

Stanford



Emma Brunskill

Associate Professor of Computer Science and, by courtesy, of Education

Bio

ACADEMIC APPOINTMENTS

- Associate Professor, Computer Science
- Associate Professor (By courtesy), Graduate School of Education
- Faculty Affiliate, Institute for Human-Centered Artificial Intelligence (HAI)

HONORS AND AWARDS

- Alumni Impact Award, University of Washington Computer Science (2020)
- Young Investigator Award, Office of Naval Research (2015)
- CAREER Award, NSF (2014)
- Faculty Fellowship, Microsoft (2012)

PROGRAM AFFILIATIONS

- Symbolic Systems Program

PROFESSIONAL EDUCATION

- PhD, Massachusetts Institute of Technology , Computer Science (2009)

Teaching

COURSES

2024-25

- Counterfactuals: The Science of What Ifs?: CS 31N (Spr)
- Lean Launchpad for Education: EDUC 260 (Aut)
- Reinforcement Learning: CS 234 (Win)

2023-24

- Reinforcement Learning: CS 234 (Spr)

2022-23

- Advanced Survey of Reinforcement Learning: CS 332 (Aut)
- Counterfactuals: The Science of What Ifs?: CS 31N (Spr)
- Reinforcement Learning: CS 234 (Win)

2021-22

- Causality, Counterfactuals and AI: OSPOXFRD 48 (Spr)
- Reinforcement Learning: CS 234 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Lauren Gillespie, Saurabh Kumar, Gabriel Poesia Reis e Silva, Roshni Sahoo, Garrett Thomas, Rose Wang

Postdoctoral Faculty Sponsor

Ge Gao, Zhaoqi Li

Master's Program Advisor

Jenny Chen, Mehmet Hamza Erol, Audrey Kwan, Peyton Lee, JB Jong Beom Lim, Alex Paek, Arpit Ranasaria, Megan Santhumayor, Akhil Vyas, Nick Walker, Evelyn Yee

Doctoral Dissertation Co-Advisor (AC)

Aishwarya Mandyam, Allen Nie, Henry Zhu

Doctoral (Program)

Joy He-Yueya, Alex Nam

Publications

PUBLICATIONS

- **Reinforcement learning tutor better supported lower performers in a math task** *MACHINE LEARNING*
Ruan, S., Nie, A., Steenbergen, W., He, J., Zhang, J. Q., Guo, M., Liu, Y., Nguyen, K., Wang, C. Y., Ying, R., Landay, J. A., Brunskill, E.
2024
- **Texting and tutoring: Short-term K-3 reading interventions during the pandemic** *JOURNAL OF EDUCATIONAL RESEARCH*
Silverman, R. D., Keane, K., Hsieh, H., Southerton, E., Scott, R. C., Brunskill, E.
2023
- **Constraint Sampling Reinforcement Learning: Incorporating Expertise For Faster Learning**
Mu, T., Theocharous, G., Arbour, D., Brunskill, E., Assoc Advancement Artificial Intelligence
ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2022: 7841-7849
- **Power Constrained Bandits.** *Proceedings of machine learning research*
Yao, J., Brunskill, E., Pan, W., Murphy, S., Doshi-Velez, F.
1800; 149: 209-259
- **EnglishRot: An AI-Powered Conversational System for Second Language Learning**
Ruan, S., Jiang, L., Xu, Q., Davis, G. M., Liu, Z., Brunskill, E., Landay, J. A., ASSOC COMP MACHINERY
ASSOC COMPUTING MACHINERY.2021: 434-444
- **Automatic Adaptive Sequencing in a Webgame**
Mu, T., Wang, S., Andersen, E., Brunskill, E., Cristea, A. I., Troussas, C.
SPRINGER INTERNATIONAL PUBLISHING AG.2021: 430-438
- **Learning When-to-Treat Policies** *JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION*
Nie, X., Brunskill, E., Wager, S.
2020
- **Scaling up behavioral science interventions in online education.** *Proceedings of the National Academy of Sciences of the United States of America*
Kizilcec, R. F., Reich, J., Yeomans, M., Dann, C., Brunskill, E., Lopez, G., Turkay, S., Williams, J. J., Tingley, D.
2020

- **Sublinear Optimal Policy Value Estimation in Contextual Bandits**
Kong, W., Valiant, G., Brunskill, E., Chiappa, S., Calandra, R.
ADDISON-WESLEY PUBL CO.2020: 4377–86
- **Being Optimistic to Be Conservative: Quickly Learning a CVaR Policy**
Keramati, R., Tamkin, A., Dann, C., Brunskill, E., Assoc Advancement Artificial Intelligence
ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2020: 4436–4443
- **Fake It Till You Make It: Learning-Compatible Performance Support**
Bragg, J., Brunskill, E., Adams, R. P., Gogate
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2020: 915–924
- **Off-Policy Policy Gradient with State Distribution Correction**
Liu, Y., Swaminathan, A., Agarwal, A., Brunskill, E., Adams, R. P., Gogate
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2020: 1180–1190
- **Interpretable Off-Policy Evaluation in Reinforcement Learning by Highlighting Influential Transitions**
Gottesman, O., Futoma, J., Liu, Y., Parbhoo, S., Celi, L., Brunskill, E., Doshi-Velez, F., Daume, H., Singh, A.
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2020
- **Supporting Children's Math Learning with Feedback-Augmented Narrative Technology**
Ruan, S., He, J., Ying, R., Burkle, J., Hakim, D., Wang, A., Yin, Y., Zhou, L., Xu, Q., AbuHashem, A., Dietz, G., Murnane, E. L., Brunskill, et al
ASSOC COMPUTING MACHINERY.2020: 567–580
- **Towards the Systematic Reporting of the Energy and Carbon Footprints of Machine Learning** *JOURNAL OF MACHINE LEARNING RESEARCH*
Henderson, P., Hu, J., Romoff, J., Brunskill, E., Jurafsky, D., Pineau, J.
2020; 21
- **Frequentist Regret Bounds for Randomized Least-Squares Value Iteration**
Zanette, A., Brandfonbrener, D., Brunskill, E., Pirota, M., Lazaric, A., Chiappa, S., Calandra, R.
ADDISON-WESLEY PUBL CO.2020: 1954–63
- **Where's the Reward?: A Review of Reinforcement Learning for Instructional Sequencing** *INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE IN EDUCATION*
Doroudi, S., Alevan, V., Brunskill, E.
2019; 29 (4): 568–620
- **Preventing undesirable behavior of intelligent machines.** *Science (New York, N.Y.)*
Thomas, P. S., Castro da Silva, B., Barto, A. G., Giguere, S., Brun, Y., Brunskill, E.
2019; 366 (6468): 999–1004
- **Fairer but Not Fair Enough On the Equitability of Knowledge Tracing**
Doroudi, S., Brunskill, E., Azcona, D., Chung, R.
ASSOC COMPUTING MACHINERY.2019: 335–39
- **PLOTS: Procedure Learning from Observations using Subtask Structure**
Mu, T., Goel, K., Brunskill, E., Assoc Comp Machinery
ASSOC COMPUTING MACHINERY.2019: 1007–15
- **Almost Horizon-Free Structure-Aware Best Policy Identification with a Generative Model**
Zanette, A., Kochenderfer, M. J., Brunskill, E., Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Limiting Extrapolation in Linear Approximate Value Iteration**
Zanette, A., Lazaric, A., Kochenderfer, M. J., Brunskill, E., Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Offline Contextual Bandits with High Probability Fairness Guarantees**
Metevier, B., Giguere, S., Brockman, S., Kobren, A., Brun, Y., Brunskill, E., Thomas, P. S., Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, et al

NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019

- **Value Driven Representation for Human-in-the-Loop Reinforcement Learning**
Keramati, R., Brunskill, E., Assoc Comp Machinery
ASSOC COMPUTING MACHINERY.2019: 176–80
- **QuizBot: A Dialogue-based Adaptive Learning System for Factual Knowledge**
Ruan, S., Jiang, L., Xu, J., Tham, B., Qiu, Z., Zhu, Y., Murnane, E. L., Brunskill, E., Landay, J. A., Assoc Comp Machinery
ASSOC COMPUTING MACHINERY.2019
- **Key Phrase Extraction for Generating Educational Question-Answer Pairs**
Willis, A., Davis, G., Ruan, S., Manoharan, L., Landay, J., Brunskill, E., Assoc Comp Machinery
ASSOC COMPUTING MACHINERY.2019
- **BookBuddy: Turning Digital Materials Into Interactive Foreign Language Lessons Through a Voice Chatbot**
Ruan, S., Willis, A., Xu, Q., Davis, G. M., Jiang, L., Brunskill, E., Landay, J. A., Assoc Comp Machinery
ASSOC COMPUTING MACHINERY.2019
- **Shared Autonomy for an Interactive AI System**
Zhou, S., Mu, T., Goel, K., Bernstein, M., Brunskill, E., ACM
ASSOC COMPUTING MACHINERY.2018: 20–22
- **Representation Balancing MDPs for Off-Policy Policy Evaluation**
Liu, Y., Gottesman, O., Raghu, A., Komorowski, M., Faisal, A., Doshi-Velez, F., Brunskill, E., Bengio, S., Wallach, H., Larochelle, H., Grauman, K., CesaBianchi, N., Garnett, et al
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2018
- **Unifying PAC and Regret: Uniform PAC Bounds for Episodic Reinforcement Learning**
Dann, C., Lattimore, T., Brunskill, E., Guyon, Luxburg, U. V., Bengio, S., Wallach, H., Fergus, R., Vishwanathan, S., Garnett, R.
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2017
- **Regret Minimization in MDPs with Options without Prior Knowledge**
Fruit, R., Pirota, M., Lazaric, A., Brunskill, E., Guyon, Luxburg, U. V., Bengio, S., Wallach, H., Fergus, R., Vishwanathan, S., Garnett, R.
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2017
- **Using Options and Covariance Testing for Long Horizon Off-Policy Policy Evaluation**
Guo, Z., Thomas, P. S., Brunskill, E., Guyon, Luxburg, U. V., Bengio, S., Wallach, H., Fergus, R., Vishwanathan, S., Garnett, R.
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2017