

Emma Brunskill

ebrun@cs.stanford.edu

<https://cs.stanford.edu/people/ebrun/>

Academic History

2009 Doctor of Philosophy, Computer Science
Massachusetts Institute of Technology

2002 Master of Science, Neuroscience
Oxford University

2000 Bachelor of Science, Computer Engineering and Physics, Magna Cum Laude, With Honors
University of Washington

Employment Record

Assistant Professor, Tenure-track, Computer Science Department
Stanford University
3/2017-Present

Assistant Professor, Tenure-track, Computer Science Department, Affiliate Machine Learning
Carnegie Mellon University
8/2011-2/2017

NSF Mathematical Sciences Postdoctoral Research Fellow, Computer Science Department
University of California, Berkeley
8/2009-7/2011

Awards and Honors Since PhD

2019 Google Faculty Research Award

2017 Best paper award Uncertainty in AI (UAI)

2017 Early Career Talk at the International Joint Conference on Artificial Intelligence (IJCAI)

2017 Best paper nomination, Educational Data Mining (EDM)

2015 ONR Young Investigator Award

2015 Best paper award, Reinforcement Learning and Decision Making (RLDM)

2014 National Science Foundation CAREER award

2014 Honorable paper, Computer Human Interaction (CHI)

2013 Best paper nomination, Educational Data Mining (EDM)

2013 Kavli Frontiers of Science Fellow (unable to attend)

2012 Microsoft Research New Faculty Fellow (1 of 7 worldwide)

2012 Google Faculty Research award

2012 Best paper nomination, Educational Data Mining (EDM)

2012 CMU Wimmer Fellow (Teaching)

2009 National Science Foundation (NSF) Mathematical Sciences Postdoctoral Fellowship

Publications

In machine learning and artificial intelligence research, like in much of Computer Science, the primary focus is conferences. The primary student author is named first. The primary faculty author is generally but not always named last. Student authors of the candidate are listed in boldface, and postdoc authors are italicized. Neural Information Processing Systems changed its abbreviation from NIPS to NeurIPS in 2018.

Refereed Journal Publications

1. *Phil Thomas*, Bruno Castro da Silva, Andrew G. Barto, Stephen Giguere, Yuriy Brun and Emma Brunskill. Preventing Undesirable Behavior of Intelligent Machines. *Science*. 366, no. 6468 (2019): 999- 1004.
2. **Shayan Doroudi**, Vincent Aleven and Emma Brunskill. Where's the Reward? A Review of Reinforcement Learning for Instructional Sequencing. *International Journal of Artificial Intelligence in Education*. 29, no. 4 (2019): 568-620.
3. Anna Rafferty, Emma Brunskill, Thomas Griffiths and Patrick Shafto. Faster Teaching via POMDP Planning. *Cognitive Science*. 40, no. 6 (2016): 1290-1332.
4. Ken Koedinger, Emma Brunskill, Ryan Baker, Elizabeth McLaughlin and John Stamper. New Potentials for Data-Driven Intelligent Tutoring System Development and Optimization. *AI Magazine*. v34 no3 (2013): 27-41.
5. Gretchen Stevens, Seth Flaxman, Emma Brunskill, Maya Mascarenhas, Colin Mathers and Mariel Finucane. Global and Regional Hearing Impairment Prevalence: An Analysis of 42 Studies in 29 Countries. *European Journal of Public Health*, 23, no. 1 (2013): 146-152.
6. Indrani Medhi, Somani Patnaik, Emma Brunskill, S.N. Nagesena Gautama, William Thies, and Kentaro Toyama. Designing Mobile Interfaces for Novice and Low-Literacy Users. *ACM Transactions on Computer-Human Interaction*, v18 n1 (2011): 2. [Extends ICTD 2009 paper]
7. Ruijie He, Emma Brunskill, and Nicholas Roy. Efficient Planning under Uncertainty with Macro-actions. *Journal of Artificial Intelligence Research (JAIR)*, v40 (2011): 523-570.
8. Emma Brunskill, Leslie Pack Kaelbling, Toma's Lozano-Pérez, and Nicholas Roy. Planning in Partially-observable Switching-mode Continuous Domains. *Annals of Mathematics and Artificial Intelligence*, v58 n3-4 (2010): 185-216.
9. Emma Brunskill, Bethany Leffler, Lihong Li, Michael L. Littman, and Nicholas Roy. Provably Efficient Learning with Typed Parametric Models, *Journal of Machine Learning Research (JMLR)*, v10 (2009). [Extends UAI 2008 conference paper]
10. Kristine Krug, Emma Brunskill, Anna Scarna, Guy Goodwin, and Andrew Parker. Perceptual Switch Rates with Ambiguous Structure-from-motion Figures in Bipolar Disorder. *Proceedings of the Royal Society B*, v275 (2008).

Refereed Journal Publications in Press/Accepted

1. Rene F. Kizilcec, Justin Reich, Michael Yeomans, **Christoph Dann**, Emma Brunskill, Glenn Lopez, Selen Turkay, Joseph J. Williams and Dustin Tingley. Scaling Up Behavioral Science Interventions in Online Education. *Proceedings of the National Academy of Sciences (PNAS)*. Accepted

Refereed Journal Publications in Submission

1. **Xinkun Nie**, Emma Brunskill and Stefan Wager. Learning When-to-Treat Policies, in submission to *Journal of the American Statistical Association (JASA)*. Submitted 2019
2. **Tong Mu**, Shuhan Wang, Brandon Cohen, Nicholas Teo, Evan Adler, Urael Xu, Nicole Cheung, Erik Andersen, and Emma Brunskill. Combining Adaptive Problem Selection with Automatic Progression Ordering in an Educational Online Game. In submission to *Journal of Learning Analytics*. Submitted 2019

Highly Competitive Refereed Conference Proceedings

1. **Andrea Zanette**, Alessandro Lazaric, Mykel Kochenderfer and Emma Brunskill. Learning Near Optimal Policies with Low Inherent Bellman Error, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2020.
2. **Yao Liu**, Pierre-Luc Bacon and Emma Brunskill. Understanding the Curse of Horizon in Off-Policy Evaluation via Conditional Importance Sampling, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2020.
3. Omer Gottesman, Joseph Futoma, **Yao Liu**, Sonali Parbhoo, Leo Anthony Celi, Emma Brunskill and Finale Doshi-Velez. Interpretable Off-Policy Evaluation in Reinforcement Learning by Highlighting Influential Transitions, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2020.
4. **Tong Mu**, Andrea Jetten and Emma Brunskill. Towards Suggesting Actionable Interventions for Wheel Spinning Students. In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2020.
5. Sherry Ruan, Jiayu He, Rui Ying, Jonathan Burkle, Dunia Hakim, Anna Wang, Yufeng Yin, Lily Zhou, Qian Yao Xu, Abdallah AbuHashem, Griffin Dietz, Elizabeth Murnane, Emma Brunskill and James Landay. Supporting Children's Math Learning with Feedback-Augmented Narrative, In *Proceedings of the ACM Interaction Design and Children Conference (IDC)*, 2020.
6. Weihao Kong, Gregory Valiant and Emma Brunskill. Sublinear Optimal Policy Value Estimation in Contextual Bandits, In *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020.
7. **Andrea Zanette**, David Brandfonbrener, Emma Brunskill, Matteo Pirota, and Alessandro Lazaric. Frequentist Regret Bounds for Randomized Least-Squares Value Iteration, In *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020.
8. **Ramtin Keramati**, **Christoph Dann**, Alex Tamkin and Emma Brunskill. Being Optimistic to Be

- Conservative: Quickly Learning a CVaR Policy, In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2020.
9. **Andrea Zanette**, Mykel Kochenderfer and Emma Brunskill. Almost Horizon-Free Structure-Aware best Policy Identification with a Generative Model, In *Proceedings of the Neural Information Processing Systems Conference (NeurIPS)*, Dec 2019.
 10. **Andrea Zanette**, Alessandro Lazaric, Mykel Kochenderfer and Emma Brunskill. Limiting Extrapolation in Linear Approximation Value Iteration, In *Proceedings of the Neural Information Processing Systems Conference (NeurIPS)*, Dec 2019.
 11. Blossom Metevier, Stephen Giguere, Sarah Brockman, Ari Kobren, Yuriy Brun, Emma Brunskill and *Philip Thomas*. Offline Contextual Bandits with High Probability Fairness Guarantees, In *Proceedings of the Neural Information Processing Systems Conference (NeurIPS)*, Dec 2019.
 12. **Yao Liu**, Alekh Agarwal, Adith Swaminathan and Emma Brunskill. Off-Policy Policy Gradient with Stationary Distribution Correction, In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2019.
 13. *Jonathan Bragg* and Emma Brunskill. Fake it Till You Make It: Learning-Compatible Performance Support, In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2019.
 14. **Christoph Dann**, Wei Wi, Lihong Li and Emma Brunskill. Policy Certificates: Towards Accountable Reinforcement Learning, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2019.
 15. **Andrea Zanette** and Emma Brunskill. Tighter Problem-Dependent Regret Bounds in Reinforcement Learning Without Domain Knowledge Using Value Function Bounds, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2019.
 16. Omer Gottesman, **Yao Liu**, Emma Brunskill and Finale Doshi-Velez. Combining Parametric and Non-parametric Models for Off-Policy Evaluation, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2019.
 17. Joshua Romoff, Peter Henderson, Ahmed Touati, Emma Brunskill, Joelle Pineau and Yann Ollivier. Separable Value Functions Across Timescales, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2019.
 18. Angelica Willis, Glenn Davis, Lakshmi Manoharan, Sherry Ruan, James Landay and Emma Brunskill. Key Phrase Extraction for Generating Educational Question-Answer Pairs, In *Proceedings of the Conference on Learning at Scale (LAS)*, 2019.
 19. **Ramtin Keramati** and Emma Brunskill. Value Driven Representation for Human-in-the-Loop Reinforcement Learning, In *Proceedings of the Conference on User Modeling, Adaptation and Personalization (UMAP)*, 2019.
 20. **Tong Mu**, **Karan Goel** and Emma Brunskill. PLOTS: Procedure Learning from Observations using sub-Task Structure, In *Proceedings of the International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2019.
 21. **Karan Goel** and Emma Brunskill. Learning Procedural Abstractions and Evaluating Discrete

- Latent Temporal Structure, In *International Conference on Learning Representations (ICLR)*, 2019.
22. Sherry Ruan, Liwei Jiang, Justin Xu, Bryce Tham, Zhengneng Qiu, Yeshuang Zhu, Elizabeth Murnane, Emma Brunskill and James Landay. QuizBot: A Dialogue-based Adaptive Learning System for Factual Knowledge, In *Computer Human Interaction (CHI)*, 2019.
 23. **Shayan Doroudi**, Ece Kamar and Emma Brunskill. Not Everyone Can Write Great Examples But Great Examples Can Come From Anywhere, In *AAAI Conference on Human Computation and Crowdsourcing (HCOMP)*, 2019.
 24. **Shayan Doroudi** and Emma Brunskill. Fairer but Not Fair Enough: On the Equitability of Knowledge Tracing, In *Conference on Learning Analytics and Knowledge (LAK)*, 2019.
 25. **Yao Liu**, Omer Gottesman, Aniruddh Raghu, Matthieu Komorowski, Aldo Faisal, Finale Doshi-Velez and Emma Brunskill. Representation Balancing MDPs for Off-Policy Policy Evaluation, In *Proceedings of the Neural Information Processing Systems Conference (NeurIPS)*, 2018.
 26. **Andrea Zanette** and Emma Brunskill. Problem Dependent RL Bounds Which Can Identify Bandit Structure in MDPs, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2018.
 27. *Philip Thomas*, **Christoph Dann** and Emma Brunskill. Decoupling Gradient-Like Learning Rules from Representations, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2018.
 28. **Shayan Doroudi** and Emma Brunskill. The Misidentified Identifiability Problem in Bayesian Knowledge Tracing, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2017.
 29. **Shayan Doroudi**, Vincent Aleven and Emma Brunskill. The Robust Evaluation Matrix: Towards a More Principled Offline Exploration of Instructional Policies, In *Proceedings of the ACM Conference on Learning at Scale*, 2017.
 30. **Shayan Doroudi**, *Phil Thomas* and Emma Brunskill. Importance Sampling for Fair Policy Selection, In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2017.
 31. **Christoph Dann**, Tor Lattimore and Emma Brunskill. Unifying PAC and Regret: Uniform PAC Bounds for Episodic Reinforcement Learning, In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, 2017.
 32. **Zhaohan Daniel Guo**, *Phil Thomas* and Emma Brunskill. Using Options and Covariance Testing for Long Horizon Off-Policy Policy Evaluation, In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, 2017.
 33. Ronan Fruit, Matteo Pirota, Emma Brunskill and Alessandro Lazaric. Regret Minimization in MDPs with Options without Prior Knowledge, In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, 2017.
 34. Akram Erraqabi, Alessandro Lazaric, Michal Valko, Emma Brunskill and **Yun-En Liu**. Trading

- Off Rewards and Errors in Multi-armed Bandits, In *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2017.
35. *Phil Thomas* and Emma Brunskill. Importance Sampling with Unequal Support, In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2017.
 36. *Phil Thomas*, Georgios Theodorou, Mohammad Ghavamzadeh, Igor Durugkar and Emma Brunskill. Predictive Off-Policy Policy Evaluation for Nonstationary Decision Problems, with Applications to Digital Marketing, In *Proceedings of the Conference on Innovative Applications of Artificial Intelligence (IAAI)*, 2017.
 37. **Karan Goel**, **Christoph Dann** and Emma Brunskill. Sample Efficient Policy Search for Optimal Stopping Domains, In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2017.
 38. *Philip Thomas* and Emma Brunskill. Data-Efficient Off-Policy Policy Evaluation for Reinforcement Learning, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2016.
 39. *Philip Thomas*, **Christoph Dann**, Bruno Castro da Silva and Emma Brunskill. Energetic Natural Gradient Descent, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2016.
 40. **Travis Mandel**, **Yun-En Liu**, Emma Brunskill and Zoran Popović. Efficient Bayesian Clustering for Reinforcement Learning, In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2016.
 41. **Li Zhou** and Emma Brunskill. Latent Contextual Bandits and their Application to Personalized Recommendations for New Users, In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2016.
 42. **Qi Guo**, Chinmay Kulkarni, Aniket Kittur, Jeffrey Bigham and Emma Brunskill. Questimator: Generating Knowledge Assessments for Arbitrary Topics, In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2016.
 43. **Zhaohan Daniel Guo**, **Shayan Doroudi** and Emma Brunskill. A PAC RL Algorithm for Episodic POMDPs, In *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2016.
 44. **Yao Liu**, **Zhaohan Daniel Guo** and Emma Brunskill. PAC Continuous State Online Multitask Reinforcement Learning with Identification, In *Proceedings of the International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2016.
 45. **Travis Mandel**, **Yun-En Liu**, Emma Brunskill and Zoran Popović. Offline Evaluation of Online Reinforcement Learning Algorithms, In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2016.
 46. **Shayan Doroudi**, Kenneth Holstein, Vincent Aleven and Emma Brunskill. Sequence Matters, But How Exactly? A Methodology for Evaluating Activity Sequences from Data, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2016.

47. James Lomas, Jodi Forlizzi, Nikhil Poonwala, Nirmal Patel, Sharan Shodhan, Kishan Patel, Ken Koedinger and Emma Brunskill. Interface Design Optimization as a Multi-Armed Bandit Problem, In *Computer Human Interaction (CHI)*, 2016.
48. **Shayan Doroudi**, Ece Kamar, Emma Brunskill and Eric Horvitz. Towards a Learning Science for Complex Crowdsourcing Tasks, In *Computer Human Interaction (CHI)*, 2016.
49. **Christoph Dann** and Emma Brunskill. Sample Complexity of Episodic Fixed-Horizon Reinforcement Learning, In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, 2015.
50. **Zhaohan Daniel Guo** and Emma Brunskill. Concurrent PAC RL, In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2015.
51. **Travis Mandel, Yun-En Liu**, Emma Brunskill and Zoran Popović. The Queue Method: Handling Delay, Heuristics, Prior Data, and Evaluation in Bandits, In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2015.
52. **Shayan Doroudi**, Kenneth Holstein, Vincent Aleven and Emma Brunskill. Towards Understanding How to Leverage Sense-making, Induction/Refinement and Fluency to Improve Robust Learning, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2015.
53. **Joseph Rollinson** and Emma Brunskill. From Predictive Models to Instructional Policies, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2015.
54. *Mohammad Azar*, Alessandro Lazaric and Emma Brunskill. Resource-Efficient Stochastic Optimization of a Locally Smooth Function under Correlated Bandit Feedback, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2014.
55. Emma Brunskill and Lihong Li. PAC-inspired Option Discovery in Lifelong Reinforcement Learning, In *Proceedings of the International Conference on Machine Learning (ICML)*, 2014.
56. **Travis Mandel, Yun-En Liu**, Sergey Levine, Emma Brunskill and Zoran Popović. Offline Policy Evaluation Across Representations with Applications to Educational Games, In *Proceedings of the International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2014.
57. **Yun-En Liu, Travis Mandel**, Emma Brunskill and Zoran Popović. Trading Off Scientific Knowledge and User Learning with Multi-Armed Bandits, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2014.
58. **Yun-En Liu, Travis Mandel**, Eric Butler, Erik Andersen, Eleanor O'Rourke, Emma Brunskill and Zoran Popović. Towards Automatic Experimentation of Educational Knowledge, In *Computer Human Interaction (CHI)*, 2014.
59. *Mohammad Azar*, Alessandro Lazaric and Emma Brunskill. Sequential Transfer in Multi-armed Bandit with Finite Set of Models, In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, 2013.
60. *Mohammad Azar*, Alessandro Lazaric and Emma Brunskill. Regret Bounds for Reinforcement

- Learning with Policy Advice, In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2013.
61. Emma Brunskill and Lihong Li. Sample Complexity of Transfer Reinforcement Learning, In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2013.
 62. Anna Rafferty, Jodi Davenport and Emma Brunskill. Estimating Student Knowledge from Paired Interaction Data, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2013.
 63. **Yun-En Liu, Travis Mandel**, Eric Butler, Erik Andersen, Eleanor O'Rourke, Emma Brunskill and Zoran Popović. Predicting Player Moves in an Educational Game: A Hybrid Approach, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2013.
 64. Siyuan Liu, Miguel Araujo, Ramayya Krishnan, Emma Brunskill, Rosaldo Rossetti and Joao Barros. Understanding Sequential Decisions via Inverse Reinforcement Learning, In *International Conference on Mobile Data Management (MDM)*, 2013.
 65. Sashank Reddi and Emma Brunskill. Incentive Decision Processes, In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2012.
 66. **Jung In Lee** and Emma Brunskill. The Impact on Individualizing Student Models on Necessary Practice Opportunities, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2012.
 67. Michael Yudelso and Emma Brunskill. Policy Building – An Extension to User Modeling, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2012.
 68. Emma Brunskill and Stuart Russell. Partially Observable Sequential Decision Making for Problem Selection in an Intelligent Tutoring System, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2011.
 69. Emma Brunskill. Estimating Prerequisite Structure from Noisy Data, In *Proceedings of the International Conference on Educational Data Mining (EDM)*, 2011.
 70. Anna Rafferty, Emma Brunskill, Tom Griffiths, and Patrick Shafto. Faster Teaching by POMDP Planning, In *Proceedings of the International Conference on Artificial Intelligence in Education (AIED)*, 2011.
 71. Emma Brunskill and Stuart Russell. RAPID: A Reachable Anytime Planner for Imprecisely Sensed Domains, In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2010.
 72. Ruijie He, Emma Brunskill, and Nicholas Roy. PUMA: Planning under Uncertainty with Macro-Actions, In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2010.
 73. Emma Brunskill. When Policies Can Be Trusted: Analyzing a Criteria to Identify Optimal Policies in MDPs with Unknown Model Parameters, In *Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS)*, 2010.
 74. Emma Brunskill, Sunil Garg, Clint Tseng, Joyojeet Pal, and Leah Findlater. Evaluating an Adaptive Multi-user Educational Tool for Low-resource Regions, In *Proceedings of the International Conference on Information and Communication Technologies and Development*

(ICTD), 2010.

75. Somani Patnaik, Emma Brunskill, and William Thies. Evaluating the Accuracy of Data Collection on Mobile Phones: A Study of Forms, SMS, and Voice, In *Proceedings of the International Conference on Information and Communication Technologies and Development (ICTD)*, 2009.
76. Yuan Wei, Emma Brunskill, Thomas Kollar and Nicholas Roy. Where to Go: Interpreting Natural Directions Using Global Inference, In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2009.
77. Emma Brunskill, Bethany Leffler, Lihong Li, Michael L. Littman and Nicholas Roy. CORL: A Continuous-state Offset-dynamics Reinforcement Learner, In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2008.
78. Finale Doshi, Emma Brunskill, Alec Shkolnik, Thomas Kollar, Khash Rohanimanesh, Russ Tedrake and Nicholas Roy. A Supervised Learning Approach for Collision Detection in Legged Locomotion, In *Proceedings of the International Conference on Intelligent Robots and Systems (IROS)*, 2007.
79. Emma Brunskill, Thomas Kollar, and Nicholas Roy. Topological Mapping using Spectral Clustering and Classification, In *Proceedings of the International Conference on Intelligent Robots and Systems (IROS)*, 2007.
80. Emma Brunskill, Eiji Uchibe, and Kenji Doya. Adaptive State Space Construction with Reinforcement Learning for Robots, In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2006.
81. Emma Brunskill and Nicholas Roy. SLAM using Incremental Probabilistic PCA and Dimensionality Reduction, In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, 2005.

Refereed Nonarchival Papers, Posters, Works in Progress, Demonstrations

1. **Zhaohan Daniel Guo** and Emma Brunskill. Sample Efficient Learning with Feature Selection for Factored MDPs, In *European Workshop on Reinforcement Learning*, 2018.
2. **Yao Liu** and Emma Brunskill. When Simple Exploration is Sample Efficient: Identifying Sufficient Conditions for Random Exploration to Yield PAC RL Algorithms, In *European Workshop on Reinforcement Learning*, 2018.
3. Emma Brunskill, Dawn Zimmaro and Candace Thille. Exploring the Impact of the Default Option on Student Engagement and Performance in a Statistics MOOC, Work in Progress, In *Proceedings of the ACM Conference on Learning at Scale*, 2018.
4. **Tong Mu**, Shuhan Wang, Erik Andersen and Emma Brunskill. Combining Adaptivity with Progression Ordering for Intelligent Tutoring Systems, Work in Progress, In *Proceedings of the ACM Conference on Learning at Scale*, 2018.
5. Sherry Ruan, Alex Kolchinski, Dan Schwartz and Emma Brunskill. Adaptive Natural-Language Targeting for Student Feedback, Work in Progress, In *Proceedings of the ACM Conference on*

Learning at Scale, 2018.

6. Sharon Zou, **Tong Mu**, **Karan Goel**, Michael Bernstein and Emma Brunskill. Shared Autonomy for Interactive Systems, In *Proceedings of the User Interface Software and Technology (UIST) Conference*, 2018.
7. **Rika Antonova**, **Joe Runde**, **Dexter Lee**, and Emma Brunskill. Automatically Learning to Teach to the Learning Objective, Work in Progress, In *Proceedings of the ACM Conference on Learning at Scale*, 2016.
8. **Min Hyung Lee**, **Joe Runde**, Warfa Jibril, Zhuoying Wang and Emma Brunskill. Learning the Features Used to Decide How to Teach, Work in Progress, In *Proceedings of the ACM Conference on Learning at Scale*, 2015.
9. Emma Brunskill and Lihong Li. The Online Discovery Problem and Its Application to Lifelong Reinforcement Learning, In the *Conference on Reinforcement Learning and Decision Making (RLDM)*, 2015.
10. Ted McCarthy, Brian DeRenzi, Josh Blumenstock and Emma Brunskill. Towards Operationalizing Outlier Detection in Community Health Programs, In *Proceedings of the International Conference on Information and Communication Technologies and Development (ICTD)*, In Note, 2013.
11. **Sukhada Palkar** and Emma Brunskill. Analysis of the Impact of Errors Made During Health Data Collection Using Mobile Phones: Exploring Error Modeling and Automatic Diagnosis, In *Symposium on Computing for Development (DEV)*, Poster, 2013.
12. Emma Brunskill. Bayes-Optimal Reinforcement Learning for Discrete Uncertainty Domains, In *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2012 Extended Abstract.
13. Emma Brunskill and Neal Lesh. Routing for Rural Health: Optimizing Community Health Worker Visit Schedules, In *AAAI Spring Symposium on Artificial Intelligence for Development*, 2010.
14. Kuang Chen, Emma Brunskill, Jonathan Dick and Prabhjot Dhadialla. Learning to Identify Locally Actionable Health Anomalies, In *AAAI Spring Symposium on Artificial Intelligence for Development*, 2010.
15. Frank Dabek, Emma Brunskill, Frans Kaashoek, David Karger, Robert Morris, Ion Stoica, and Hari Balakrishnan. Building Peer-to-peer Systems with Chord, a Distributed Lookup Service, In *Proceedings of Hot Topics in Operating Systems (HotOS)*, 2001.

Presentations

Invited Plenary Talks and Distinguished Lectures

- 2019 Uncertainty in Artificial Intelligence (UAI)
- 2019 Conference on Learning Theory (COLT)
- 2019 Cornell Computer Science Colloquium Series
- 2019 Women in Data Science Conference
- 2019 New York Academy of Sciences Annual Machine Learning Symposium

- 2019 Pinterest Distinguished Speaker Series
- 2018 Women in Machine Learning Workshop
- 2017 Neural Information Processing Systems Invited Tutorial
- 2017 Human Computation (HCOMP) conference
- 2017 Kavli Frontiers of Engineering
- 2017 Neural Information Processing Systems Invited Tutorial
- 2016 Office of Science Technology Policy Workshop on Safety and Control for AI
- 2014 CMU Ideas Lab Presenter, World Economic Forum, Davos
- 2012 Neural Information Processing Systems Invited Tutorial
- 2012 CMU Ideas Lab Presenter, World Economic Forum, China

Other Invited Presentations

- 2020 UCLA IPAM Workshop Intersections between Control, Learning and Optimization
- 2020 Neural Information Processing Systems (NeurIPS) Workshop on Machine Learning with Guarantees
- 2020 Neural Information Processing Systems (NeurIPS) Workshop on Deep Reinforcement Learning
- 2019 Princeton IAS, New Directions in Reinforcement Learning and Control
- 2019 Workshop on the Algorithmic Foundations of Learning and Control
- 2019 Invited Tutorial, Stanford AI and Cyber Security for Congress Staffers
- 2019 Emerging Challenges in Deep Learning (Simons Institute)
- 2019 International Conference on Machine Learning (ICML) Workshop on Real-world Sequential Decision Making: Reinforcement Learning and Beyond
- 2019 Invited Panel, International Conference on Machine Learning (ICML) Workshop on Real Life Reinforcement Learning
- 2019 1st Conference on Learning for Dynamics and Control (L4DC)
- 2019 Simons New Directions in Theoretical Machine Learning
- 2018 Google Research
- 2018 Reinforcement Learning Summer School, Vector Institute, Canada
- 2018 International Conference on Machine Learning (ICML) Workshop on Exploration in Reinforcement Learning
- 2018 International Conference on Machine Learning (ICML) Workshop on Planning and Learning
- 2018 International Conference on Machine Learning (ICML) Workshop on Statistical Relational AI
- 2018 Machine Learning Advances and Applications Seminar, Vector Institute, Canada
- 2018 AAAI Spring Symposium Workshop
- 2017 Invited Tutorial, Simons Foundations of Machine Learning Boot Camp
- 2017 Neural Information Processing Systems (NeurIPS) Workshop on Teaching Machines, Robots and Humans
- 2017 Neural Information Processing Systems (NeurIPS) Workshop on Hierarchical Reinforcement Learning
- 2017 Neural Information Processing Systems (NeurIPS) Workshop on From 'What If?' to 'What Next?'
- 2016 International Conference on Machine Learning (ICML) Workshop on Machine Learning in Education
- 2016 International Conference on Machine Learning (ICML) Workshop on Abstraction in RL

- 2015 Fall AAAI Symposium on Sequential Decision Making for Intelligent Agents
- 2015 Data Science for Social Good Summer School
- 2015 Reinforcement Learning and Decision Making (RLDM) Conference 2015, Launch CMU, Silicon Valley
- 2015 Personalized Learning Workshop hosted by Rice University
- 2014 Neural Information Processing Systems (NeurIPS) Workshop on Personalization
- 2014 Neural Information Processing Systems (NeurIPS) Workshop on Novel and Applications in RL
- 2014 Neural Information Processing Systems Workshop on Human Propelled Machine Learning
- 2014 AAAI Workshop on Sequential Decision-Making with Big Data
- 2012 Neural Information Processing Systems (NeurIPS) Workshop on Personalizing Education with Machine Learning
- 2011 Microsoft Research Summer Institute
- 2011 International Conference on Machine Learning (ICML) Workshop on Machine Learning for Global Challenges
- 2010 ICAPS POMDP Practitioners Workshop on Tractable, Approximate POMDP Planning for Robotics

Department Seminars

- 2020 Carnegie Mellon University
- 2020 Georgia Institute of Technology
- 2019 Harvard University
- 2018 New York University & Columbia University Data Science Seminar
- 2018 Massachusetts Institute of Technology
- 2016 University of California, Berkeley
- 2015 Johns Hopkins University
- 2015 Stanford University
- 2015 University of Texas at Austin
- 2015 University College London
- 2014 Princeton University
- 2014 Harvard University
- 2014 University of Washington
- 2014 Duke University
- 2014 McGill University
- 2011 Carnegie Mellon University

Students

Current Ph.D. Students

Ramtin Keramati

Thesis: Safe and Robust Reinforcement Learning

Anticipated Date of Graduation: 2021

Andrea Zanette, Co-advised with Mykel Kochenderfer

Thesis: Instance Dependent Bounds for Reinforcement Learning and Scaling Up

Anticipated Date of Graduation: 2021

Tong Mu

Thesis: Reinforcement Learning and Human Learning

Anticipated Date of Graduation: 2022

Xinkun Nie, CS-Co-advisor. Primary advisor: Stefan Wager

Thesis: Counterfactual Reasoning.

Anticipated Date of Graduation: 2022

Yao Liu

Thesis: Batch Off policy Reinforcement Learning

Anticipated Date of Graduation: 2022

Scott Fleming, Co-advised with Nigam Shah

Thesis: Health & machine learning

Anticipated Date of Graduation: 2023

Completed Ph.D. Student Supervision

Christoph Dann, Carnegie Mellon

Thesis: Strategic Exploration in Reinforcement Learning - New Algorithms and Learning Guarantees

Now: Research Scientist at Google Brain

Graduated 2019

Shayan Doroudi, Carnegie Mellon

Thesis: Integrating Human and Machine Intelligence for Enhanced Curriculum Design

Now: Assistant Professor at UC Irvine

Graduated 2019

Zhaohan Daniel Guo, Carnegie Mellon

Thesis: Directed Exploration for Improved Sample Efficiency in Reinforcement Learning

Now: Research Scientist at Deep Mind

Graduated 2019

Travis Mandel, Co-advised with Zoran Popović, University of Washington

Thesis: Towards More Practical Reinforcement Learning

Now: Assistant Professor at University of Hawaii

Graduated 2017

Yun-En Liu, Co-advised with Zoran Popović, University of Washington

Thesis: Building Behavioral Experimentation Engines

Now: Senior Researcher at Enlearn, educational technology nonprofit

Graduated 2015

Postdoctoral Advising

Pierre-Luc Bacon (2018-2019)

Bilevel optimization and off policy RL

Now: Assistant Professor at University of Montreal

Peyton Greenside (2018-2019)

Schmidt Science Fellow, RL for scientific monitoring

Now: Co-founder biotech startup

Jonathan Bragg (2018-2019)

AI for performance and learning support

Now: AI2 Research Scientist

Philip Thomas (2015-2017)

Offline policy evaluation and ensuring good behavior of ML procedures

Now: Assistant Professor at University of Massachusetts, Amherst

Mohammad Azar (2012-2013)

Multi-armed bandits, spectral methods and transfer learning

Now: DeepMind Research Scientist

Supervised Masters Students with Publication

Karan Goel, Carnegie Mellon

Now: PhD student at Stanford

Graduated 2018

Rika Antonova, Carnegie Mellon

Now: PhD student in Sweden

Graduated 2016

Qi Guo, Carnegie Mellon

Now: LinkedIn

Graduated 2016

Joe Runde, Carnegie Mellon

Now: IBM

Graduated 2015

Min Hyung, Carnegie Mellon

Now: AirBnB

Graduated 2015

Li Zhou, Carnegie Mellon
Now: ML researcher at Amazon
Graduated 2014

Sukhada Palkar, Carnegie Mellon
Now: AirBnB
Graduated 2013

Jung In Lee, Carnegie Mellon
Now: lawyer
Graduated 2013

Supervised Undergraduates with Publication

Joseph Rollinson, Carnegie Mellon
Now: Duolingo
Graduated 2015

Professional Activities

Program Conference Program Chair or Co-Chair

2017 Program Co-chair, Reinforcement Learning and Decision Making (RLDM)

Conference Organizing Committee

2015 Tutorials Co-chair, International Conference on Automated Planning and Scheduling (ICAPS)
2014/15 Tutorials Co-chair, Association for Advancement of Artificial Intelligence Conference (AAAI)
2013 Doctoral Consortium Co-chair, International Conference on Automated Planning and Scheduling (ICAPS)

Board Membership

2018-present International Machine Learning Society (runs ICML)
2012-present Journal of Artificial Intelligence (JAIR)
2012-2016 Women in Machine Learning (WIML)

Workshop Organizer

Fall 2020 Theory of Reinforcement Learning at UC Berkeley Simons Institute
2019 International Conference on Machine Learning (ICML) Workshop on Exploration in Reinforcement Learning
2018 Uncertainty in Artificial Intelligence Workshop on Safety, Risk and Uncertainty in RL
2016/17 Rising Stars in EECS Workshop
2015 International Conference on Machine Learning (ICML) Workshop on Machine Learning and Education
2011 IJCAI Workshop on Decision Making in Partially Observable, Uncertain Worlds

Top Level Conference Program Committee Member

2019, 2020 Senior Area Chair, International Conference on Machine Learning (ICML)
2018, 2019 Senior Area Chair, Neural Information Processing Systems (NeurIPS/NIPS)

2015, 2018 Area Chair, International Conference on Machine Learning (ICML)
 2016, 2018 Area Chair, International Joint Conference on Artificial Intelligence (IJCAI)
 2019 Area Chair, International Conference on Learning Representations (ICLR)
 2018, 2020 Area Chair, Association for the Advancement in Artificial Intelligence (AAAI)
 2015, 2017 Area Chair, Neural Information Processing Systems (NIPS)
 2015-16, 2020 Senior Program Committee, Uncertainty in Artificial Intelligence
 2015-17 Senior Program Committee, Association for the Advancement in Artificial Intelligence
 2015/17/19 Program Committee, Reinforcement Learning and Decision-Making Conference
 2011/13/15 Senior Program Committee, International Joint Conference on Artificial Intelligence
 2015-2020 Program Committee, Learning @ Scale (LAS)

University and Department Service

University and Committee Work

2019-2020 Stanford HAI Grant Selection Committee
 2018-2019 Stanford Human-Centered AI Design Team
 2018-2019 Stanford Data Science Institute Design Team
 2014-2016 CMU Undergraduate SURG Selection Committee
 2015 CMU OurCS workshop research mentor
 2014 CMU SRC-URO Meeting of the Minds poster judging
 2013 CMU OurCS workshop poster judge
 2013 CMU Learning Media Research Working Group

School and Department Work

2018/19/20 Stanford Graduate Admissions
 2018 Stanford CS and Society Committee
 2016 CMU CSD Open house faculty coordinator
 2015/16 CMU CSD DRC
 2015 CMU MLD Department Head Search Committee
 2015/16 CMU CSD Speakers Club
 2013/15 CMU CSD Faculty Hiring Committee