Swaminathan S K

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Education

Indian Institute of Technology Kharagpur   Expected graduation date: 05/27
B.Tech. + M.Tech. (Dual Degree) in Computer Science and Engineering   *CGPA: 9.22/10*

Sri Krish International School, Chennai, India   Graduation year: 2022
Central Board of Secondary Education, Class 12   *Percentage: 97.8%*

National Institute of Open Schooling, India   Graduation year: 2019
National Institute of Open Schooling, Class 10   *Percentage: 94.2%*

Projects

Evaluating In-Sample Softmax in Offline Reinforcement Learning - MLRC 2023   *PyTorch, Gymnasium, Matplotlib*
- Reproduced and evaluated the results of the paper, "In-Sample Softmax for Offline Reinforcement Learning", ICLR '23
- Compared the results against other in-sample algorithms like IAC (Zhang et al., 2023) and BCQ (Fujimoto et al., 2019)
- Debugged the open-source code-base of BCQ and INAC and contributed the code-base made from scratch for IAC

Music Genre Classification and Comparison with Spectrograms - Neuromatch 2023   *PyTorch, Matplotlib*
- Used PyTorch to build a model that was pre-trained on ResNet18 architecture with fine-tuning on the final layer
- Used Autoencoders for dimensionality reduction and plotted the latent variables to observe clusters on a 2D graph
- Increased accuracy from 77% to 90% by splitting the 30s spectrograms of the GTZAN Dataset into 3s spectrograms

Path planning and control in known and unknown 3D environments - AGV 2022   *OpenCV, VizDOOM, NumPy*
- Improved efficiency of RRT* at tight spaces in the map, by generating the sampling space with a bridge-test algorithm
- Implemented a simple feedback loop to follow the path simulated in the DOOM environment using VizDoom
- Implemented a wall-following algorithm using Sobel detection on the depth map to traverse the unknown environment

Chimera (On-going) - Makerspace, Technology Robotix Society 2023-Present   *ROS, QuadSDK, Python*
- Collaborating on a four-membered project to build an autonomously controlled quadruped on flat environments
- Set up an open-source framework QuadSDK locally to simulate and plan the quadruped movement and controls

Positions of Responsibility

Technology Robotix Society, IIT Kharagpur | *Subhead*   Aug. 2023 - Present
- Conducted four workshops on Manual and Autonomous Robotics with a footfall of at least 200 students per event
- Mentored for two sessions on Computer Vision for AI and Robotics at Winterschool of AI and Robotics 2024

Autonomous Ground Vehicle Research Group, IIT Kharagpur | *Undergraduate Researcher*   Aug. 2023 - Present
- Implemented planning and control algorithms such as Pure Pursuit, PID, and RRT with ROS noetic and ROS foxy
- Integrated Fuzzy Tiling Activations onto a DQN for discrete control environment dataset generation for MuJoCo tasks
- Reproduced and evaluated the results of the paper titled "The In-Sample Softmax for Offline Reinforcement Learning"

Skills

Languages: Python, C++, C, Bash, LaTeX, Protobuf, HTML, CSS
Frameworks and Libraries: NumPy, Pandas, Pytorch, Sci-kit Learn, ROS, OpenCV, Git, GitHub, Linux, gRPC

Coursework Information

University: Programming and Data Structures in C, Linear Algebra and Numerical Analysis, Advanced Calculus, Probability and Statistics, Basic Electronics, Discrete Structures, Algorithms-I, Basic Engineering Mechanics
Other: Neuromatch Academy Deep Learning 2023, CS 182 Deep Neural Networks UC Berkeley
On-going: Software Engineering, Reinforcement Learning - NPTEL IITM, Finite Language and Automata Theory, Systems Programming, Switching Circuits

Awards and Achievements

JEE Advanced 2022 All India Rank-388 | JEE Main 2022 All India Rank-420
One of the 39 students all over India, selected to attend the Selection Camp for International Physics Olympiad 2022
Awarded by the then Vice President of India, Shri M. Venkaiah Naidu, for being a national topper in NIOS Board Exam
Part of the contingent that secured Gold in Inter IIT Tech Meet 12.0 at IIT Madras for an optimization problem statement
Awarded a fully-sponsored trip by Goethe Institut for a German Language Camp at Stein an der Traun, Bayern, Germany