Atharv Sonwane

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Research Interests

⋆ Reinforcement Learning ⋆ Robotics ⋆ Neurosymbolic AI ⋆ Meta Learning ⋆ Autonomous Navigation
⋆ Cognitive Science ⋆ Program Synthesis ⋆ Automata Theory ⋆ Hierarchical Learning ⋆ Distributed Systems

Education

⋆ **Birla Institute of Technology and Science, Pilani** Aug. 2018 - Present
Bachelor in Engineering (Hons.), Computer Science. CGPA = 8.68 / 10 *Goa, India*

Technical Skills

Programming	C/C++, Python, Java, Rust, MATLAB, SQL, OCaml, Bash
Deep Learning	PyTorch, Tensorflow, Keras, NumPy, JAX, scikit-learn, pandas, Matplotlib
Robotics	Robot Operating System (ROS), rViz, Gazebo, MAVROS, PX4, Raspberry Pi
Tools	Git, LaTeX , Unix, TravisCI, AutoCAD, Qiskit

Experience

⋆ **APP Centre for Artificial Intelligence Research & TCS Research** | **WEB** *Jan 2021 - Current*
Undergraduate Researcher | Advisors: Prof Ashwin Srinivasan and Dr. Gautam Shroff

- ▷ Adapting Bayesian Neural Program Synthesis for visual reasoning tasks
- ▷ Contributing to project on automaton augmented reinforcement learning

⋆ **Centre of Robotics and Machine Intelligence IIIT Allahabad** | **WEB** *Summer 2020*
Research Intern | Advisor: Prof G.C. Nandi

- ▷ Explored how Deep Reinforcement Learning algorithms can be used for robotics in a simulated setting
- ▷ Implemented and tested performance of various Deep RL algorithms from scratch in PyTorch

⋆ **Council of Scientific and Industrial Research - CERRI** | **WEB** | **CODE** *Summer 2020*
Research Intern | Advisors: Samarth Singh and Dr. Rakesh Warier

- ▷ Applied Deep Q learning to navigation of autonomous quadcopters. A live depth-map feed was taken as input to generate movement commands for the drone
- ▷ Built a controller on top of the MAVROS framework and simulated the learning process using PX4 and PX4 SITL.

⋆ **Digital Communications Lab, BITS Goa** *Jan 2020 – April 2020*
Undergraduate Researcher | Advisors: Abhijit Dey and Dr. Nitin Sharma

- ▷ Analysis and forecasting of GNSS (Global Navigation Satellite System) signals to learn more about disturbances due to ionospheric activity using Deep Learning
- ▷ Implemented LSTM based models in TensorFlow for both forecasting and classification tasks based on ionospheric time series data

Projects

⋆ **GenRL | PyTorch Reinforcement Learning Library** | **CODE** *June 2020 – Present*
Society for Artificial Intelligence and Deep Learning (SAiDL)

- ▷ Collection of SOTA algorithms in Deep and Classical RL along with various utilities
- ▷ Contributed implementations of various Deep Contextual Bandits
- ▷ Core Maintainer and currently working on implementation of distributed RL using RPC

⋆ **Trotbot | Autonomous Delivery Robot | CODE** *Sep 2018 – Present*
Electronics and Robotics Club, BITS Goa (ERC)

- ▷ Built obstacle detection and path planning stack using Robot Operating System (ROS) in Python
- ▷ Implemented Rapidly Exploring Random Trees (RRT) for path planning in complex indoor environments

⋆ **Structure and Inductive Biases in Reinforcement Learning | CODE** *July 2020 – Dec 2020*

- ▷ Investigating how inductive biases are incorporated in various ML algorithms
- ▷ Implemented methods which used graph representations in RL to explore structural inductive bias

⋆ **GenNav | Python library for Robotics Navigation | CODE** *March 2020 – Present*
Electronics and Robotics Club, BITS Goa (ERC)

- ▷ Co-author and Lead Maintainer working with a team of 10+ student contributors
- ▷ Modular collection of navigation algorithms and broad range utilities commonly used in Robotics with unified API
- ▷ Developing a ROS wrapper to enable easy integration into real world robotics systems

⋆ **Causality in Reinforcement Learning | CODE** *July 2020 – September 2020*

- ▷ Experimentation with integrating causal factors in RL algorithms for better performance in medical settings.

⋆ **Oneshot Classification using Transfer Learning | CODE** *Aug 2019*

- ▷ Used transfer learning techniques to improve performance of a Siamese network for one shot learning on the Omniglot dataset.

⋆ **Deep Q Learning for Atari Environments | CODE** *Aug 2019*

- ▷ Experimented with using Double DQN algorithm to play Pong and Pacman gym environments.

⋆ **Spoken Digit Classification | CODE** *Dec 2019*

- ▷ Trained a CNN to classify audio clips of spoken digits encoded with a Short Time Fourier transform.

Teaching and Leadership Roles

⋆ **Teaching Assistant - Machine Learning (BITS F464)** *Jan 2021 – Present*

- ▷ Conducting weekly labs on implementation of machine learning algorithms, working under Prof Tirtharaj Dash and Prof Ashwin Srinivasan
- ▷ Responsible for organising the course project component

⋆ **Teaching Assistant - Discrete Structures for Computer Science (CS F222)** *Aug 2020 – Dec 2020*

- ▷ Mentored undergraduate students in weekly problem solving sessions for course taught by Prof AB Matthews

⋆ **Student Coordinator - Electronics and Robotics Club | WEB** *Aug 2020 – Present*

- ▷ Leading a large (100+) group of undergraduates interested in Robotics. Organising research projects, funding, work exhibitions and holding regular discussion sessions

⋆ **Member - Society for Artificial Intelligence and Deep Learning | WEB** *Aug 2020 – Present*

- ▷ Involved in research projects, teaching introductory courses, and discussion sessions on AI and deep learning

⋆ **Instructor for Student Run Courses on Robotics and Deep Learning** *April 2020 – Dec 2020*

⋆ **Committee Member - SandBox Innovation Laboratory | WEB** *Aug 2020 – Present*

Relevant Courses

Meta Learning$^{\#*}$, **Machine Learning**, **Artificial Intelligence***, Linguistics, Probability and Statistics, Graphs and Networks, Theory of Computation, Data Structures and Algorithms, Linear Algebra, Calculus, Operating Systems, Object Oriented Programming, Computational Physics, Quantum Informatics and Computing, **Convolutional Neural Networks for Visual Recognition** † (Stanford CS231n), **Deep Reinforcement Learning** † (UC Berkeley CS285)

= graduate level, * = ongoing, † = online