – Primary developer (with Percy Liang) of MLcomp, a collaborative environment for objectively executing and comparing machine learning programs. We hope to make MLcomp a central hub for experimental ML research (March 2008 to Present)

AWARDS

Academic

- **NSF CAREER award**, titled “Machine Learning through the Lens of Economics (And Vice Versa).” (February 2015)

- **Yahoo! PhD Fellowship 2008 Winner**, one of four students to receive full two years of financial support towards a PhD. (Spring 2008)

- **Winner of the Web Spam Challenge**, Track II of a Machine Learning competition that compared submitted algorithms for detecting Web Spam. (Summer 2007)
- **Winner of Key Technical Challenges Grant**, a Yahoo!-funded award of \$5000 in support of academic research. (Spring 2007)