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stephanie-milani
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Stephanie Milani

Research Interests

Reinforcement learning, interpretability and explainability, AI evaluation and measurement, AI transparency, human-AI interaction, sequential decision-making.

Education

2019–Present **Carnegie Mellon University**, .
Ph.D. in Machine Learning.
Advisor: Fei Fang.

2021 **Carnegie Mellon University**.
M.S. in Machine Learning Research.

2019 **University of Maryland, Baltimore County**.
B.S. in Computer Science, B.A. in Psychology. *Cum Laude*. Honors College Certificate. Presidential Scholar.
Advisors: Marie desJardins and Cynthia Matuszek.

Publications

For an up-to-date list, please see my Google Scholar. * *denotes equal contribution.*

Book Chapters

[1] **S. Milani**, Z. Zhang, N. Topin, Z. R. Shi, C. Kamhoua, E. E. Papalexakis, F. Fang. Interpretable Multi-Agent Reinforcement Learning with Decision-Tree Policies. *Explainable Agency in Artificial Intelligence, CRC Press / Taylor & Francis*, 2024. **Invited contribution**.

Peer-Reviewed Conference and Journal Papers

[1] A. Venugopal, **S. Milani**, F. Fang, B. S. Ravindran. MABL: Bi-Level Latent-Variable World Model for Sample-Efficient Multi-Agent Reinforcement Learning. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2024. *25% acceptance.*

[2] **S. Milani**, A. Kanervisto, K. Ramanauskas, S. Schulhoff, B. Houghton, R. Shah. The MineRL BASALT Evaluation and Demonstrations Dataset for Training and Benchmarking Agents that Solve Fuzzy Tasks. *Neural Information Processing Systems (NeurIPS) Benchmarks & Datasets Track*, 2023. **Oral Presentation**, *1% acceptance.*

[3] **S. Milani**, N. Topin, M. Veloso, F. Fang. Explainable Reinforcement Learning: A Survey and Comparative Review. *ACM CSUR Special Issue on Trustworthy AI*, 2023.

[4] **S. Milani**, A. Juliani, I. Momennejad, R. Georgescu, J. Rzpecki, A. Shaw, G. Costello, F. Fang, S. Devlin, K. Hofmann. Navigates Like Me: Understanding How People Evaluate Human-Like AI in Video Games. *ACM Conference on Human Factors in Computing Systems (CHI)*, 2023. *27.7% acceptance.*
Previous versions in NeurIPS-21 Workshop on Human-Centered AI and CHI-22 Late Breaking Work.

[5] M. Carroll, O. Paradise, J. Lin, R. Georgescu, M. Sun, D. Bignell, **S. Milani**, K. Hofmann, M. Hausknecht, A. Dragan, S. Devlin. Uni[MASK]: Unified Inference in Sequential Decision Problems. *Neural Information Processing Systems (NeurIPS)*, 2022. **Oral Presentation**, *1.9% acceptance.*
Previous version in ICLR-22 Workshop on Generalizable Policy Learning in the Physical World.

[6] **S. Milani***, Z. Zhang*, N. Topin, Z. R. Shi, C. Kamhoua, E. Papalexakis, F. Fang. MAVIPER: Learning Decision Tree Policies for Interpretable Multi-Agent Reinforcement Learning. *European Conference on Machine Learning (ECML)*, 2022. *26% acceptance.*
Previous version in AAAI-22 Explainable Agency in AI Workshop, **Invited for book chapter**.

[7] N. Topin, **S. Milani**, F. Fang, M. Veloso. Iterative Bounding MDPs: Learning Interpretable Policies via Non-Interpretable Methods. *AAAI Conference on Artificial Intelligence*, 2021. *21% acceptance*.

[8] **S. Milani**, W. Shen, K. S. Chan, S. Venkatesan, N. O. Leslie, C. Kamhoua, F. Fang. Harnessing the Power of Deception in Attack Graph Games. *Conference on Decision and Game Theory for Security (GameSec)*, 2020.

[9] J. Winder, **S. Milani**, M. Landen, E. Oh, S. Parr, S. Squire, M. desJardins, C. Matuszek. Planning with Abstract Learned Models While Learning Transferable Subtasks. *AAAI Conference on Artificial Intelligence*, 2020. *20.6% acceptance*.
Previous versions in ICAPS IntEx Workshop, 2017; RLDM, 2017; and Do Good Robotics Symposium, 2019.

[10] H. Li, **S. Milani**, V. Krishnamoorthy, M. Lewis, K. Sycara. Perceptions of Domestic Robots' Normative Behavior Across Cultures. *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES)*, 2019.

Peer-Reviewed Workshop Papers, Extended Abstracts, and Proceedings

[1] **S. Milani**, A. Kanervisto*, K. Ramanauskas*, S. Schulhoff, B. Houghton, S. Mohanty, B. Galbraith, K. Chen, Y. Song, T. Zhou, B. Yu, H. Liu, K. Guan, Y. Hu, T. Lv, F. Malato, F. Leopold, A. Raut, V. Hautamäki, A. Melnik, S. Ishida, J. F. Henriques, R. Klassert, W. Laurito, E. Novoseller, V. G. Goecks, N. Waytowich, D. Watkins, J. Miller, R. Shah. Towards Solving Fuzzy Tasks with Human Feedback: A Retrospective of the MineRL BASALT 2022 Competition. To appear in *PMLR: NeurIPS 2022 Competition and Demonstration Track*, 2024.

[2] R. Shah, S. H. Wang, C. Wild, **S. Milani**, A. Kanervisto, V. G. Goecks, N. Waytowich, D. Watkins-Valls, B. Prakash, E. Mills, D. Garg, A. F. Fries, A. Souly, J. S. Chan, D. del Castillo, T. Lieberum. Retrospective on the 2021 BASALT Competition on Learning from Human Feedback. *PMLR: NeurIPS 2021 Competition and Demonstration Track*, 2022.

[3] A. Kanervisto*, **S. Milani***, K. Ramanauskas, N. Topin, Z. Lin, J. Li, J. Shi, D. Ye, Q. Fu, W. Yang, W. Hong, Z. Huang, H. Chen, G. Zeng, Y. Lin, V. Micheli, E. Alonso, F. Fleuret, A. Nikulin, Y. Belousov, O. Svidchenko, A. Shpilman. MineRL Diamond 2021 Competition: Overview, Results, and Lessons Learned. *PMLR: NeurIPS 2021 Competition and Demonstration Track*, 2022.

[4] Y. Du, Z. Song, **S. Milani**, C. Gonzalez, F. Fang. Learning to Play Adaptive Cyber Deception Game. *The 13th Workshop on Optimization and Learning in Multiagent Systems at the International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2022.

[5] W. H. Guss, **S. Milani**, N. Topin, B. Houghton, S. Mohanty, A. Melnik, A. Harter, B. Buschmaas, B. Jaster, C. Berganski, D. Heitkamp, M. Henning, H. Ritter, C. Wu, X. Hao, Y. Lu, H. Mao, Y. Mao, C. Wang, M. Opanowicz, A. Kanervisto, Y. Schraner, C. Scheller, X. Zhou, L. Liu, D. Nishio, T. Tsuneda, K. Ramanauskas, G. Juceviciute. Towards robust and domain agnostic reinforcement learning competitions: MineRL 2020. *PMLR: NeurIPS 2020 Competition and Demonstration Track*, 2021.

[6] **S. Milani**, N. Topin, B. Houghton, W. H. Guss, S. P. Mohanty, O. Vinyals, N. S. Kuno. A Retrospective Analysis of the 2019 MineRL Competition on Sample-Efficient Reinforcement Learning Using Human Priors. *PMLR: NeurIPS 2019 Competition and Demonstration Track*, 2020.

[7] **S. Milani***, Z. Fan*, S. Gulati, T. Nguyen, F. Fang, A. Yadav. Intelligent Tutoring Strategies for Students with Autism Spectrum Disorder: A Reinforcement Learning Approach. *AAAI Conference on Artificial Intelligence (AAAI) Workshop on AI for Education*, 2020.
Also accepted for lightning talk at the CMU Symposium on AI and Social Good, 2020.

[8] B. Houghton, **S. Milani**, N. Topin, W. H. Guss, K. Hofmann, D. Perez-Liebana, M. Veloso, R. Salakhutdinov. Guaranteeing Reproducibility in Deep Learning Competitions. *Neural Information Processing Systems (NeurIPS) Challenges in Machine Learning (CiML) Workshop*, 2019.

[9] **S. Milani**, N. Topin, K. Sycara. Penalty-Modified Markov Decision Processes: Efficient Incorporation of Norms into Sequential Decision Making Problems. *Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM)*, 2019.

Technical Reports

[1] **S. Milani**. Penalty-Modified Abstract Markov Decision Processes. *Technical Report for Undergraduate Research Award, UMBC*, 2019.

[2] **S. Milani**. Creating a Scalable Framework for Model-Free Reinforcement Learning in Norm-Rich Environments. *Robotics Institute Summer Scholars Working Papers Journal*, 2018.

[3] **S. Milani** and C. Mertz. Generating Hard Positive Examples via Adversary for Occluded Traffic Sign Detection. *Robotics Institute Summer Scholars Working Papers Journal*, 2017.

Selected Honors and Awards

Research

2023 **NeurIPS 2023 Scholar Award**, to attend NeurIPS 2023.

CMU Graduate Student Travel Grant, ($750 USD) to attend CHI 2023.

2022 **ECML PhD Registration Grant**, 17% acceptance.

AAAI Student Scholarship

2019 **Travel Awards: NeurIPS** ($500 USD), **RLDM** ($300 USD), **ICML** ($1000 USD), **ICML Diversity and Inclusion** ($500 USD, Declined).

Top Reviewer Award, ICML. Awarded to top 33% of all reviewers.

2018–2019 **UMBC Undergraduate Research Award** ($1500 USD), selective scholarship to support undergraduate research with a UMBC faculty mentor on an original project. Awarded for *Integrating Ethical Reasoning into the Abstract Markov Decision Process Framework*. 1 of 55 awarded.

Newman Civic Fellow, 1 of 268 awarded nationally for leadership and dedication to increasing access to computer science. Nominated by the President of UMBC.

2017–2019 **National Academy of Engineering Grand Challenge Scholar**, 1 of 7 students selected in yearly cohort to focus on finding solutions to address important societal problems.

2018 **OurCS Workshop Oracle Scholar**, one of a select group of participants designated as Oracle Scholar. 1 of 102 chosen nationally to attend OurCS research workshop.

2017, 2018 **UMBC Researcher of the Week**

2017 **Traffic21 Women in Transportation Fellow**, 1 of 1 awarded to support RISS internship.

Academic and Service

2021 **Funding Proposal for MineRL BASALT** (€15,000), AIJ. Awarded to R. Shah, C. Wild, S. H. Wang, N. Alex, B. Houghton, W. H. Guss, **S. Milani**, N. Topin, P. Abbeel, S. Russell, and A. Dragan.

2020 **Inclusivity Compute and Conference Grants for MineRL Competition at NeurIPS** (€7,500), AIJ. Awarded to **S. Milani** and N Topin.

2019 **Inclusivity Travel Grants for MineRL Competition and Workshop at NeurIPS** (€3,000). Awarded to **S. Milani** and N. Topin.

UMBC Honors College Community Service Award, 1 of 4 awarded at UMBC for strong academic performance and outstanding community service.

Grace Hopper Student Scholar, funded by Palo Alto Networks to attend Grace Hopper Conference. 1 of 657 awarded nationally.

2018–2019 **Rewriting the Code Fellow**, awarded for technically-skilled experience and projects.

2017–2018 **France-Merrick Scholar** ($2750 USD), 1 of 7 awarded at UMBC. For commitment to leadership and service in computer science and artificial intelligence.

Selected Professional and Community Service

Organizing

2023 **ICML WiML Un-Workshop**, Logistics Chair.

MineRL BASALT Competition on Fine-Tuning from Human Feedback, Workshop Organizer.

2021–2023 **MineRL BASALT Competition on Learning from Human Feedback**, Competition Organizer.

2019–2021 **MineRL Competition on Sample-Efficient Reinforcement Learning**, Competition Organizer.

2021 **Minecraft as a Research Platform for RL Workshop at MSR Research Summit**, Workshop Organizer.

Reviewing

2023 ICML-23, NeurIPS-23, AAAI-24 PC Member of Student Program

2022 GameSec-22, AAMAS-22 Workshop on Autonomous Agents for Social Good, ICML-22, Cooperative AI Foundation Proposal

2021 NeurIPS-21 Competition Track, ICML-21

2020 ICLR-21, AAAI-21, Game Theory and Machine Learning for Cyber Security (Book Chapter Reviewer), ICML-20 (Top Reviewer Award), AAAI-20 Workshop on Diversity in Artificial Intelligence

2019 ICML-19 Workshop on AI for Social Good, ICLR-19 Workshop on AI for Social Good

2018, 2017 RISS Working Papers Journal

Academic and Departmental Service

2021–2024 **Carnegie Mellon University Machine Learning PhD Admissions Committee**.

2020–2021 **Carnegie Mellon University Machine Learning Master's Admissions Committee**.

2020 **Carnegie Mellon University RISS Admissions Committee**.

2018, 2017 **RISS Working Papers Journal**, Assistant Managing Editor.

Outreach

2023, 2020 **CMU Graduate Application Support Program (GASP)**, Mentor. Supported student now PhD student at the University of Cambridge.

2019–2021 **CMU AI Mentorship Program**, Mentor.

2019 **Rewriting the Code Alumni Office Hours.** Dedicated 30 min/week to provide career and academic advice to female undergrads.

2016-2019 **UMBC Computer Science Education**, Vice President (2016-2017), President (2017-2018), Treasurer (2018-2019).

2017 **Creative Coders**, Co-founder. Co-founded program to introduce middle-school students to CS.

North County High School Computer Science Classes, Co-presenter.

2017, 2016 **Hour of Code at UMBC**, Organizer and Volunteer. Organized and volunteered during two-day-long Hour of Code events on CS and AI.

Invited Talks and Events.

Does not include contributed conference or workshop talks.

2023 **Invited Speaker**, Miao Embodied AI Lab at the University of Connecticut. *Human-Interpretable Reinforcement Learning*.

Invited Speaker, Berkeley Multi-Agent Learning Seminar. *Human-Interpretable Multi-Agent Reinforcement Learning*.

Invited Speaker, AMD. *Navigates Like Me: Understanding How People Evaluate Human-Like AI in Video Games*.

Invited Speaker, University of Maryland Multi-Agent Reinforcement Learning Seminar. *Human-Interpretable Multi-Agent Reinforcement Learning*.

Selected Hot Desk Demo, CHI Interactivity. *Navigates Like Me: Understanding How People Evaluate Human-Like AI in Video Games*.

2022 **Invited Speaker**, Women in AI Ignite at NeurIPS. *Human-Centered Multi-Agent Systems: Learning from and for People*.

Invited Panelist, Machine Learning Graduate Student Panel, Carnegie Mellon University Robotics Institute Summer Scholars Program.

2021 **Invited Speaker**, Microsoft Research AI and Gaming Research Summit. *The MineRL 2020 Competition on Sample Efficient Reinforcement Learning using Human Priors*.

Invited Panelist, Microsoft Research AI and Gaming Research Summit.

Invited Panelist, Graduate School Application Support, Carnegie Mellon University Robotics Institute Summer Scholars Program.

2020 **Invited Speaker**, The Campus Laboratory School at Carlow University Career Day. *Sustainability through Computer Science*.

2019 **Invited Panelist**, RISS Orientation, Carnegie Mellon University Robotics Institute Summer Scholars Program.

2018 **Invited Participant**, CCC AI Roadmap Workshop: Integrated Intelligence. Sole undergraduate student. Resulted in *A 20-Year Community Roadmap for AI Research in the US*.

Research Experience

2019–Present **Carnegie Mellon University**, *Machine Learning Department*.
Graduate Researcher advised by Fei Fang.

2022 **Microsoft Research, Montreal**, *Reinforcement Learning Group*.
Ph.D. Research Intern advised by Geoffrey J. Gordon.

2021 **Microsoft Research, Cambridge**, *Deep Reinforcement Learning for Games Group*.
Ph.D. Research Intern advised by Katja Hofmann and Harm van Seijen.

2019 **Carnegie Mellon University**, *Robotics Institute*.
Post-Bacc Research Intern advised by David Held.

2018–2019 **Carnegie Mellon University**, *Robotics Institute*.
Undergraduate Research Intern advised by Katia Sycara in the *Robotics Institute Summer Scholars Program*. Supported by NSF REU.

University of Maryland, Baltimore County, *Computer Science and Electrical Engineering*.
Undergraduate Research Assistant advised by Cynthia Matuszek. *URA Scholar*.

2016–2019 **University of Maryland, Baltimore County**, *Computer Science and Electrical Engineering*.
Undergraduate Research Assistant advised by Marie desJardins.

2017 **Carnegie Mellon University**, *Robotics Institute*.
Undergraduate Research Intern advised by Christoph Mertz in the *Robotics Institute Summer Scholars Program*.

2014–2016 **University of Maryland, School of Medicine**, *Neurobiology Department*.
Undergraduate Research Assistant advised by Jennifer Wenzel.

Teaching Experience

2024 **Machine Learning with Large Datasets (10-405/10-605), CMU**, *Co-Head Teaching Assistant*.
Instructors: Geoff Gordon and Ameet Talwalkar.

2021 **Historical Advances in Machine Learning (10-777), CMU**, *Teaching Assistant*.
Instructor: Aaditya Ramdas.

2017–2018 **Creative Coders**, Curriculum Developer.

Developed curriculum for middle-school students to learn CS concepts.

2016–2017 **Computer Science Matters in Maryland**, Curriculum Developer.

Affiliations

SIGCHI, Rewriting the Code Alumni, AAAI, ACM.