Alekh Agarwal

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Interests

I am broadly interested in several theoretical aspects of machine learning, convex optimization and statistics. I like to understand new theoretical problems and challenges arising out of large-scale learning, and have recently focused in the areas of distributed machine learning, designing learning algorithms that work under a computational budget, high-dimensional statistics and fundamental complexity of convex optimization problems.

Education

- **UC Berkeley** - PhD Candidate in EECS department starting Fall 2007
  Advisors: Prof. Peter Bartlett and Prof. Martin Wainwright
- **UC Berkeley** - Received MA in Statistics in Dec. 2009.
- **Indian Institute of Technology**, Bombay. (2003 - 2007)
  Bachelor of Technology Programme at Department of Computer Science and Engineering
  - Overall CGPA: **9.55/10**

Major Academic Achievements

- **Google PhD Fellowship** - Was awarded the Google Fellowship for years 2011-13.
- **MSR PhD Fellowship** - Was awarded the MSR Fellowship for years 2009-11.
- **International Physics Olympiad** - Represented India at the IPhO 2003 and won an **Honorable Mention**.
- **IIT JEE 2003** - Ranked $13^{\mathbf{th}}$ in all of India, out of around 2,000,000 students.
- **NTSE 2001** - Awarded the prestigious **National Talent Search** Scholarship.

Submitted Preprints

- **A Reliable Effective Terascale Linear Learning System** - *Alekh Agarwal, Olivier Chapelle, Miroslav Dudik and John Langford* - arXiv preprint, in submission.
- **Stochastic convex optimization with bandit feedback** - *Alekh Agarwal, Dean Foster, Daniel Hsu, Sham Kakade and Alexander Rakhlin* - submitted to SIAM Journal on Optimization.
- **The Generalization Ability of Online Algorithms for Dependent Data** - *Alekh Agarwal and John Duchi* - submitted to IEEE Transactions on Information Theory.
- **Ergodic Subgradient Descent** - *John Duchi, Alekh Agarwal, Mikael Johansson and Michael Jordan* - submitted to SIAM Journal on Optimization.
- **Distributed Delayed Stochastic Optimization** - *Alekh Agarwal and John Duchi* - submitted to Journal of Machine Learning Research.
- **Fast global convergence of gradient methods for high-dimensional statistical recovery** - *Alekh Agarwal, Sahand Negahban and Martin Wainwright* - submitted to Annals of Statistics.
- **Noisy matrix decomposition via convex relaxation: Optimal rates in high dimensions** - *Alekh Agarwal, Sahand Negahban and Martin Wainwright* - submitted to Annals of Statistics.
- **A Stochastic View of Optimal Regret through Minimax Duality** - *Jacob Abernethy, Alekh Agarwal, Peter Bartlett and Alexander Rakhlin*
- **Matrix Regularization techniques for online multitask learning** - *Alekh Agarwal, Peter Bartlett and Alexander Rakhlin*

JOURNAL PUBLICATIONS

- **Information-theoretic lower bounds for the oracle complexity of convex optimization** - *Alekh Agarwal, Peter Bartlett, Pradeep Ravikumar and Martin Wainwright* - to appear in IEEE Transactions on Information Theory.
- **Dual Averaging for Distributed Optimization: Convergence Analysis and Network Scaling** - *John Duchi, Alekh Agarwal and Martin Wainwright* - to appear in IEEE Transactions on Automatic Control, January 2012.
- **Message passing in graph structured linear programs: Convergence, proximal projections and rounding schemes** - *Pradeep Ravikumar, Alekh Agarwal and Martin Wainwright* - in Journal of Machine Learning Research, Vol. 11, 2010.

CONFERENCE PUBLICATIONS

- **Contextual Bandit Learning Under the Realizability Assumption** - *Alekh Agarwal, Miroslav Dudik, Satyen Kale, John Langford and Robert Schapire* - AISTATS 2012.
- **Stochastic optimization with non-i.i.d. noise** -*Alekh Agarwal and John Duchi* - NIPS 2011 OPT Workshop.
- **Stochastic convex optimization with bandit feedback** - *Alekh Agarwal, Dean Foster, Daniel Hsu, Sham Kakade and Alexander Rakhlin* - NIPS 2011.
- **Distributed Delayed Stochastic Optimization** - *Alekh Agarwal and John Duchi* - NIPS 2011.
- **Ergodic Subgradient Descent** - *John Duchi, Alekh Agarwal, Mikael Johansson and Mike Jordan* - Allerton 2011.
- **Learning with Missing Features** - *Afshin Rostamizadeh, Alekh Agarwal and Peter Bartlett* - UAI 2011.
- **Oracle inequalities for computationally budgeted model selection** - *Alekh Agarwal, John Duchi, Peter Bartlett and Clement Levrard* - COLT 2011.
- **Noisy matrix decomposition via convex relaxation: Optimal rates in high dimensions** - *Alekh Agarwal, Sahand Negahban and Martin Wainwright* - ICML 2011.
- **Information-theoretic lower bounds on the oracle complexity of sparse convex optimization** - *Alekh Agarwal, Peter Bartlett, Pradeep Ravikumar and Martin Wainwright* - NIPS 2010 OPT Workshop.
- **Distributed Dual Averaging in Networks** - *John Duchi, Alekh Agarwal and Martin Wainwright* - NIPS 2010.
- **Fast convergence rates of gradient methods for high-dimensional statistical recovery** - *Alekh Agarwal, Sahand Negahban and Martin Wainwright* - NIPS 2010.
- **Optimal Algorithms for Online Convex Optimization with Multi-Point Bandit Feedback** - *Alekh Agarwal, Ofer Dekel and Lin Xiao* - COLT 2010.
- **Optimal Allocation Strategies for the Dark Pool Problem** - *Alekh Agarwal, Peter Bartlett and Max Dama* - AISTATS 2010.
- **Information-theoretic lower bounds for the oracle complexity of convex optimization** - *Alekh Agarwal, Peter Bartlett Pradeep Ravikumar and Martin Wainwright* - NIPS 2009.
- **A Stochastic View of Optimal Regret through Minimax Duality** - *Jacob Abernethy, Alekh Agarwal, Peter Bartlett and Alexander Rakhlin* - COLT 2009.
- **Message passing in graph structured linear programs: Convergence, proximal projections and rounding schemes** - *Pradeep Ravikumar, Alekh Agarwal and Martin Wainwright* - ICML 2008.
- **An analysis of inference with Universum** - *Fabian Sinz, Olivier Chapelle, Alekh Agarwal and Bernhard Schölkopf* - NIPS 2007.
- **Learning Random Walks to Rank Nodes in Graphs** - *Alekh Agarwal and Soumen Chakrabarti* - ICML 2007.
- **Learning Parameters in Entity-Relationship Graphs from Ranking Preferences** - *Soumen Chakrabarti and Alekh Agarwal* - ECML-PKDD 2006.

- **Learning to Rank Networked Entities** - *Alekh Agarwal, Soumen Chakrabarti and Sunny Aggarwal* - ACM SIGKDD 2006.
- **Sentiment Analysis: A New Approach for Effective Use of Linguistic Knowledge and Exploiting Similarities in a Set of Documents to be Classified** - *Alekh Agarwal and Pushpak Bhattacharyya* - ICON 2005.
- **Augmenting WordNet with Polarity Information on Adjectives** - *Alekh Agarwal and Pushpak Bhattacharyya* - International Wordnet Conference 2006.

Invited Talks

- DISCML 2009 workshop - Rounding schemes for early termination in graph structured linear programs.

  Berkeley EconCS seminar - Optimal allocation strategies for the dark pool problem.
- MMDS 2010 workshop - Information-theoretic lower bounds on the oracle complexity of convex optimization (also given at IBM Research, Almaden).
- MSR Theory Seminar - Dual Averaging for Distributed Optimization: Convergence Analysis and Network Scaling.
- CMU Statistical Learning Colloquium - Noisy matrix decomposition via convex relaxation.
- Banff workshop on Sparse and Low Rank Approximation - Noisy matrix decomposition via convex relaxation.
- MSR Machine Learning Seminar - Learning and stochastic optimization with non-i.i.d. data.

Professional Activities

- COST workshop - Co-organizing workshop on Computational Trade-offs in Statistical Learning at NIPS 2011.
- LCCC workshop - Co-organized workshop on Learning in Cores, Clusters and Clouds at NIPS 2010.
- Journal Refereeing - JMLR, MLJ, IEEE Info Theory, Annals of Statistics, IEEE TNN, IEEE TAC.
- Conference Reviewing - NIPS, COLT, ICML, AISTATS.

Work Experience

- **Yahoo! Research** Worked with John Langford, Miroslav Dudik and Olivier Chapelle on distributed optimization for large scale machine learning. The algorithm developed is being used to train the model in production for ad display. Also worked on associative reinforcement learning.
- **Microsoft Research** Worked with Lin Xiao and Ofer Dekel in Summer 2009 on online convex optimization under partial feedback.
- **Yahoo! Research** Worked with Olivier Chapelle in Summer 2008 on displaying ads on the Yahoo! search page using techniques from bandit optimization.
- **Max Planck Institute** Worked with Bernhard Schölkopf and Bob Williamson in Summer 2006 and developed new reductions such as from one-class to binary classification and from binary classification to ranking.

Teaching Experience

Teaching assistant for the following classes at Berkeley:

CS281A - Introductory graduate machine learning class with nearly 100 students.

CS174 - Undegraduate randomized algorithms.

References

Prof. Peter Bartlett
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Prof. Martin Wainwright
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Prof. Robert Schapire
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