

Max Simchowit

Title: Provable Guarantees for Generative Behavior Cloning.

Abstract: Imitation from human demonstrations, known as behavior cloning, has shown tremendous progress towards the development of generalist, flexible robotic agents. In this talk, we will develop a ground-up mathematical understanding of when a robot agent can execute behavior via supervised learning from demonstrations. We show that a hierarchical approach - combining imitation with generative models, just as DDPMs, with a few key ideas from control theory - can enable the imitation of *nearly arbitrary behaviors.* We will see how our approach overcomes the challenges of compounding error whilst accommodating complex, so-called “multi-modal” behavior. Finally, we will discuss key future directions for developing a theory of robot learning fit for the field’s future ambitions. “Provable Guarantees for Generative Behavior Cloning: Bridging Low-Level Stability and High-Level Behavior.” Adam Block, Ali Jadbabaie, Daniel Pfrommer, **Max Simchowit**, Russ Tedrake. *NeurIPS 2023*. <https://arxiv.org/abs/2307.14619>.

Bio: Max Simchowit is a postdoctoral researcher in the Robot Locomotion Group at MIT CSAIL. He studies the theoretical foundations of machine learning problems with a sequential or dynamical component; he currently focuses on robotics and out-of-distribution learning, and with past work ranging broadly across control, reinforcement learning, optimization and algorithmic fairness. He received his PhD from University of California, Berkeley in 2021 under Ben Recht and Michael I. Jordan, and his work has been recognized with an ICML 2018 Best Paper Award, ICML 2022 Outstanding Paper Award, and RSS 2023 Best Paper Finalist designation.