David M. Klee

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Research Experience

Helping Hands Lab | NU — Boston, MA
Advisors: Robin Walters & Robert Platt — *Sept 2018 - Present*

- Designing $SO(3)$-equivariant convolutional network for object pose prediction with high sample-efficiency
- Developed goal-conditioned RL method that leverages structured goal space to solve long-horizon manipulation tasks
- Investigated the role of shift-equivariance in data augmentation for image-based reinforcement learning (RL)

Pharmacy on Demand Project | MIT — Cambridge, MA
Advisor: Allan Myerson — *Sept 2016 – July 2018*

- Project overseen by Dept. of Defense to develop modules for small-scale, automated drug tablet manufacturing.
- Designed automation software for weighing, blending, compacting dry powders according to each drug formulation.

Education

Northeastern University (NU) — Boston, MA
PhD in Computer Science; GPA: 3.9/4.0 — *Sept. 2018 – May 2024 (Expected)*

Massachusetts Institute of Technology (MIT) — Cambridge, MA
Bachelors of Science in Chemical Engineering; GPA: 5.0/5.0 — *Sept. 2014 – June 2018*

Publications

David Klee, O. Biza, R. Platt and R. Walters. "Image to Sphere: Learning Equivariant Features for Efficient Pose Prediction" *International Conference on Learning Representations*. ICLR, 2023.

M. Jia, D. Wang, G. Su, David Klee, X. Zhu, R. Walters, R. Platt. "SEIL: Simulation-augmented Equivariant Imitation Learning" *IEEE International Conference on Robotics and Automation*. ICRA, 2023.

David Klee, O. Biza, R. Platt and R. Walters. "Image to Icosahedral Projection for SO(3) Object Reasoning from Single-View Images" *Proceedings of Machine Learning Research, Volume on Symmetry and Geometry in Neural Representations*. PMLR, 2022.

David Klee, O. Biza and R. Platt. "Graph-Structured Policy Learning for Multi-Goal Manipulation" 2022 *IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS). IEEE, 2022.

Preprints

Biza, Ondrej, David Klee, Robert Platt, JW van de Meent, LLS Wong. "Factored World Models for Zero-Shot Generalization in Robotic Manipulation" 2022.

Workshop Papers and Talks

David Klee, R. Walters and R. Platt. "Understanding the Mechanism behind Data Augmentation's Success on Image-based RL" *Multi-disciplinary Conference on Reinforcement Learning and Decision Making*. RLDM, 2022.

David Klee and R. Platt. "Teaching Robotic Manipulation with Accessible Hardware" *International Joint Conference on Artificial Intelligence: Diversity and Inclusion Events*. IJCAI-DEI, 2021.

Teaching

Teaching Assistant, NU CS5335: Robotics Science and Systems, *Spring 2023*

Instructor, NU CS4910: Deep Learning for Robotics, *Spring 2022*

Teaching Assistant, NU CS5100: Introduction to Artificial Intelligence, *Fall 2020*

Service

Mentor, Young Scholars Program, *Summer 2021 & 2022*

Teacher, O'Bryant High School Machine Learning Outreach Program, *Spring 2022*

Organizer, Teacher Northeastern University Robotics Outreach Program, *Spring 2021*

Reviewer NeurReps 2022, ICRA 2023

Open Source Projects

Educational Platform for Low-Cost Robotic Arm

- Developed intuitive Python API to calibrate and control robot arm using inverse kinematics and collision detection.
- Provided thorough documentation and examples, including self-guided project for using AI to play game with robot.

Technical Skills

Languages: Python, C++, Matlab, HTML/CSS, Javascript (D3)
Technology: Linux, ROS, PyBullet, PyTorch, Tensorflow, OpenCV, OpenAI Gym, Scikit-Learn

Honors and Awards

USILA/Nike Scholar All-American in Lacrosse, *2018*
Phi Sigma Kappa Top Scholar Award, *2017*