MANAV KULSHRESTHA

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EDUCATION

Ph.D. in Computer Science, Purdue University — Expected 2027
- Specializing in robot decision making and control through machine learning
- Recent project employs Graph attention for concept learning towards rearrangement planning in robotic arms

B.S. in Computer Science, *Summa Cum Laude*, University of Massachusetts - Amherst — 2018 - 2022
B.S. in Mathematics, *Summa Cum Laude*, University of Massachusetts - Amherst — 2018 - 2022

Relevant Graduate Level Coursework: Machine learning, Robotics: Perception, Dynamics, and Control; Neural Networks; Advanced Algorithms; Algorithms for Data Science; Advanced Linear Algebra; Regression Analysis...

SELECTED PUBLICATIONS

- **Structural Concept Learning via Graph Attention for Multi-Level Rearrangement Planning**. Conference on Robot Learning (CoRL) 2023. *Manav Kulshrestha*, Ahmed H. Qureshi.
- **PROVES: Establishing Image Provenance using Semantic Signatures**. Winter Conference on Applications of Computer Vision (WACM) 2022. Mingyang Xie, *Manav Kulshrestha*, Jinghan Yang, Shaojie Wang, Ayan Chakrabarti, Yevgeniy Vorobeychik.

SKILLS

Languages Python, Java, C, C++, Arduino, MATLAB, Javascript, Dafny, Coq, ARM Assembly
Frameworks PyTorch, Numpy, Pandas, TensorFlow+lite, Caffe, CoreML, ONNX, Sklearn, OpenCV, Matplotlib
Technologies Anaconda, Jupyter Notebook, Docker, CUDA, cuDNN

RESEARCH EXPERIENCE

Research Assistant, Purdue University, IDEAS Lab — Aug 2022 - PRESENT
- Working on multi-agent scene understanding with Prof. Aniket Bera. Previously worked on rearrangement manipulation planning using structural concept learning Prof. Ahmed Qureshi (accepted to CoRL 2023)

Research Assistant, University of Massachusetts — Aug 2021 - May 2022
- Worked on persistent movement tracking for computer vision systems through the lens of perspective tracking at *UMass Computer Vision Lab*
- Honors Thesis (Improving Object Recognition and Tracking through Alignment and Optical Flow) with Prof. Erik Learned-Miller

Robotics Institute Summer Scholar, Carnegie Mellon University — Jun 2021 - Sep 2021
- Worked on modeling "trust" between human operators and robots working towards a common goal from a interpretability and performance perspective with Prof. Katia Sycara at the *Advanced Agent-Robotics Technology Lab*
- Modelled "trust" using an Inverse Reinforcement Learning model as well as a Bayesian Probabilistic model
- Worked on creating an egocentric test environment for a multi-agent system for future work

Research Intern, Washington University — May 2020 - May 2021
- Derived and used homography estimation to detect affine transformation between pair of images using face correspondence
- Implemented a pipeline server to demonstrate proof of concept which ensures and quantify image authenticity using its provenance
- Trained a MTCNN to detect facial regions and an Inception-Resnet to extract feature vectors from it

INDUSTRY EXPERIENCE

Engineering Intern, Neurala Inc. — May 2019 - Aug 2019
- Implemented an Android SDK for a proprietary machine learning framework, from the ground up, which allows for training, inference, combining pre-trained neural nets, and communicating with a server portal for administrative control
- Worked on using hardware acceleration for said SDK using Google's Neural Networks API on mobile devices
- Created a demo to showcase training and inference using a SAST Camera
- Created a tool to easily convert between and test model accuracy and consistency across different frameworks

AWARDS AND HONORS

Bay State Fellowship (Declined), Commonwealth Honors College Recognition, UMass Departmental Statistics Award, Outstanding UCA Award, MIT Blueprint Creativity Award, FTC World Championship, FTC Design award, FTC Innovation Award