Karkala Shashank Hegde

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Programming Skills

Python (Tensorflow, PyBullet, Mujoco, Gym, PyTorch, Pandas, Numpy, Flask, Scikit-learn, Scipy, ROSpy), **MATLAB** (Statistics and ML, Deep Learning, Signal Processing Toolboxes), **C++** (OpenAL, OpenCV)

Education

- **University of Southern California - PhD** — Los Angeles, USA
  Electrical and Computer Engineering — *GPA: 3.94/4* — *2021 – Present*
  AI Researcher at the Robotic Embedded Systems Laboratory, advised by Dr. Gaurav Sukhatme.
  Teaching Assistant: EE541 - A Computational Introduction to Deep Learning; EE641 - Deep Learning Systems; CSCI567 - Machine Learning.
- **University of Southern California - Master of Science** — Los Angeles, USA
  Electrical and Computer Engineering — *GPA: 3.94/4* — *2019 – 2021*
- **National Institute of Technology Karnataka - Bachelor of Technology** — Surathkal, India
  Electrical and Electronics Engineering — *GPA: 8.17/10* — *Thesis GPA: 9.5/10* — *2013 – 2017*

Research Experience

- **Research assistant -PhD** — Los Angeles, USA
  Robotic Embedded Systems Laboratory[link], USC — *Sept 2020 - present*
  - Used CLIP language encoder with Latent Diffusion Models and Graph Hypernetworks for generative modeling in behavior space for robotic control.
  - Develop and train sample efficient distributed learning methods for language-conditioned robotic control on SLURM.
  - Create high-performing small Neural Networks on AWS EC2 instances for quadrotor flight control.
  - Experiment with audio-based communication between agents with multi-agent reinforcement learning for video game AI
- **Research assistant - MS** — Los Angeles, USA
  Stochastic Systems & Learning Lab[link],Dynamic Robotics & Control Lab[link],Hardware Accelerated Lab[link]Nov 2019 - May 2021
  - Build scale-able Reinforcement Learning policies using function approximators with lesser trainable parameters.
  - Experiment on different action spaces such as impedance control, torque control, force control, and use hybrid learning methods with model predictive control to help faster learning. Use RLLib for distributed learning.
  - Torque Transfer[code]: Transfer learning between open-world self-driving simulations for faster learning and generalization.
  - SpectroGAN[code]: Used a Generative Adversarial Neural Network to embed emotions in spectrograms of speech signals

Industry Experience

- **Data Scientist Intern** — Los Angeles, USA
  SalesDNA — *May 2021 - August 2021*
  - Built data pipelines for collection, cleaning, and real-time markov decision process modeling of sales processes.
- **Data Scientist** — Bangalore, India
  Fidelity Investments: Asset Management Technology — *July 2017 - July 2019*
  - Built a simulator using real trading data and trained a RL agent for portfolio construction in equity trading.
  - Worked with the Equity Trading team to develop backend services with java spring-boot, python flask, SQL, and splunk.

Select Publications

- **Hegde, S.**, Huang, Z., and Sukhatme, G.S., 2023. HyperPPO: A scalable method for finding small policies for robotic control. arXiv preprint arXiv:2309.16663.(Submitted to ICRA 2024)[site]
- **Hegde, S.**, Batra, S., Zentner, K.R. and Sukhatme, G.S., 2023. Generating Behaviorally Diverse Policies with Latent Diffusion Models. arXiv preprint arXiv:2305.18738. (Accepted at NeurIPS 2023)[site]
- **Hegde, S.** and Sukhatme, G.S., 2023, May. Efficiently Learning Small Policies for Locomotion and Manipulation. In 2023 IEEE International Conference on Robotics and Automation (ICRA 2023) (pp. 5909-5915). IEEE.[site]
- G. Salhotra, **S. Hegde**, SS. Batra, P. Englert, GS. Sukhatme (2022) *Guided Learning of Robust Hurdling Policies with Curricular Trajectory Optimization, Southern California Robotics Symposium*[site]
- **S. Hegde**, Kanervisto, A., & Petrenko, A. (2021, August). Agents that listen: High-throughput reinforcement learning with multiple sensory systems. In 2021 IEEE Conference on Games (CoG) (pp. 1-5). IEEE. [site]
- **S. Hegde**, V. Kumar, and A. Singh. (2018). *Risk aware portfolio construction using deep deterministic policy gradients.* IEEE Symposium Series on Computational Intelligence (SSCI) Bangalore, Nov. 2018. [pdf]

Achievements

- **USC Annenberg Fellow**: Awarded for my PhD; **Masters Student Honors Program**[link]: For outstanding academic and research achievements during my Masters
- **Soda bottle classification contest**[link]**:** Winner of image classification contest hosted by Deep Cognition.
- **High School:** Best Outgoing student in school, ranked in top 1% of All India Engineering exam.