Eli Bronstein

elibronstein.com | elibronst@gmail.com | (541) 520-2910

EDUCATION

UNIVERSITY OF CALIFORNIA, BERKELEY | B.S. in Electrical Engineering and Computer Science

- **GPA** : 3.9 / 4.0. **Graduated** : May 2019.
- **Classes** : Robotics, Deep Reinforcement Learning, Machine Learning, Convex Optimization, Probability, Linear Algebra

RESEARCH AND WORK EXPERIENCE

UNDERGRADUATE RESEARCHER | InterACT Lab (Prof. Anca Dragan) at UC Berkeley — Sep 2017 - present

- Worked on game-theoretic hierarchical planning for human and autonomous car interaction: combined long-horizon solution to high-level dynamic game between human and autonomous vehicle (computed offline) with short receding-horizon online trajectory planning. **Published** in ICRA 2019 (arxiv.org/abs/1810.05766).
- Analyzed sample complexity of learning methods (PPO, neural net, deep IRL) on the model-free to model-based spectrum in the context of human-robot car interaction to determine the asymptotic relationship between amount of training data and the robot's achieved reward.
- Integrated autonomous car planning codebase with a realistic driving simulation for human-robot interaction experiments.
- Significantly improved driving simulator for self-driving car experiments: decreased overhead, developed informative real-time visualizations of agents' rewards, created debugging mode, etc.

UNDERGRADUATE RESEARCHER | Hybrid Systems Lab at UC Berkeley — Jan - May 2019

- Worked on novel algorithm for real-time safety analysis based on Hamilton-Jacobi reachability to provide strong safety guarantees while efficiently performing tasks in uncertain environments.
- Integrated safety algorithm with vision-based planner and deployed it on Turtlebot to navigate through cluttered office environment.
- **Paper** : arxiv.org/abs/1905.00532

ROBOTICS INSTITUTE SUMMER SCHOLAR | Intelligent Coordination and Logistics Lab at CMU — Jun 2017 - present

- Created a Bayesian hierarchical statistical model for bus dwell times to provide real-time predictions to adaptive traffic signal control systems. Made the model robust to high stochasticity of bus patterns, data-lightweight, and computationally efficient.
- Showed ability of Bayesian model to maximize proportion of low-error predictions (compared to traditional offline and online regression).
- Invited to continue research remotely with lab to generalize model, resulting in integration with an adaptive traffic signal control system.
- **Technical report** : trid.trb.org/view/1526414. **Poster** : riss.ri.cmu.edu/research-posters/2017-posters/

PROJECTS

GRASP TRANSFER BY PARTS — Mar - May 2019

- Developed method to transfer robust grasps precomputed on an object dataset to a novel object using a grasping-by-parts approach.
- Segmented novel object into parts approximated by superquadrics, identified most similar part from object dataset using a superquadric similarity algorithm, transferred precomputed grasps from dataset part to novel object part, and evaluated quality of transferred grasp using force closure metric.

MULTI-TEACHER SINGLE-TASK POLICY DISTILLATION IN DEEP REINFORCEMENT LEARNING — Oct - Dec 2018

- Extended policy distillation in RL to the multi-teacher case: student neural net learns from multiple teacher neural nets.
- Framed multi-teacher case as a multi-armed bandit problem (learning from teacher is similar to pulling an arm) and compared performance of several bandit algorithms.
- Applied contextual bandit algorithm to learn holistic policy from multiple teachers that are experts in disjoint subparts of state space.

SKILLS

- **Programming languages** : proficient in Python; experience with: C, Java, HTML, CSS, Javascript, SQL
- **Frameworks** : Tensorflow, Keras, scikit-learn, SciPy, NumPy, Pandas, PyMC (Bayesian statistical modeling)
- **Language Skills** : fluent in English and Spanish (spoken, written), Russian and Hebrew (spoken).

SELECTED AWARDS

- **National Science Foundation (NSF) Research Experience for Undergraduates (REU) Scholarship Recipient** (2017) - received funding to conduct and present research as part of the CMU Robotics Institute Summer Scholars Program.