

# Kate Rakelly, Ph.D.

US citizen || Currently based in the Portland, OR area

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Equipped with deep expertise in machine learning, I am interested in working on problems related to climate change and biodiversity. Through my PhD and research experience, I have developed not only technical expertise, but also the ability to learn new areas, collaborate effectively, and communicate technical information to diverse audiences.

My research background is in meta-learning and deep reinforcement learning research, including work in imitation learning for modeling human driving, deep reinforcement learning applied to robotics, and few-shot learning for computer vision. I have strong research/publishing experience (1500+ citations).

## Experience

### Senior Research Scientist

April 2022 - August 2023

Cruise LLC

San Francisco, CA

- Developed imitation learning models in PyTorch to simulate human drivers in order to test self-driving car models.
- Contributed to development of Python-based planning simulation and evaluation system.

### Research Intern

January 2021 - June 2021

Google Deepmind, supervised by Tom Le Paine and Nando de Freitas

London, UK

- Developed and tested a hierarchical meta-reinforcement learning algorithm in TensorFlow to perform meta-learning across a broad range of simulated robotic tasks.

### Research Assistant

August 2015 - December 2020

University of California, Berkeley, supervised by Sergey Levine

Berkeley, CA

- Theoretically and empirically analyzed common algorithms for unsupervised state representation learning to determine which representations preserve the information required to learn the optimal control policy [1].
- Formulated the problem of meta-learning (“learning to learn”) as learning to infer probabilistic task variables from experience. Derived novel meta-learning algorithms that leverage this insight for:
  - state-based robotic control [5].
  - robotic control from sensory observations [2].
  - image segmentation [4].
- Developed a fast video semantic segmentation algorithm by updating visual features at different depths in the CNN network at different rates based on their semantic stability over time [6].

### Research Intern

January 2015 - May 2015

Adobe Inc., supervised by Bryan Russell

San Francisco, CA

- Extracted deep visual features from an auto-encoder model trained on visual Behance data, and created an interactive visualization prototype to explore the embedding space.

### Undergraduate Research Assistant

May 2014 - January 2015

University of California, Berkeley, supervised by Alyosha Efros

Berkeley, CA

- Built a data processing pipeline in Python to process raw yearbook photos obtained from digital libraries.
- Developed a deep learning classifier using the Caffe framework to predict the date a yearbook photo was taken and used the resulting features to analyze fashion trends [7].

## Education

### University of California, Berkeley

August 2015 - December 2020

Ph.D. in Computer Science, advised by Prof. Sergey Levine

Berkeley, CA

Ph.D. Thesis: [Learning and Analyzing Representations for Meta-Learning and Control](#) [3]

- National Science Foundation GRFP Honorable Mention, 2017

### University of California, Berkeley

August 2011 - May 2015

B.S. in Electrical Engineering and Computer Science (EECS)

Berkeley, CA

- Graduated with High Honors (top 10% of EECS students by GPA)

## Teaching

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**Head Teaching Assistant, CS294-112: Deep Reinforcement Learning**, UC Berkeley Fall 2018  
Managed administration of the teaching team. Held office hours. Designed and graded homework assignments.

**Teaching Assistant, CS70: Discrete Mathematics for Computer Science**, UC Berkeley Summer 2014  
Taught two weekly discussion sections. Composed assignments and exam questions.

**Teaching Assistant, EE100: Introduction to Microelectronic Circuits**, Summer 2013, UC Berkeley Summer 2013  
Taught two weekly discussion sections. Composed assignments and exam questions.

## Talks and Lectures

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### Guest Lectures

“Introduction to Meta-Reinforcement Learning.” CS285: Deep Reinforcement Learning, UC Berkeley Fall 2019  
“Exploration in Meta-Reinforcement Learning.” CS330: Deep Multi-Task and Meta-Learning, Stanford U. Fall 2019  
“Learning Image Segmentation from Limited Labeled Data.” CS188 Introduction to AI, UC Berkeley Summer 2018

### Talks

“An Inference Perspective on Meta-Reinforcement Learning” December 2020  
– Invited talk at [NeurIPS 2020 Workshop on Meta-Learning](#)  
“Efficient Meta-RL with Probabilistic Context Embeddings” April 2019  
– Contributed talk at [ICLR 2019 Workshop on Structure and Priors in RL](#)

## Mentoring and Outreach

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**BAIR Undergraduate Research**, Mentor 2018-2020  
Guided undergraduate researchers through the research process from project idea to publication.

**BAIR Underrepresented Undergraduate Mentoring Program**, Organizer 2018-2020  
Organized and mentored in program for undergraduates from underrepresented groups interested in AI.

## Academic Service

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### Workshop Organization

Beyond Tabula Rasa in RL Workshop: Agents that Adapt and Generalize (ICLR 2020), lead organizer  
Workshop on Robotic Learning (NeurIPS 2019), junior organizer

### Conference Paper Reviewing

International Conference of Machine Learning (2019, 2020), International Conference on Learning Representations (2019, 2020, 2021, 2022), Conference on Robotic Learning (2019, 2020), Neural Information Processing Systems (2019), Conference on Computer Vision and Pattern Recognition (2019)

## Publications

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◊ indicates a student I mentored. \* indicates authors contributed equally.

For more information about each project, see [katerakelly.github.io](https://katerakelly.github.io).

- [1] Kate Rakelly, Abhishek Gupta, Carlos Florensa, and Sergey Levine. 2021. Which mutual-information representation learning objectives are sufficient for control? *Advances in Neural Information Processing Systems*, 34:26345–26357.
- [2] Zihao Zhao,<sup>◊</sup>, Anusha Nagabandi\*, Kate Rakelly\*, Chelsea Finn, and Sergey Levine. 2021. Meld: Meta-reinforcement learning from images via latent state models. In *Conference on Robot Learning*, pages 1246–1261. PMLR.
- [3] Kate Rakelly. 2020. Learning and Analyzing Representations for Meta-Learning and Control. *Ph.D. thesis, University of California, Berkeley*.
- [4] Kate Rakelly, Evan Shelhamer, Trevor Darrell, Alexei A Efros, and Sergey Levine. 2019. Meta-learning to guide segmentation.
- [5] Kate Rakelly\*, Aurick Zhou,<sup>◊</sup>, Deirdre Quillen, Chelsea Finn, and Sergey Levine. 2019. Efficient off-policy meta-reinforcement learning via probabilistic context variables. In *International conference on machine learning*, pages 5331–5340. PMLR.
- [6] Evan Shelhamer\*, Kate Rakelly\*, Judy Hoffman\*, and Trevor Darrell. 2016. Clockwork convnets for video semantic segmentation. In *Computer Vision—ECCV 2016 Workshops: Amsterdam, The Netherlands, October 8-10 and 15-16, 2016, Proceedings, Part III 14*, pages 852–868. Springer.

[7] Shiry Ginosar, Kate Rakelly, Sarah Sachs, Brian Yin, and Alexei A Efros. 2015. *A century of portraits: A visual historical record of american high school yearbooks*. In *Proceedings of the IEEE International Conference on Computer Vision Workshops*, pages 1–7.

## Skills

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*Python, PyTorch, Deep Learning (DL), Machine Learning (ML), Artificial Intelligence (AI), Reinforcement Learning (RL), Meta Learning, Transfer Learning, Imitation Learning*