Aseem Saxena

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Experience

Graduate Research Assistant : Oregon State University Jun '21–Present
Advisor: Prof Alan Fern *Corvallis, Oregon, USA*

- **Uncertainty Quantification in Vision Language Models. (Ongoing)** We applied Conformal Prediction for calibrated evaluation of VLM model output uncertainty. Skills - ***Pytorch, Large Language Models (LLM), VLM, Retrieval Augmented Generation (RAG)***
- **Sim-to-real Learning of Footstep Constrained Bipedal Locomotion.** We develop an RL formulation for training dynamic gait controllers that can respond to specified touchdown locations. Published research at IEEE ICRA 2022. [4] Skills - ***Pytorch, Mujoco***
- **Multi-Task Learning for Grape Cold-Hardiness Prediction.** We show that with just upto thirty seasons of data for any cultivar, our MTL model can consistently outperform the state-of-the-art scientific model. Our work is deployed on AgWeatherNet which is used daily by 14K subscribers. Published research at Machine Learning Journal, AAAI 2023, AIAFS 2023. [1] [2] [3]. Skills - ***Pytorch, RNNs***
- **Probabilistic Forecasting.** Deployed on AgWeathernet. Skills - **Gaussian Processes**
- **Side Effect Minimization in Reinforcement Learning.** We propose a formal criterion for side effect regularization via the assistance game framework and empirically demonstrate the reasonableness of our problem formalization via ground-truth evaluation in two gridworld environments. Published research at NeurIPS ML Safety Workshop 2022. [5] Skills - ***Pytorch, AI Safety Gridworlds***
- **Offline Policy Evaluation (OPE).** We study how different farmer strategies work across different farms (without a simulator) via learning a Multi-Dynamics World Model and show that this incurs negative interference under limited data, undermining generalization. Skills - ***Pytorch, World Models, Crop Simulators***
- **Teaching Assistant.** ME 430 Systems Dynamics and Control. Fall 2021.

AI Engineer Jan '19–Jan '21
Panasonic : Technology Innovation Team *Singapore*

- **Bayesian Optimization for Material Design.** Reduced iteration time from 2 years to 2 weeks to obtain a material composition which meets design criteria with just 30 samples. Skills - ***Gaussian Processes***
- **Edge Deployment of Deep Learning Models.** Successfully deployed vision models on dated Android TV boxes with lower computational resources, achieving a 30 FPS. Skills - ***OpenCV, TensorFlow, ONNX***
- **Real-time Multi Object Tracking.** Developed a 50+ FPS tracker using Kalman Filters for state estimation and Hungarian algorithm for data association. Tracker deployed in a shop with 1000 daily visits. Skills - ***C++***
- **Deep Learning for Gaze Estimation via Synthetic images.** Trained entirely on synthetic images, fine-tuned on real images and successfully deployed in a shop with 1000 daily visits. Skills - ***Pytorch, Unity***

Research Staff Sep '17–Jul '18
National University of Singapore, Adaptive Computing Lab, Prof David Hsu *Singapore*

- **Imitation Learning for Autonomous Driving in an Unstructured Environment.** Published research at Robotics: Science and Systems (RSS) 2019. [6] Skills - ***Pytorch, C++, Unity***
- **Visualization Tool** to debug QMDPNet, a POMDP solver. Skills - ***TensorFlow, Tkinter***
- **Robust position and velocity controller for the Fetch robot.** Skills - ***ROS, C++***

Computer Vision Engineer Jul '16–Apr '17
Ducere Technologies Pvt Ltd *Hyderabad, India*

· Low cost LiDAR system using a Teraranger One ToF sensor on a pan tilt unit. Skills - ***PointCloud Library***
· Obstacle Avoidance algorithm for depth data based on RANSAC. Skills - ***PointCloud Library***

Research Assistant Jun '15-Jul '16, Apr '17-Jul '17
Professor Madhava Krishna
Robotics Research Center, International Institute of Information Technology *Hyderabad, India*

· ***Mahindra Driverless Car Challenge***: Traffic sign recognition and tracking. Skills - ***Caffe, C++***
· **Learning for Visuomotor Control**. Published at ICRA 2017. [7] Skills - ***Caffe, OpenRAVE, MATLAB***
· **Implementation of 'Guess from Far Recognise when Near'**, a system for object search in unknown environments via frontier based navigation, far object recognition using 2D image segmentation and near object recognition using a bag of words model trained on 3D point clouds. Skills - ***ROS, PointCloud Library***
· **Deep Learning for Table Interest Point Detection** via segmentation and vanishing lines. Skills - ***OpenCV***
· **Automating GrabCut for Multilabel Image Segmentation** - without user guidance by learning a Gaussian mixture model for each label and performing alpha expansion. Skills - ***C++, Markov Random Fields***

Research Intern May '14–Jul '14
Strand Life Sciences Pvt. Ltd. *Bangalore, India*

· **Decision Trees and for cancerous mutation classification**. Skills - ***Scikitlearn***

Academic Projects

[1] Avoiding Side Effects in Complex Navigation Environments [Link]

[2] Distributed Q-Learning [Link]

[3] Offline-RL for Bipedal Robots [Link]

[4] Studying Robustness of Semi-supervised Visual Features to Adversarial Attacks [Link]

[5] MC Dropout for Efficient Exploration [Link]

Education

MS in Artificial Intelligence Mar '21 - Dec '24
Oregon State University Current GPA: 3.89/4.0
Areas of Research : *Bipedal Robots, Multi-Task Learning, Offline RL, Forecasting, AI Safety*

B.E(Hons) in Electrical and Electronics Engineering
M.Sc(Hons) in Biological Sciences 2011–2016
Birla Institute of Technology and Science Pilani, India GPA: 7.34/10.00

Skills

Distributed Computing	Docker, Ray, MultiProcessing
Deep Learning	Pytorch, Tensorflow, Caffe
Computer Vision	OpenCV, Point Cloud Library
Robotics Platforms	Nvidia Omniverse, Mujoco, Robot Operating System(ROS) Unity, Gazebo, OpenRAVE, Nvidia Isaac
Programming Languages	Python, C/C++, JAVA, MATLAB

Relevant Coursework

Intelligent Agents and Decision Making, Deep Learning, Optimization, Probabilistic Graphical Models, Natural Language Processing, Big Ideas in AI, Algorithms, Kinematics Dynamics and Control, Social and Ethical Issues in AI, Linear Algebra, Fundamentals of Statistics, Machine Learning, Multivariate Calculus, Differential Equations, Probability and Statistics, Object Oriented Programming

Service

Led **Generative AI reading group 2023** at OSU with AI Grad Student Association.
Faculty Relations Chair at the AI Graduate Student Association in Oregon State University.(2022)
Faculty Relations Chair at the Robotics Graduate Student Association in Oregon State University. (2021)
thegradient.pub - Writing articles on recent developments and long term trends in Artificial Intelligence.
Stanford Scholar Initiative - Led and actively participated in the creation of research talks on influential research papers viz. Deep Residual Learning, FRAUDAR, Rovables, Real-Time 3D Reconstruction and 6-DoF Tracking with an Event Camera and Bayesian Active Learning for Posterior Estimation.

Publications

[1] **Multi-Task Learning for Temporal Processes: A Case Study on Modeling Plant Cold Hardiness**
Aseem Saxena, Paola Pesantez-Cabrera, Jonathan Magby, Markus Keller, Alan Fern
(Under Review) Machine Learning Journal, Springer, 2024

[2] **Multi-Task Learning for Budbreak Prediction**
Aseem Saxena, Paola Pesantez-Cabrera, Rohan Ballapragada, Markus Keller, Alan Fern
AIAFS *Association for Advancement of Artificial Intelligence (AAAI) 2023* [Link]

[3] **Grape Cold Hardiness Prediction via Multi-Task Learning**
Aseem Saxena, Paola Pesantez-Cabrera, Rohan Ballapragada, Kin-Ho Lam, Markus Keller, Alan Fern
IAAI (Innovative Applications of Artificial Intelligence), 2023 [Link]

[4] **Sim-to-Real Learning of Footstep-Constrained Bipedal Dynamic Walking**
Helei Duan, Ashish Malik, Jeremy Dao, Aseem Saxena, Kevin Green, Jonah Siekmann,
Alan Fern, Jonathan Hurst
IEEE ICRA (International Conference on Robotics and Automation), 2022 [Link]

[5] **Formalizing the Problem of Side Effect Regularization**
Alexander Matt Turner*, Aseem Saxena*, Prasad Tadepalli
Equal Contribution, *NeurIPS ML Safety Workshop 2022* [Link]

[6] **LeTS-Drive: Driving in a Crowd by Learning from Tree Search**
Panpan Cai, Yuanfu Luo, Aseem Saxena, David Hsu, Wee Sun Lee
RSS (Robotics Science and Systems) 2019 [Link]

[7] **Exploring Convolutional Networks for End-to-End Visual Servoing**
Aseem Saxena*, Harit Pandya*, Gourav Kumar, K. Madhava Krishna
Equal Contribution, IEEE ICRA(International Conference on Robotics and Automation), 2017 [Link]