

Austin J. Garrett

Education

- Cambridge, MA** **Masters of Engineering, Computer Science**
June 2020 *Massachusetts Institute of Technology*
- Cambridge, MA** **Double Major BS, Computer Science and Physics**
June 2019 *Massachusetts Institute of Technology*
CS Major GPA: 4.8/5.0 Cumulative GPA: 4.6/5.0

Coursework

Probabilistic Programming Languages (Listener), Computational Cognitive Science, Statistical Learning Theory, Seminar in Undergraduate Research, Formal Reasoning about Programs, Theory of Computation, Introduction to Algorithms, Performance Engineering of Software Systems

Research Experience

- Cambridge, MA** **Probabilistic Computing Project**
June 2019 - Present *Master's Student. Supervisor: Vikash Mansinghka*
Goal: Develop cognitively-inspired Bayesian techniques for computer vision. Explore action's essential role in making MCMC-based techniques tractable.
 - Work in the Gen probabilistic programming ecosystem to develop modern inference techniques inspired by breakthroughs in cognitive science.
 - Explore theoretical links between cognitive science, artificial intelligence, physics, and self-organizing systems.
 - Develop synthesized techniques that leverage and theoretically combine probabilistic modeling with modern neural network techniques.
- Cambridge, MA** **Computational Cognitive Science Group**
June 2017 - June 2019 *Undergraduate Researcher. Supervisor: Joshua Tenenbaum*
Goal: Leverage Bayesian program synthesis and program induction techniques for cognitively inspired learning algorithms, especially in intuitive physics.
 - Develop and implement neural network architectures for various physical scene intuition problems using TensorFlow and PyTorch.
 - Formalize generative models and inference algorithms for shape skeleton inference.
- Cambridge, MA** **ISEE**
Jan 2018 - Sep 2018 *Research Intern. Supervisor: Wongun Choi*
Goal: Develop and implement multi-object perception architectures for autonomous vehicles using LIDAR data.
 - Design novel deep neural network architectures extending state-of-the-art research in computer vision problems, with specific applications to self-driving cars.
 - Implement many-object detection and regression models using the PyTorch GPU-accelerated framework.
 - Extensive work in manipulating LIDAR point datasets, and handling transformations between camera and 3D coordinate systems.

Projects

- Cambridge, MA** **Existential Doubt: Bayesian inference about the existence and 6D pose of fully occluded objects**
June 2019 - Present *Collaborators: Marco Cusumano-Towner*
- Demonstrate the combination of prior knowledge with observational data to replicate common-sense reasoning about fully-occluded objects.
 - Correctly infer the position of unseen objects based on a generative world model that is able to reason which object positions would explain observational data.
- Cambridge, MA** **Program Induction for Physical Scene Inference**
Sep 2018 - May 2019 *Collaborators: Kelsey Allen*
- Formalize syntactic planning DSL for physical block manipulation.
 - Create extensive environment and API for integrating planning DSL with physical simulations of 3D block worlds using PyBullet.
 - Extend work from Kevin Ellis et. al. on program induction to learn reusable solutions to subtasks over physical tower construction using graph neural networks.
- Cambridge, MA** **Cross-Modal Learning in Autonomous Vehicles**
June 2018 - Sep 2018 *Collaborators: Wongun Choi*
- Design algorithm for cross-modal learning, combining the strength of various modalities to augment supervised data with automatically generated labels.
 - Obtain and clean large raw datasets from real-world robotics platforms using ROS.

Skills

Programming Python, Julia, Gen, Java, C++, Haskell, Coq, Lua, JavaScript, MATLAB
Technologies PyTorch, TensorFlow, Keras, LaTeX, Git, Mathematica, HTML, CSS