Karthik Sridharan

Contact Information

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Research Interests

Machine Learning, Statistical Learning Theory, Online Learning and Decision Making, Optimization, Empirical Process Theory, Concentration Inequalities, Game Theory

Education

Ph.D., Computer Science, Sep 2006 - Oct 2011

- Institute : Toyota Technological Institute at Chicago
- Advisor: Nathan Srebro
- Area of Study: Theoretical Machine Learning

M.S., Computer Science, Aug 2004 - Jun 2006

- Institute : University at Buffalo, State University of New York
- Advisor: Venu Govindaraju
- Area of Study: Biomtrics/Applied Machine Learning

B.E., Computer Science and Engineering, Aug 2000 - Jun 2004

- Institute : M.S. Ramaiah Institute of Technology, Bangalore, India

Work Experience

Assistant Professor, **(current)**

- Department : Computer Science
- Institute : Cornell University

Postdoctoral Research Scholar, (Nov 2011 to 2014)

- Institute : Department of Statistics, University of Pennsylvania
- Supervisor : Prof. Alexander Rakhlin , co-supervisor : Prof. Michael Kearns

Internship, Summer'09

- Institute : Microsoft Research, Redmond
- Mentor : Ofer Dekel
- Projects : Robust selective sampling from single and multiple teachers

Research Assistant, Sep 2004 - Jun 2006

- Institute : Center for Unified Biometrics and Sensors, SUNY Buffalo
- Mentor : Venu Govindaraju
- Projects : Semantic Face Retrieval, Facial Expression Recognition and Analysis

Teaching Experience

Fall 2014, 2015

- Course : Machine Learning Theory
- Institution : Cornell University

Spring 2015, 2016

- Course : Machine Learning for Data Sciences
- Institution : Cornell University

Spring 2012, 2014 (Co-Taught with Prof. Alexander Rakhlin)

- Course : Statistical Learning Theory and Sequential Prediction
- Institution : University of Pennsylvania

Teaching Assistant, Winter 2011

- Course : Computational and Statistical Learning Theory
- Instructor : Nathan Srebro
- Institute : TTIC/ University of Chicago

Teaching Assistant, Spring 2010

- Course : Convex Optimization
- Instructor : Nathan Srebro
- Institute : TTIC/ University of Chicago

Publications

Journals :

1. **Empirical Entropy, Minimax Regret and Minimax Risk**
   Alexander Rakhlin, Karthik Sridharan, Alexandre Tsybakov
   Bernoulli Journal, Forthcoming, 2014. (accepted 09/2014)

2. **Online Learning via Sequential Complexities**
   Alexander Rakhlin, Karthik Sridharan, Ambuj Tewari
   Journal of Machine Learning Research (JMLR), vol 16, pp. 155–186, 2015

3. **Sequential Complexities and Uniform Martingale Laws of Large Numbers**
   Alexander Rakhlin, Karthik Sridharan, Ambuj Tewari
   Probability Theory and Related Fields, 2015, Volume 161, Issue 1-2, pp 111-153.

4. **Selective Sampling and Active Learning from Single and Multiple Teachers**
   Ofer Dekel, Claudio Gentile, Karthik Sridharan
   Journal of Machine Learning Research (JMLR), 2012

5. **Learning Kernel Based Half-spaces with the 0-1 Loss**
   Shai Shalev-Shwartz, Ohad Shamir, Karthik Sridharan
   SIAM Journal of Computing, 2011

6. **Learnability, Stability and Uniform Convergence**
   Shai Shalev-Shwartz, Ohad Shamir, Nathan Srebro, Karthik Sridharan
   Journal of Machine Learning Research (JMLR), 2010.

7. **A Neural Network based CBIR System using STI Features and Relevance Feedback**
   K.G. Srinivasa, Karthik Sridharan, P. D. Shenoy, Venugopal K.R., L.M. Patnaik
   International Journal on Intelligent Data Analysis, Volume 10, Number 2, 2006.

Conferences :

8. **Learning in Games: Robustness of Fast Convergence**
   Dylan Foster, Zhiyuan Li, Thodoris Lykouris, Karthik Sridharan, Eva Tardos
   Neural Information Processing Systems (NIPS 2016)

9. **Exploiting the Structure: Stochastic Gradient Methods Using Raw Clusters**
   Zeyuan Allen-Zhu*, Yang Yuan*, Karthik Sridharan
   Neural Information Processing Systems (NIPS 2016) (* - main contributors)

10. **BISTRO: An Efficient Relaxation-Based Method for Contextual Bandits**
    Alexander Rakhlin, Karthik Sridharan
    International Conference on Machine Learning (ICML 2016)

11. **Differentially Private Causal Inference**
    Matt Kusner, Yu Sun, Karthik Sridharan, Kilian Weinberger
    Artificial Intelligence and Statistics (AISTATS 2015)

12. **Adaptive Online Learning**
    Dylan Foster, Alexander Rakhlin, Karthik Sridharan
    Advances in Neural Information Processing Systems (NIPS 2015)

13. **Hierarchies of Relaxations for Online Prediction Problems with Evolving Constraints**
    Alexander Rakhlin, Karthik Sridharan
    Conference on Learning Theory (COLT), 2015

14. **Learning with Square Loss: Localization through Offset Rademacher Complexity**
    Tengyuan Liang, Alexander Rakhlin, Karthik Sridharan
    Conference on Learning Theory (COLT), 2015

15. **Online Optimization : Competing with Dynamic Comparators**
    Ali Jadbabaie, Alexander Rakhlin, Shahin Shahrampour, Karthik Sridharan
    Artificial Intelligence and Statistics (AIStats), 2015

16. **Online Non-parametric Regression**
    Alexander Rakhlin, Karthik Sridharan
    Conference on Learning Theory (COLT), 2014

17. **On Semi-Probabilistic Universal Prediction**
    Alexander Rakhlin, Karthik Sridharan
    Proceedings of IEEE Information Theory Workshop, 2013. Invited paper

18. **Optimization, Learning, and Games with Predictable Sequences**
    Alexander Rakhlin, Karthik Sridharan
    Neural Information Processing Systems (NIPS) 2013.

19. **Competing With Strategies**
    Wei Han, Alexander Rakhlin, Karthik Sridharan
    Conference on Learning Theory (COLT) 2013.

20. **Online Learning With Predictable Sequences**
    Alexander Rakhlin, Karthik Sridharan
    Conference on Learning Theory (COLT) 2013.

21. **Localization and Adaptation in Online Learning**
    Alexander Rakhlin, Ohad Shamir, Karthik Sridharan
    Artificial Intelligence and Statistics (AISTATS) 2013 ***(full oral presentation)***.

22. **Relax and Randomize : From Value to Algorithms**
    Alexander Rakhlin, Ohad Shamir, Karthik Sridharan
    Neural Information Processing Systems (NIPS) 2012 ***(full oral presentation)***.

23. **Making Stochastic Gradient Descent Optimal for Strongly Convex Problems**
    Alexander Rakhlin, Ohad Shamir, Karthik Sridharan
    International Conference on Machine Learning (ICML), 2012

24. **Minimizing The Misclassification Error Rate Using a Surrogate Convex Loss**
    Shai Ben-David, David Loker, Nathan Srebro, Karthik Sridharan
    International Conference on Machine Learning (ICML), 2012

25. **On the Universality of Online Mirror Descent**
    Nathan Srebro, Karthik Sridharan, Ambuj Tewari
    Neural Information Processing Systems (NIPS), 2011

26. **Better Mini-Batch Algorithms via Accelerated Gradient Methods**
    Andrew Cotter, Ohad Shamir , Nathan Srebro, Karthik Sridharan
    Neural Information Processing Systems (NIPS), 2011

27. **Online Learning: Stochastic and Constrained Adversaries**
    Alexander Rakhlin, Karthik Sridharan, Ambuj Tewari
    Neural Information Processing Systems (NIPS), 2011

28. **Online Learning: Beyond Regret**
    Alexander Rakhlin, Karthik Sridharan, Ambuj Tewari
    Conference on Learning Theory (COLT) 2011 ***(Best paper award)***.

29. **Complexity-based Approach to Calibration with Checking Rules**
Dean Foster, Alexander Rakhlin, Karthik Sridharan, Ambuj Tewari
Conference on Learning Theory (COLT) 2011.

30. **Online Learning: Random Averages, Combinatorial Parameters and Learnability**
Alexander Rakhlin, Karthik Sridharan, Ambuj Tewari
Neural Information Processing Systems (NIPS) 2010 ***(full oral presentation)***.

31. **Smoothness, Low Noise and Fast Rates**
Nathan Srebro, Karthik Sridharan, Ambuj Tewari
Neural Information Processing Systems (NIPS) 2010.

32. **Learning Kernel-Based Halfspaces with the Zero-One Loss**
Shai Shalev-Shwartz, Ohad Shamir, Karthik Sridharan
Conference on Learning Theory (COLT), 2010 ***(Best paper award)***.

33. **Robust Selective Sampling from Single and Multiple Teachers**
Ofer Dekel, Claudio Gentile, Karthik Sridharan
Conference on Learning Theory (COLT), 2010

34. **Convex Games in Banach Spaces**
Karthik Sridharan, Ambuj Tewari
Conference on Learning Theory (COLT), 2010

35. **Learning exponential families in high-dimensions: Strong convexity and sparsity**
Sham Kakade, Ohad Shamir, Karthik Sridharan, Ambuj Tewari
International Conference on Artificial Intelligence and Statistics (AISTATS), 2010

36. **Learnability and Stability in the General Learning Setting**
Shai Shalev-Shwartz, Ohad Shamir, Nathan Srebro, Karthik Sridharan
Conference on Learning Theory (COLT), 2009

37. **Stochastic Convex Optimization**
Shai Shalev-Shwartz, Ohad Shamir, Nathan Srebro, Karthik Sridharan
Conference on Learning Theory (COLT), 2009

38. **The Complexity of Improperly Learning Large Margin Halfspaces**
Shai Shalev-Shwartz, Ohad Shamir, Karthik Sridharan
Open Problems, Conference on Learning Theory (COLT), 2009

39. **Multi-View Clustering via Canonical Correlation Analysis**
Kamalika Chaudhuri, Sham Kakade, Karen Livescue, Karthik Sridharan
International Conference on Machine Learning (ICML), 2009

40. **On the Complexity of Linear Prediction: Risk Bounds, Margin Bounds and Regularization**
Sham Kakade, Karthik Sridharan, Ambuj Tewari
Neural Information Processing Systems (NIPS), 2008

41. **Fast Rates for Regularized Objectives**
Shai Shalev-Shwartz, Nathan Srebro, Karthik Sridharan
Neural Information Processing Systems (NIPS), 2008

42. **Information Theoretic Framework for Multi-view Learning**
Karthik Sridharan, Sham Kakade
Conference on Learning Theory (COLT), 2008

43. **Competitive Mixtures of Simple Neurons**
Karthik Sridharan, Matthew J Beal, Venu Govindaraju
International Conference on Pattern Recognition (ICPR), 2006

44. **Identifying handwritten text in mixed documents**
Faisal Farooq, Karthik Sridharan, Venu Govindaraju
International Conference on Pattern Recognition (ICPR), 2006

45. **Classification of Machine Print and Handwritten Arabic Documents**
Karthik Sridharan, Faisal Farooq, Venu Govindaraju
Symposium on Document Image Understanding Technology (SDIUT), 2005

46. **A Sampling Based Approach to Facial Feature Extraction**
Karthik Sridharan, Venu Govindaraju
IEEE Automatic Identification Advanced Technologies (AUTOID), 2005
(Best paper award, 2nd prize)

47. **A Probabilistic Approach to Semantic Face Retrieval**
Karthik Sridharan, Sankalp Nayak, Sharat Chikkerur, Venu Govindaraju
Audio and Video-based Biometric Person Authentication (AVBPA), 2005

48. **A Dynamic Migration Model for Self-adaptive Genetic Algorithms**
K.G. Srinivasa, Karthik Sridharan, P. D. Shenoy, Venugopal K.R., L.M. Patnaik
International Conference on Intelligent Data Engineering and Automated Learning, 2004

49. **An Effective Content-Based Image Retrieval System Using STI features and Relevance feedback**
K.G. Srinivasa, Karthik Sridharan, P. D. Shenoy, Venugopal K.R., L.M. Patnaik
International Conference on Knowledge Based Computer Systems (KBCS), 2004

50. **EASOM: An Efficient Soft Computing Method for Predicting the Share Values**
K.G. Srinivasa, Karthik Sridharan, P. D. Shenoy, Venugopal K.R., L.M. Patnaik
International Conference on Artificial Intelligence and Applications (AIA), 2004

In Preperation/Submitted :

51. **On Equivalence of Martingale Tail Bounds and Deterministic Regret Inequalities**
Alexander Rakhlin, Karthik Sridharan

52. **On Sequential Probability Assignment with Binary Alphabets and Large Classes of Experts**
Alexander Rakhlin, Karthik Sridharan

53. **Online Nonparametric Regression with General Loss Functions**
Alexander Rakhlin, Karthik Sridharan

Theses :

54. **Learning From an Optimization Viewpoint**
Karthik Sridharan, Ph.D. Thesis
Advisor : Nathan Srebro
Committee : David McAllester, Arkadi Nemirovski, Alexander Razborov, Nati Srebro
Toyota Technological Institute, Chicago, 2011

55. **Semantic Face Retrieval**
Karthik Sridharan, Master's Thesis
Advisor : Venu Govindaraju
Computer Science, SUNY Buffalo, 2006

Books and Book Chapters:

56. **On Martingale Extensions of Vapnik-Chervonenkis Theory with Applications to Online Learning**
Alexander Rakhlin, Karthik Sridharan
Chapter 15 in Measures of Complexity, Festschrift in honor of A. Chervonenkis.

57. **Statistical Learning Theory and Sequential Prediction**
Alexander Rakhlin, Karthik Sridharan
Book, in Preparation.

PC member COLT 2013, 2014, 2015, 2016, 2017; ALT 2015; ICML 2016, NIPS 2016

Refereeing

Conference Refereeing : NIPS, ICML, COLT, AISTATS, ALT

Journal Refereeing : Journal of Machine Learning Research, Machine Learning, Pattern Recognition Letters, IEEE Transactions on Information Theory, Mathematical Programming SERIES A and B, Bernoullis Journal, Annals of Statistics, SIAM Optimization

Awards

Best Paper Award - Conference on Learning Theory (COLT), 2011

Best Paper Award - Conference on Learning Theory (COLT), 2010

Best Paper Award (Second Prize) - IEEE Automatic Identification Advanced Technologies (AutoID), 2005

Young IT Professional Award, South Regional, Computer Society of India, 2003