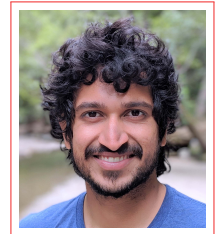


Aaditya K. Ramdas

Curriculum Vitae



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📄 stat.cmu.edu/~aramdas

Research summary

My research spans algorithms, theory and applications of statistical inference and machine learning:

- **reproducibility in science and technology**
 - controlling false discoveries in novel static and dynamic settings
 - multiple hypothesis testing, selective and simultaneous inference,
 - quantifying selection bias, causal inference
- **active, sequential decision-making**
 - experimentation for online and streaming settings
 - human-in-the-loop interactive inference
 - large-scale A/B-testing, multi-armed bandits
- **assumption-light uncertainty quantification**
 - always-valid sequential confidence intervals, anytime p -values
 - conformal prediction intervals, distribution-free calibration
 - inference by betting, safe e -values

Employment

2018– Assistant Professor (tenure-track).
Department of Statistics and Data Science (Dietrich College)
Machine Learning Department (School of CS)
Carnegie Mellon University (CMU), Pittsburgh (USA)
[NSF CAREER Award \(2020-25\)](#)
[Adobe Faculty Research Award \(2019-20\)](#)
[COPSS Leadership Academy Inductee \(2021-24\)](#)
[Bernoulli New Researcher Award \(2021\)](#)

2021– Advisor, Bain & Company.

2015–18 Postdoctoral Researcher in EECS and Statistics.
University of California, Berkeley (UCB), Berkeley (USA)
Mentors: Michael I. Jordan & Martin J. Wainwright

Academic Background

2010–15 PhD in Statistics and Machine Learning.
Carnegie Mellon University (CMU), Pittsburgh (USA) GPA 4.2/4
Advisors: Larry Wasserman & Aarti Singh

[Umesh K. Gavaskar Memorial PhD Thesis Award](#), Department of Statistics (2016)
[Alan J. Perlis Graduate Student Teaching Award](#), School of Computer Science (2015)
[Mihaela Serban Memorial Research Award](#), American Stat Assoc. Pitt. chapter (2015)
[Outstanding Representative Award](#), Graduate Student Assembly (2015)
[Graduate Teaching Assistant Award](#), Machine Learning Department (2014)
[Doug Beeferman PhD Fellowship](#), Machine Learning Department (2013)
[Future Faculty Program Graduate](#), Eberley Center for Teaching Excellence (2013-15)

2005–09 Bachelors in Computer Science and Engineering. GPA 9.44/10
Indian Institute of Technology (IIT), Bombay (India)
[Inlaks Full Scholarship \(3 yrs\)](#), for best all-round student (academic+extra-curricular) in IIT Bombay
[IIT Bombay Cultural Citation](#), highest honor for cultural accomplishments over 4 years
[Prime Minister's invitee to Republic Day Parade](#), for academic excellence*

IIT Joint Entrance Exam India Rank 47/400,000, *Central Board Exams 97.4%, India Rank 10/300,000

Published or accepted peer-reviewed journal papers

Hyperlinks to all papers (ArXiv, proceedings, software) are available from my website publications page. They are omitted here for brevity.

35. 2022 On the bias, risk and consistency of sample means in multi-armed bandits.
J. Shin, A. Ramdas, A. Rinaldo [SIAM J Math of Data Science](#)
34. 2022 Sequential estimation of quantiles with applications to A/B-testing & bandits.
S. Howard, A. Ramdas [Bernoulli](#)
33. 2021 Testing exchangeability: fork-convexity, supermartingales, and e-processes.
A. Ramdas, J. Ruf, M. Larsson, W. Koolen [Intl J Approx Reasoning](#)
[Special Issue for Glenn Shafer's 75th birthday](#)
32. 2021 Fast and powerful conditional randomization testing via distillation.
M.Liu, E. Katsevich, L. Janson, A. Ramdas [Biometrika](#)
31. 2021 Nonparametric iterated-logarithm extensions of the sequential generalized LRT.
J. Shin, A. Ramdas, A. Rinaldo [IEEE J Selected Areas in Info Theory](#)
[Special Issue on Sequential, Active and Reinf. Learning](#)
30. 2021 Path length bounds for gradient descent and flow.
C. Gupta, S. Balakrishnan, A. Ramdas [J ML Research](#)
29. 2021 Nested conformal prediction and quantile out-of-bag ensemble methods.
C.Gupta, A. Kuchibhotla, A. Ramdas [Pattern Recognition](#)
[Special Issue on Conformal Prediction and Applications](#)
28. 2021 Time-uniform, nonparametric, nonasymptotic confidence sequences.
S. Howard, A. Ramdas, J. Sekhon, J. McAuliffe [Annals of Stat](#)
27. 2021 Asynchronous online testing of multiple hypotheses.
T. Zrnic, A. Ramdas, M. Jordan [J ML Research](#)
26. 2021 Classification accuracy as a proxy for two-sample testing.
I. Kim*, A. Ramdas*, A. Singh, L. Wasserman [Annals of Stat](#)
[Winner, Stat Learning & Data Science Student Paper Award](#)
25. 2021 Online control of the familywise error rate.
J. Tian, A. Ramdas [Stat Meth in Medical Research](#)
24. 2021 Predictive inference with the jackknife+.
R. Barber, E. Candes, A. Ramdas, R. Tibshirani [Annals of Stat](#)
23. 2020 Interactive martingale tests for the global null.
B. Duan, A. Ramdas, S. Balakrishnan, L. Wasserman [Elec J Stat](#)
22. 2020 A general interactive framework for FDR control under structural constraints.
L. Lei, A. Ramdas, W. Fithian [Biometrika](#)
21. 2020 Simultaneous high-prob. bounds on the FDP in structured, regression & online settings.
E. Katsevich, A. Ramdas [Annals of Stat](#)
20. 2020 The limits of distribution-free conditional predictive inference.
R. Barber, E. Candes, A. Ramdas, R. Tibshirani [Information & Inference](#)
19. 2020 Time-uniform Chernoff bounds via nonnegative supermartingales.
S. Howard, A. Ramdas, J. Sekhon, J. McAuliffe [Prob Surveys](#)
18. 2020 Universal inference.
L. Wasserman*, A. Ramdas*, S. Balakrishnan* [PNAS](#)
17. 2020 Optimal rates and tradeoffs in multiple testing.
M. Rabinovich, A. Ramdas, M. Wainwright, M. Jordan [Stat Sinica](#)
16. 2019 Decoding from pooled data (I): sharp information-theoretic bounds.
A. El-Alaoui, A. Ramdas, F. Krzakala, L. Zdeborova, M. Jordan [SIAM J Math of Data Science](#)
15. 2019 Decoding from pooled data (II): phase transitions of message passing.
A. El-Alaoui, A. Ramdas, F. Krzakala, L. Zdeborova, M. Jordan [IEEE Trans. Info Theory](#)
14. 2019 A unified treatment of multiple testing with prior knowledge using the p-filter.
A. Ramdas, R. Barber, M. Wainwright, M. Jordan [Annals of Stat](#)
13. 2019 Function-specific mixing times and concentration away from equilibrium.
M. Rabinovich, A. Ramdas, M. Wainwright, M. Jordan [Bayesian Analysis](#)
12. 2019 DAGGER: a sequential algorithm for FDR control on DAGs.
A. Ramdas, J. Chen, M. Wainwright, M. Jordan [Biometrika](#)

11. 2018 On kernel methods for covariates that are rankings.
H. Mania, A. Ramdas, M. Wainwright, M. Jordan, B. Recht Elec J of Statistics
10. 2018 The power of online thinning in reducing discrepancy.
R. Dwivedi, O. N. Feldheim, O. G. Gurevich, A. Ramdas Prob Theory Related Fields
9. 2017 Iterative methods for solving factorized linear systems.
A. Ma, D. Needell, A. Ramdas SIAM J Matrix Analysis and App
8. 2017 Rows vs. columns: randomized Kaczmarz or Gauss-Seidel for ridge regression.
A. Hefny*, D. Needell*, A. Ramdas* SIAM J Scientific Comp.
7. 2016 p-filter: multi-layer FDR control for grouped hypotheses.
R. Barber*, A. Ramdas* J Royal Stat Soc B
6. 2016 Wasserstein two-sample testing and related families of nonparametric tests.
A. Ramdas, N. Garcia, M. Cuturi Entropy
[Special Issue, Statistical Significance and the Logic of Hypothesis Testing](#)
5. 2016 Fast & flexible ADMM algorithms for trend filtering.
A. Ramdas, R. Tibshirani J Comp and Graphical Stat
4. 2015 Convergence properties of the rand. extended Gauss-Seidel & Kaczmarz methods.
A. Ma*, D. Needell*, A. Ramdas* SIAM J Matrix Analysis and App.
3. 2015 Towards a deeper geometric, analytic and algorithmic understanding of margins.
A. Ramdas, J. Peña Opt Meth and Software
2. 2015 Regularized brain reading with shrinkage and smoothing.
L. Wehbe, A. Ramdas, R. Steorts, C. Shalizi Annals of Applied Stat
1. 2014 Simultaneously uncovering patterns of brain regions involved in story reading.
L. Wehbe, B. Murphy, P. Talukdar, A. Fyshe, A. Ramdas, T. Mitchell PLoS ONE

Published, full-length, peer-reviewed conference papers

Most AI and ML conferences follow stringent, blind peer-review processes, and have low acceptance rates ($\lesssim 30\%$), and have official proceedings. The following list excludes short papers submitted to workshops, which usually have high acceptance rates, and often do not have proceedings.

35. 2021 A unified framework for bandit multiple testing.
N. Xu, R. Wang, A. Ramdas NeurIPS
34. 2021 RiLACS: risk limiting audits via confidence sequences.
I. Waudby-Smith, P. Stark, A. Ramdas [video talk](#) EVoteID
[Best Paper Award \(Security, Usability and Technical Issues Track\)](#)
33. 2021 Distribution-free uncertainty quantification for classification under label shift.
A. Podkopaev, A. Ramdas [long oral](#) UAI
31. 2021 Best arm identification in additive transfer bandits.
O. Neopane, A. Singh, A. Ramdas Asilomar
[Finalist, Best Student Paper](#)
32. 2021 Distribution-free calibration guarantees for uniform-mass binning without sample splitting.
C. Gupta, A. Ramdas [video talk](#) ICML
30. 2021 Off-policy confidence sequences.
N. Karampatziakis, P. Mineiro, A. Ramdas [video talk](#) ICML
29. 2021 Dynamic algorithms for online multiple testing.
N. Xu, A. Ramdas [video talk](#) Math and Sci ML
28. 2021 Uncertainty quantification using martingales for misspecified Gaussian processes.
W. Neiswanger, A. Ramdas [video talk](#) ALT
27. 2020 Confidence sequences for sampling without replacement.
I. Waudby-Smith, A. Ramdas [spotlight](#) NeurIPS
26. 2020 Distribution-free binary classification: prediction sets, confidence intervals and calibration.
C. Gupta, A. Podkopaev, A. Ramdas [spotlight](#) NeurIPS
25. 2020 Familywise error rate control by interactive unmasking.
B. Duan, A. Ramdas, L. Wasserman ICML
24. 2020 Conditional versus marginal bias in multi-armed bandits.
J. Shin, A. Ramdas, A. Rinaldo ICML

23. 2020 Online control of the false coverage rate and false sign rate.
A. Weinstein*, A. Ramdas* ICML
22. 2020 The power of batching in multiple hypothesis testing.
T. Zrnic, D. Jiang, A. Ramdas, M. Jordan AISTATS
21. 2020 Analyzing student strategies in blended courses using clickstream data.
N. Akpinar, A. Ramdas, U. Acar long oral Edu. Data Mining
20. 2019 Conformal prediction under covariate shift.
R. Tibshirani, R. Barber, E. Candes, A. Ramdas NeurIPS
19. 2019 A higher order Kolmogorov-Smirnov test.
V. Sadhanala, Y. Wang, A. Ramdas, R. Tibshirani long oral AISTATS
18. 2019 Are sample means in multi-armed bandits positively or negatively biased?.
J. Shin, A. Ramdas, A. Rinaldo spotlight NeurIPS
17. 2019 ADDIS: an adaptive discarding alg. for online FDR control with conservative nulls.
J. Tian, A. Ramdas NeurIPS
16. 2018 SAFFRON: an adaptive algorithm for online FDR control.
A. Ramdas, T. Zrnic, M. Wainwright, M. Jordan long oral ICML
15. 2017 Online control of the false discovery rate with decaying memory.
A. Ramdas, F. Yang, M. Wainwright, M. Jordan long oral NeurIPS
14. 2017 MAB-FDR: Multi (A)rmed/(B)andit testing with online FDR control.
F. Yang, A. Ramdas, K. Jamieson, M. Wainwright spotlight NeurIPS
13. 2017 QuTE: decentralized multiple testing on sensor networks with FDR control.
A. Ramdas, J. Chen, M. Wainwright, M. Jordan IEEE CDC
12. 2017 Generative models and model criticism via optimized Maximum Mean Discrepancy.
D. Sutherland, H. Tung, H. Strathmann, S. De, A. Ramdas, A. Smola, A. Gretton ICLR
11. 2016 Sequential nonparametric testing using the law of the iterated logarithm.
A. Balsubramani*, A. Ramdas* UAI
10. 2016 Minimax lower bounds for linear independence testing.
D. Isenberg*, A. Ramdas*, A. Singh, L. Wasserman IEEE ISIT
9. 2016 Asymptotic behavior of ℓ_q -based Laplacian regularization in semi-supervised learning.
A. El-Alaoui, X. Cheng, A. Ramdas, M. Wainwright, M. Jordan COLT
8. 2015 Fast two-sample testing with analytic representations of probability measures.
K. Chwialkowski, A. Ramdas, D. Sejdinovic, A. Gretton NeurIPS
7. 2015 High-dimensional power of linear-time two-sample tests for mean-shift alternatives.
S. Reddi*, A. Ramdas*, B. Poczos, A. Singh, L. Wasserman AISTATS
6. 2015 On the decreasing power of kernel- & distance-based hyp. tests in high dimensions.
A. Ramdas*, S. Reddi*, B. Poczos, A. Singh, L. Wasserman AAAI
5. 2015 Nonparametric independence testing for small sample sizes.
A. Ramdas*, L. Wehbe* long oral IJCAI
4. 2014 Margins, kernels and non-linear smoothed perceptrons.
A. Ramdas, J. Peña long oral ICML
3. 2014 An analysis of active learning with uniform feature noise.
A. Ramdas, B. Poczos, A. Singh, L. Wasserman long oral AISTATS
2. 2013 Optimal rates for stochastic convex optimization under Tsybakov noise condition.
A. Ramdas, A. Singh long oral ICML
1. 2013 Algorithmic connections between active learning & stochastic convex optimization.
A. Ramdas, A. Singh long oral ALT

Under Revision

- (arXiv) Distribution-free prediction sets with random effects.
R. Dunn, L. Wasserman, A. Ramdas major revision, JASA
- (arXiv) False discovery rate control using e-values.
R. Wang, A. Ramdas minor revision, JRSSB
- (bioRxiv) Brainprint: identifying individuals using Magnetoencephalography.
S. Wu, A. Ramdas, L. Wehbe major revision, Nature Comm Bio

- (arXiv) Estimating means of bounded random variables by betting.
I. Waudby-Smith, A. Ramdas major revision, JRSSB
- (arXiv) Gaussian universal inference.
R. Dunn, S. Balakrishnan, A. Ramdas, L. Wasserman major revision, Biometrika

Under Review

- (arXiv) Large-scale simultaneous inference under dependence.
J. Tian, X. Chen, E. Katsevich, J. Goeman, A. Ramdas submitted, Scandinavian J Stat
- (arXiv) Doubly-robust confidence sequences for sequential causal inference.
I. Waudby-Smith, D. Arbour, R. Sinha, E. Kennedy, A. Ramdas submitted, JASA
- (arXiv) Top-label calibration.
C. Gupta, A. Ramdas submitted, ICLR
- (arXiv) On the power of conditional independence testing under model-X.
E. Katsevich, A. Ramdas submitted, EJS
- (arXiv) Sequential estimation of convex functionals via reverse submartingales and exchangeable filtrations.
T. Manole, A. Ramdas submitted, IEEE TIT
[Winner, Statistical Society of Canada, Student Paper Award](#)
- (arXiv) Tracking the risk of a deployed model and detecting harmful distribution shifts.
A. Podkopaev, A. Ramdas submitted, ICLR
- (arXiv) Dimension-agnostic inference using cross U-statistics.
I. Kim, A. Ramdas submitted, Bernoulli

To be submitted

- (arXiv) Interactive rank tests using martingales.
B. Duan, L. Wasserman, A. Ramdas
- (arXiv) Interactive identification of individuals with positive treatment effect while controlling FDR.
B. Duan, L. Wasserman, A. Ramdas
- (arXiv) Admissible anytime-valid sequential inference must rely on nonnegative martingales.
A. Ramdas, J. Ruf, M. Larsson, W. Koolen
- (arXiv) Comparing sequential forecasters.
YJ. Choe, A. Ramdas
- (pre) The lady keeps tasting coffee: randomization inference by betting.
A. Ramdas, L. Wehbe

Miscellaneous articles

- 2021 Discussion of "Testing by Betting".
A. Ramdas J Royal Stat Soc A
- 2019 Discussion of "Covariate-assisted ranking and screening for two-sample inference".
A. Ramdas J Royal Stat Soc B
- 2015 Adaptivity & comp.-Stat tradeoffs for high-dimensional two-sample testing.
A. Ramdas, S. Reddi, B. Poczos, A. Singh, L. Wasserman technical report
- 2015 Computational and Statistical Advances in Testing and Learning.
A. Ramdas CMU PhD Thesis
[Umesh K. Gavaskar Memorial Thesis Award](#)
- 2011 Algorithms for graph similarity and subgraph matching.
D. Koutra, A. Parikh, A. Ramdas, J. Xiang technical report

Presentations

Slides and videos to several talks and tutorials are linked from my website.

Seminars

- 2021 TBD (MSU, Stat)
(Duke, BioStat)

	TBD	(USC, Marshall)
	TBD	(UC Riverside, Stat)
	Sequential, interactive, dimension-agnostic inference	(CERN, Stat/Phy)
	Estimating means of bounded random variables by betting	(ETH, Stat)
	Estimating means of bounded random variables by betting	(Iowa, Stat)
	Distribution-free uncertainty quantification: conformal and calibration	(MBUZAI, CS)
	Distribution-free multi-class calibration	(UFSCAR, Stat)
2020	Dimension-agnostic inference	(Ecole Poly., Stat/Prob)
	Distribution-free inference: conformal prediction and calibration	(U. Toulouse, Stat/ML)
	The lady keeps tasting coffee	(UGA, Stat)
	Betting scores, e-values and martingales	(Rutgers, Prob)
	Online multiple testing	(UNC, Biostat)
	Election auditing via confidence sequences for sampling w/o replacement	(UWaterloo, Stat)
	Election auditing via confidence sequences for sampling w/o replacement	(CMU, Theory)
	Assumption-free prediction intervals for black-box regression algorithms	(Princeton, IAS)
2019	Uniform, nonasymptotic, nonparametric confidence sequences	(Columbia, Prob)
	Bias, risk and consistency of sample means in multi-armed bandits	(Rice, ECE)
	Uniform, nonasymptotic, nonparametric confidence sequences	(McGill, Stat)
	Exponential line-crossing inequalities	(MIT, IDSS)
	Bias, risk and consistency of sample means in multi-armed bandits	(Berkeley, EE)
	Quantiles for bandits and RL	(Mila, CS)
	Doubly-sequential experimentation	(IU, Psych)
2018	Sequential estimation of coin bias and nonparametric generalizations	(Oxford, CSML)
	A new framework for large-scale sequential A/B testing	(IIT Delhi, CS)
	Interactive algorithms for multiple hypothesis testing	(USC, Marshall)
	Exponential line-crossing inequalities	(USC, Math)
	Uniform, nonasymptotic, nonparametric confidence sequences	(Bocconi Milan, DS)
	Interactive algorithms for multiple hypothesis testing	(UCSD, Math)
	Interactive algorithms for multiple hypothesis testing	(UC Davis, Stat)
	Interactive algorithms for multiple hypothesis testing	(UIUC, Stat)
	Interactive algorithms for multiple hypothesis testing	(GaTech, ISyE)
	From stopping times to spotting times in multiple testing	(Stanford, Stat)
	Towards “simultaneous selective inference”	(Berkeley, Stat)
	From stopping times to spotting times in multiple testing	(Princeton, ORFE)
	From stopping times to spotting times in multiple testing	(Cambridge, Stat)
	Towards “simultaneous selective inference”	(UMich., Stat)
	Interactive algorithms for multiple hypothesis testing	(CMU, Stat)
	Towards “simultaneous selective inference”	(Wharton, Stat)
	Towards “simultaneous selective inference”	(EPFL, Math.)
	A new framework for large-scale sequential A/B testing	(EPFL, CS)
	A new framework for large-scale sequential A/B testing	(ETH Zurich, CS)
	Interactive algorithms for multiple hypothesis testing	(Caltech, CMS)
	Interactive algorithms for multiple hypothesis testing	(Duke, Stat)
	A new framework for large-scale sequential A/B testing	(UCL, Gatsby)
	Interactive algorithms for multiple hypothesis testing	(Columbia, Stat)
	Interactive algorithms for multiple hypothesis testing	(UChicago, Stat+Booth)
	Interactive algorithms for multiple hypothesis testing	(UWash., Stat)
	Interactive algorithms for multiple hypothesis testing	(Harvard, Stat)
	Interactive algorithms for multiple hypothesis testing	(Yale, Stat)
	Interactive algorithms for multiple hypothesis testing	(Cornell, Stat)
	A new framework for large-scale sequential A/B testing	(UIUC, CS)
	A new framework for large-scale sequential A/B testing	(Columbia, CS)

- 2017 DAGGER: A sequential algorithm for FDR control on DAGs (Stanford, BioStat)
 DAGGER: A sequential algorithm for FDR control on DAGs (UCB, BioStat seminar)
 STAR: Interactive multiple testing for structured FDR control (Temple Univ., Stat)
 STAR: Interactive multiple testing for structured FDR control (UTSW, Biomed.)
 Is reproducibility a problem in the tech industry? (UCB, BAIR seminar)
 Multi (A)rmcd/(B)andit testing with online FDR control (UTSW, Biomed.)
 Multi (A)rmcd/(B)andit testing with online FDR control (CMU, ML/AI)
 Multi (A)rmcd/(B)andit testing with online FDR control (Stanford, MS&E)
 Multi (A)rmcd/(B)andit testing with online FDR control (UT Austin, ECE)
 QuTE: Decentralized FDR control on sensor networks (UCB, BLISS seminar)
- 2016 False Discovery Rate - a tutorial and new directions (IIT Bombay, EE)
 p-Filter: FDR control for grouped hypotheses (Wharton, Stat)
 p-Filter: FDR control for grouped hypotheses (Stanford, Stat)
 p-Filter: FDR control for grouped hypotheses (UC Davis, Stat)
 Asymptotics of Laplacian regularization in semi-supervised learning (CMU, ML)
- 2015 Adaptivity in high-dimensional two sample testing (UC Berkeley, CS)
- 2014 Adaptivity in high-dimensional two sample testing (Kyoto University, Stat)
 Adaptivity in high-dimensional two sample testing (ISM Tachikawa, Stat)
 Fast & flexible algorithms for trend filtering (Gatsby, Neuro.)
- 2013 Connecting active learning and stochastic optimization (CMI Chennai, Math.)
 Connecting active learning and stochastic optimization (IIT Madras, CS)

Industry Research Labs

- 2021 Auditing elections: why and how? (MSR, NY)
 Doubly sequential experimentation (Vinted)
- 2020 Interactive, sequential experimentation (Berry Consultants, NY)
- 2019 A framework for asynchronous large-scale sequential testing (Two Sigma, NY)
 A framework for asynchronous large-scale sequential testing (MSR, Montreal)
 Sequential estimation of quantiles for A/B testing and bandits (MSR, Redmond)
 Are bandit sample means positively or negatively biased? (Google, Pittsburgh)
 A gentle introduction to conformal prediction (MSR, Montreal)
- 2018 A new framework for large-scale sequential A/B testing (MSR, New England)
- 2017 Is reproducibility a problem in the tech industry? (Uber Research, SF)
 Is reproducibility a problem in the tech industry? (AirBnB Research, SF)
- 2016 Sequential and multiple testing in modern ML (Groupon Research, Palo Alto)
 p-Filter: FDR control for grouped hypotheses (Lawrence National Labs, Livermore)
 Multiple testing issues in industry (AmpLab industry retreat)
- 2015 Sequential nonparametric testing (Alibaba Research, Seattle)
 Sequential nonparametric testing (Google Research, Pittsburgh)
- 2014 Fast & flexible algorithms for trend filtering (MSR, Cambridge)
- 2013 Active learning & stochastic optimization (IBM Research, Bangalore)
- 2012 Connecting statistical & logical inference (MSR, Cambridge)

Conference and Workshop Talks

- 2021 Distribution-free calibration for multi-class classification (MLCS Toulouse)
 Distribution-free uncertainty quantification (IFDS Madison)
 Martingales, e-values and betting (IMS World Stat Congress [award talk](#))
 Estimating means of bounded random variables by betting (ICON-STARF)
 Online multiple testing (MCP)
 Interactive multiple testing (MRC Cambridge)
- 2020 Universal inference using the split likelihood ratio test (ITA)
 Confidence sequences and nonparametric supermartingales (Intl. Seminar on Selective Inf.)
 UQ using martingales for misspecified Gaussian processes (ICML Active Learning Wshop)

	Universal inference using the split likelihood ratio test	(Marseille Luminy)
	Betting scores, e-values and martingales	(JRSS discussion)
2019	Interactive FDR control with a human-in-the-loop	(ISI-YSM)
	Theoretical guarantees for doubly sequential experimentation	(UCSD Data Science)
	A unified framework for martingale concentration inequalities	(ITA)
	Online control of the false coverage rate	(WHOA-PSI4)
	The state-of-the-art in online multiple testing	(MCP)
	Simultaneous inference in sequential analysis	(ICSA)
	A tutorial on conformal prediction	(IPAM)
	Are sample means in multi-armed bandits positively or negatively biased?	(Asilomar)
2018	Towards “simultaneous selective inference”	(WHOA-PSI3)
	Towards “simultaneous selective inference”	(CMStat)
	SAFFRON: an adaptive algorithm for online FDR control	(ICML)
	Towards “simultaneous selective inference”	(CiMi)
	Uniform nonasymptotic confidence sequences for sequential estimation	(INI)
2017	On kernel methods for covariates that are rankings	(CNA)
	Online FDR control with decaying memory	(NeurIPS)
	QuTE: decentralized multiple testing on sensor networks with FDR control	(CDC)
	A unified treatment of multiple testing with prior knowledge	(MCP)
	Optimal rates and tradeoffs in multiple testing	(MCP)
	Optimal rates and tradeoffs in multiple testing	(ICSA)
	Sequential nonparametric testing using the law of the iterated logarithm	(ITA)
	The power of online thinning in reducing discrepancy	(MCM)
	The power of online thinning in reducing discrepancy	(IISA)
	STAR: Interactive multiple testing for structured FDR control	(WHOA-PSI2)
2016	A unified framework for multiple testing with prior knowledge	(NeurIPS WADAPT)
	Sequential nonparametric testing using the law of the iterated logarithm	(Lorentz)
	Function-specific mixing times and concentration away from equilibrium	(MCQMC)
	Minimax bounds for linear independence testing	(ISIT)
	Function-specific mixing times and concentration away from equilibrium	(ISBA)
	Beyond worst-case mixing times for markov chains	(ITA)
2015	Nonparametric independence testing for small sample sizes	(IJCAI)
	Adaptivity in high-dimensional two-sample testing	(JSM)
	Sequential nonparametric testing using the law of the iterated logarithm	(IWSM)
2014	Margins, kernels and nonlinear smoothed perceptrons	(ICML)
	Active learning with uniform feature noise	(AISTATS)
2013	Connecting convex optimization and active learning	(NeurIPS OPT)
	Algorithmic connections between convex optimization and active learning	(ALT)
	Optimal convex optimization under Tsybakov noise condition	(ICML)

Teaching

Tutorials

2020	Conformal prediction (2hrs)	(Learning Theory W’shop, TIFR)
2019	Large-scale sequential experimentation (4hrs)	(KDD)

Courses taught

Course webpages along with schedules, syllabi, lecture notes, readings and other resources, are all linked from my website.

2021 (F)	Historical advances in machine learning (PhD).	
2021 (S)	Game-theoretic statistics (PhD), <i>Co-instructor + G. Shafer (Rutgers), R. Wang (Waterloo).</i>	
2021 (S)	The ABCDE of Statistical Methods in Machine Learning (PhD),	<i>Instructor.</i>
2020 (F)	Voting (UG),	<i>Co-instructor + T. Seidenfeld (Phil.), L. Tetrault (Hist.).</i>

- 2020 (S) The ABCDE of Statistical Methods in Machine Learning (PhD), *Instructor.*
 2019 (F) (Some) Statistical methods for reproducibility (PhD), *Instructor.*
 2019 (S) Introduction to Machine Learning (PhD), *Co-instructor + L. Wehbe (ML).*
 2018 (F) Martingales: concentration inequalities and sequential analysis (PhD), *Instructor.*

Outreach (Schools)

- 2020 Election polling: bias and variance (40 mins, grade twelve, Winchester Thurston, Pittsburgh)
 2019 Introduction to ML (40 mins, grade twelve, Vidya Mandir Mylapore, Chennai)
 2017 Introduction to AI (40 mins, grade eleven, Vidya Mandir Mylapore, Chennai)
 Trash-free Living (60 mins, full school, Paathashaala, Chennai)
 2016 Robots that run (60 mins, grade three, Stege Elementary, Richmond)
 2015 SVD, Random Graphs and Random Walks (90x3 mins, high school, PACT, Princeton)
 Introduction to CS (90x2 mins, middle school girls, Technights, CMU)
 Introduction to ML (30x2 mins, high school, Indian School Al-Ghubra, Muscat)
 2014 Mechanism Design: Auctions & Voting (80 mins, high school, Andrew's Leap, CMU)
 2013 Multi-armed Bandits (80 mins, high school, Andrew's Leap, CMU)

Teacher Training

- 2013-15 Completed "Future Faculty" training program by CMU's Eberly Center for Teaching Excellence (transcript available).
 2014-20 Training Seminars: Course & syllabus design, Promoting peer learning, Planning & delivering effective lectures, Leveraging diversity & promoting equity, Conducting productive discussions, Engaging students in active learning, Good assessment practices, Bias-busters

Grants

Jointly secured over two million dollars of funding, with over one million dollars being my share.

- 2021-22 Bloomberg Gift (+ Chirag Gupta's Bloomberg PhD student award for "Distribution-free uncertainty quantification"). Sole PI. \$15,000 over 1 year (awarded 10/07/2021).
 2021-22 PricewaterhouseCoopers Grant. "Efficient AI-Enhanced Financial Statement Auditing with Statistical Guarantees". Multi-PI (+Pierre Liang, Zachary Lipton). \$407,500/3 over 1 year (awarded 10/01/2021).
 2021-23 Army Research Grant. "Enabling the Safe and Responsible Use of RL". Multi-PI (+Philip Thomas, Emma Brunskill, Nan Jiang). \$975,000/4 over 2 years (awarded 02/01/2021).
 2021-24 NSF DMS CDS&E-MSS. "Statistical Procedures and Performance Measures for Simulator-Based Frequentist Inference". Multi-PI (+Ann Lee, Mikael Kuusela). \$425,000/3 over 3 years (awarded 07/01/2021).
 2020-25 NSF CAREER Award (DMS). "Online multiple hypothesis testing: a comprehensive treatment". Sole PI. \$400,000 over 5 years (awarded 11/15/2019).
 2020-22 Block Center Grant. \$55,000 over two years. "Developing and deploying risk-limiting election audits with continuous monitoring". Sole PI.
 2019-21 Adobe Faculty Research Award. "Quantile-based A/B testing and multi-armed bandits". \$80,000 gift. Sole PI.
 2019-21 Berkman Faculty Fellowship. \$5,000 over two years. Sole PI.
 2019-22 NSF DMS Small. "Nonparametric confidence sequences and their applications". Sole PI. \$160,000 over 3 years (awarded 7/30/2019).

Mentorship at CMU

- 2020 Completed active listening training session by CMU's Counseling and Psychological Services.

Postdoctoral researchers

- 2021-23 Shubhanshu Shekhar (StatDS+Math, joint with M. Larsson)
 2019-20 Eugene Katsevich (StatDS, joint with K. Roeder).
 Next position: Assistant Professor, Wharton (UPenn) Statistics

2018-19 Asaf Weinstein (StatDS, joint with M. Gavish @ HUJI).
Next position: Assistant Professor, HUJI Statistics

Graduated PhD students

2020 Jaehyeok Shin (StatDS, joint with A. Rinaldo; externals: G. Lugosi, S. Rakhlin),
Thesis: Bias of the sample mean in multi-armed bandits.
Next position: Data Scientist, Google

2021 Boyan Duan (StatDS, joint with L. Wasserman; externals: P. Grunwald, W. Fithian),
Thesis: Advances in interactive testing.
Next position: Data Scientist, Google

2021 Robin Dunn (StatDS, joint with L. Wasserman; externals: S. Murphy, R. Martin),
Thesis: Advances in universal inference [NSF Fellowship](#).
Next position: Data scientist, Novartis

Pre-proposal PhD student advisees

2023 Chirag Gupta (MLD),
Topic: Distribution-free uncertainty quantification for ML [Bloomberg Fellowship](#).

2023 Aleksandr Podkopaev (StatDS+MLD),
Topic: Distribution-free uncertainty quantification for ML.

2023 Ojash Neopane (MLD, joint with Aarti Singh),
Topic: Multi-armed bandits [NSF Fellowship](#).

2024 Ian Waudby-Smith (StatDS),
Topic: Anytime-valid sequential inference.

2024 Justin Whitehouse (CSD, joint with Steven Wu),
Topic: Differential privacy and adaptive data analysis.

2026 Neil Xu (StatDS),
Topic: Online multiple testing.

PhD Thesis Committees

2021-23 David Zhao (StatDS)

2021-22 Costin Bădescu (CSD)

2021-22 Heejong Bong (StatDS)

2021-22 Ron Yurko (StatDS)

2020-22 Natalia Lombardi De Oliveira (StatDS)

2020-21 Ciaran Evans (StatDS)

2020-21 Alan Mishler (StatDS)

2020-21 Danijel Kivaranovic (Stat, University of Vienna)

2019-20 Rianne de Heide (CS, CWI Amsterdam)

2018-20 Ilmun Kim (StatDS)

2018-20 Kevin Tran (ChemE)

PhD Advanced Data Analysis Projects

2020 Ian Waudby-Smith (StatDS, joint with Philip Stark),
Area: Post-election auditing.

2019 Nil-jana Akpınar (StatDS, joint with Umut Acar),
Area: Educational data mining.

Masters Capstone Projects

2020 Radhika Khandelwal, Surya Sindwani, Xiaofan Xu, Muhammad Yafi, Zhe Fei (Heinz)

Service

Organization: full- or multi-day workshops and conferences

2022 5-day Workshop on safe anytime-valid inference (EuRandom, Eindhoven), *Organizer*.
+ Peter Grunwald.

- 2021 Lead instructor, ~~10-day Bocconi-Oxford-Imperial summer school at Lake Como, for advanced PhD students. Topic: "Inference using betting, e-values and martingales", (Covid).~~
- 2021 1-day Workshop on Distribution-free Uncertainty Quantification (ICML), *Organizer.*
+ Anastasios Angelopoulos, Stephen Bates, Sharon Li, Ryan Ribshirani.
- 2020 2-day Workshop on statistical learning theory (TIFR, Mumbai), *Organizer.*
+ Sandeep Juneja, Devavrat Shah.
- 2018-20 3-week working group on conformal prediction (AIM Square), *Organizer.*
+ Ryan Tibshirani, Rina Barber, Emmanuel Candes.
- 2017 3-day 20th Conference on AI & Statistics (AISTATS), *Publicity Chair.*
Program Chairs: Aarti Singh, Jerry Zhu.
- 2016 1-day Workshop on Adaptive Data Analysis (NeurIPS), *Organizer.*
+ Adam Smith, Aaron Roth, Vitaly Feldman.
- 2016 1-day Workshop on Modern Nonparametrics (NeurIPS), *Organizer.*
+ Zoltan Szabo, Han Liu, Mladen Kolar, Samory Kpotufe, Bharath Sriperumbudur, John Lafferty.
- 2015 1-day Workshop on Active Learning: Theory & Practice (ICML), *Organizer.*
+ Akshay Krishnamurthy, Aarti Singh, Nina Balcan.
- 2014 1-day Workshop on Optimization in Machine Learning (NeurIPS), *Organizer.*
+ Alekh Agarwal, Suvit Sra, Miro Dudik, Zaid Harchaoui, Martin Jaggi.

Organization: individual sessions at meetings

- 2021 Invited session: statistical inference by betting (JSM, IMS invited session), *Organizer.*
- 2020 Invited session: conformal prediction (~~Stat Learning and Data Sci., Covid~~), *Organizer.*
- 2020 Invited session: multiple testing (~~Stat Learning and Data Sci., Covid~~), *Organizer.*
- 2019 Invited session: sequential analysis (Asilomar), *Organizer.*

Senior Program Committee (or Meta-Reviewer, or Area Chair)

- 2022 9th International Conference on Learning Representations (ICLR).
- 2022 33rd International Conference on Algorithmic Learning Theory (ALT).
- 2021 34th Annual Conference on Learning Theory (COLT).
- 2021 37th Conference on Uncertainty in Artificial Intelligence (UAI).
- 2020 34th Conference on Neural Information Processing Systems (NeurIPS).
- 2020 33rd Annual Conference on Learning Theory (COLT).
- 2020 37th International Conference on Machine Learning (ICML).
- 2020 31st International Conference on Algorithmic Learning Theory (ALT).
- 2020 36th Conference on Uncertainty in Artificial Intelligence (UAI).
- 2019 33rd Conference on Neural Information Processing Systems (NeurIPS).
- 2019 22nd Conference on AI & Statistics (AISTATS).
- 2019 36th International Conference on Machine Learning (ICML).
- 2019 32nd Annual Conference on Learning Theory (COLT).

Associate Editor

- 2021- New England Journal of Statistics in Data Science
- 2021- ACM/IMS Journal of Data Science

Book Reviewer

- Stat Cambridge University Press
- ML Foundations and Trends in Machine Learning

Miscellaneous

- 2020 NSF DMS Grant Review Panel
- 2020 arXiv StatML moderator

Journal Reviewer

- Stat Annals of Statistics, Journal of the Royal Statistical Society Series B (JRSSB), Biometrika, Bernoulli, Statistics and Probability Letters, Annals of Applied Statistics, Journal of the American Statistical Association, Statistica Sinica, Statistical Science, Scandinavian Journal of Statistics, Electronic Journal of Statistics, Annals of the Institute of Statistical Mathematics, The American Statistician.
- ML/AI Journal of Machine Learning Research, Machine Learning Journal, Journal of Artificial Intelligence Research, Data Mining and Knowledge Discovery.
 - EE IEEE Transactions on Information Theory, IEEE Signal Processing Letters, IEEE Transactions on Pattern Analysis and Machine Intelligence.
 - Opt. BIT Numerical Algorithms, Optimization Methods and Software, Numerical Mathematics, SIAM Journal on Matrix Analysis.
- Other Bioinformatics, Discrete and Computational Geometry, Entropy.

Conference Reviewer

- ML Conference on Learning Theory (COLT), Conference on AI & Statistics (AISTATS), International Conference on Machine Learning (ICML), Neural Information Processing Systems (NeurIPS), European Conference on Machine Learning (ECML).
- AI Conference on Artificial Intelligence (AAAI), Conference on Uncertainty in Artificial Intelligence (UAI), International Joint Conference on Artificial Intelligence (IJCAI).
- Other Intl. Symp. on Information Theory (ISIT), Math. and Scientific Machine Learning (MSML).

Department Service

- 2020- StatML faculty advisor and course review committee
- 2020- MLD department review committee
- 2020- SCS distinguished speaker seminar committee
- 2018- StatDS department seminar organizer
- 2019- MLD speaking skills committee
- 2019- Trained social host for events with alcohol (StatDS+MLD)
- 2018- Wellness network (StatDS+MLD)
- 2018- Miscellaneous: judge, Meeting of the Minds (2019), first day StatDS retreat organizer (2018), StatDS strategic planning.
- 2015-16 Graduate admissions committee, CS Department (UCB)
 - 2014 Lead Organizer, ML Department Student Research Symposium (CMU)
- 2012-15 Organizer, weekly lunch seminar series on ML (CMU)
- 2014-15 Teaching Faculty Hiring Committee, ML Department (CMU)
- 2014-15 Graduate Student Assembly Rep. (CMU), [Outstanding Representative Award](#)
- 2013-14 Graduate Admissions Committee, ML Department (CMU)
- 2013-14 Education Review Committee Founder, ML Department (CMU)

University Service

- 2020 Panel Discussant on Voting and Elections for Alumni Outreach (CMU)
- 2015-17 Steward for Postdoctoral Union (UCB)
- 2014-15 SafeZone Allies for LGBTQ Safety, Trained Member (CMU)
- 2014-15 Campus Smoking Policy Review Committee, Member (CMU)
- 2012-13 Explorer's Club Core Officer (CMU)
- 2011-12 Indian Graduate Students Association Treasurer (CMU)

Distractions

- **Endurance sports.** Finishing medalist, Ironman triathlon (2.4mi swim, 112mi bike, 26.2mi run) at Louisville, Kentucky (Aug 25, '13). Completed half-ironman in Grafham, olympic triathlons in Marlow ('12), Pittsburgh ('13), Tahoe ('16), and marathons in Columbus ('12) and Pittsburgh ('12, '13, '14), and half-marathons in Wales ('12), Philadelphia ('13), Chicago ('13), Ealing ('14), Berkeley ('15), Napa ('17).

- **Team sports.** Represented the Oman cricket team in the U-13 Gulf Cup (silver medal), and in the U-15 Asia Cup (ranked 5/14). Also played several years for the IIT Bombay Inter-IIT (silver medal) and Carnegie Mellon cricket teams. Awarded several Hostel-3 Sports Colors for winning top-3 spots in table-tennis, badminton, cricket, basketball and water-polo.
- **Adventure sports.** Finished a 26-day Basic Mountaineering Course in the Himalayas (Jul 1-26, '06), a 10-day backpacking school ('13) and 15-day climbing school by the Explorer's Club of Pittsburgh ('15). Also completed a 7-day PADI scuba openwater diving course ('11), and a 2-day Advanced Free Fall Skydiving course ('10), and a 2-day wilderness first aid course ('12).
- **Community service.** Raised funds in '18 for organizations fighting AIDS and empowering women in Zambia (340 mile bike ride from Lusaka to Livingstone). Fundraising in '16 and '17 for the San Francisco AIDS Foundation and the Los Angeles LGBT Center (545 mile bike ride in California from SF to LA, also training ride leader in '17). Also fundraised for the National Multiple Sclerosis Society (150 mile bike ride in Pennsylvania, '13, and in '21) and the Pittsburgh Animal Rescue League and Wildlife Center (Pittsburgh marathon, '12). Regular volunteer for beach cleaning and daily school traffic warden for 3 years (2001-03).