Aravind Rajeswaran

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Research Interests

Mathematical foundation and applications of machine learning and optimization. In particular:

- Deep reinforcement learning and stochastic optimization for robotics
- Multi-task and transfer learning
- Stochastic optimization algorithms for neural networks

Education

University of Washington, Seattle *Sep 2016 - present*
PhD in Machine Learning

- **Co-advised** by Profs. **Sham Kakade** and **Emanuel Todorov**
- **Coursework :** machine learning, computer vision, neural control of movement

Indian Institute of Technology, Madras *Aug 2011 – July 2015*
BTech (Honors) with focus on optimization, signals, & systems

- **Thesis :** Topological search over networks *(best undergraduate thesis award)*
- **Key Courses :** machine learning, reinforcement learning, convex optimization, time series analysis, optimal control, networked system
- **Advisers :** Profs. Balaraman Ravindran and Shankar Narasimhan

Academic awards and Honors

- PhD fellowship from University of Washington *2016*
- PhD fellowships from UC Berkeley, CMU, and Caltech among others *(declined)* *2016*
- Bhagyalakshmi and Krishna Ayengar award for best undergraduate thesis. *2015*
- Summer student fellowship award from the CS and Statistical Physics groups of IMSc, India. *2014*

Selected Research Experience

- **OpenAI** - Research Intern
  Mentors : John Schulman and Igor Mordatch *June 2017 - Sep 2017*
  Worked on improving policy gradient methods for RL by leveraging human demonstrations and variance reduction techniques. Studied applications of developed algorithms in dexterous hand manipulation and multi-agent systems.
- **Computer Science & Engineering, UW** - Graduate Research Assistant
  Mentors : Sham Kakade and Emanuel Todorov *Aug 2016 - present*
  Development of faster and more robust stochastic optimization algorithms for policy search. Our focus is on continuous control tasks like dexterous robotic manipulation. I'm also working towards reconciling policy search with trajectory optimization in order to fully utilize the potential of model-based methods.
- **Computer Science & Engineering, UW** - Remote Summer Researcher
  Mentors : Sergey Levine *May 2016 - Aug 2016*
  Developed an Ensemble Policy Optimization (EPOpt) approach for training expressive neural network policies that can transfer from simulated source tasks to real-world target tasks. EPOpt combines a form of adversarial training and Bayesian model adaptation to find robust policies on a collection of simulated tasks that can generalize to several target tasks.

Publications

Google scholar page: link

- Towards Generalization and Simplicity in Continuous Control. Rajeswaran et al. NIPS 2017.
- EPOpt: Learning Robust Neural Network Policies Using Model Ensembles. Rajeswaran et al. ICLR 2017.
- Learning Complex Dexterous Manipulation with Deep Reinforcement Learning and Demonstrations. Rajeswaran et al. arXiv:1709.10087.
- Divide-and-Conquer Reinforcement Learning. Ghosh, Singh, Rajeswaran et al. arXiv:1711.09874.
- Identifying Topology of Power Distribution Networks Based on Smart Meter Data. Jayadev, Rajeswaran et al. IEEE Transactions on Smart Grid 2017.
- A Novel Approach for Phase Identification in Smart Grids Using Graph Theory and Principal Component Analysis. Jayadev, Rajeswaran et al. ACC 2016.

Computer Skills

- **Programming Languages:** Python, C++, Julia
- **Libraries:** pytorch, theano, tensorflow, keras

References

- **Dr. Emanuel Todorov**, Associate Professor (CSE & Applied Math), UW Seattle.
- **Dr. Sham Kakade**, Associate Professor (CSE & Statistics), UW Seattle.
- **Dr. Sergey Levine**, Assistant Professor (EECS), UC Berkeley.
- **Dr. Igor Mordatch**, Research Scientist, OpenAI.
- **Dr. Balaraman Ravindran**, Associate Professor (CSE), IIT Madras.