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
  ▷ Currently working on Bayesian Neural Program Synthesis and its applications to visual reasoning tasks
  ▷ Contributing to project on automata augmented Deep 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 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 prediction and classification of 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**   *April 2020 – Dec 2020*
    - ▷ Mentored and created reference material for introductory courses in Robotics and Deep Learning

- ★ **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