Amirtha Varshini A S

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Education

- **Georgia Institute of Technology**, Atlanta, GA — Aug. 2021 - May 2023
  Master of Science in Computer Science (ML Concentration) — ***GPA: 4.0/4.0***
- **National Institute of Technology Tiruchirappalli**, India — Jul. 2014 - May 2018
  Bachelor of Technology in Electronics and Communication Engineering — ***GPA: 8.90/10***

Technical Skills

- **Languages**: Python, C, C++, C#, SQL, HTML, CSS, JS, PHP, Bash, TCL
- **Frameworks**: PyTorch, TensorFlow, Scikit-Learn, SciPy, Pandas, Numpy, OpenCV, Linux, QNX, ARM V8, CUDA, Unity
- **Graduate Coursework** : Machine Learning with Limited Supervision, Computer Vision (CV), Deep Reinforcement Learning for Intelligent Control, Graduate Algorithms, Machine Learning, Deep Learning Specialization (Coursera)

Experience

- **Amazon Robotics**, Westborough, MA - *Software Development Engineer Intern* — May 2022 - Aug. 2022
  - Performed object tracking on packages in a warehouse by integrating with segmented shipping labels returned by AR-ID, an ML, and CV-based solution. Successfully enabled AR-ID to process multiple packages using this tracking.
  - Developed an app using Augmented Reality(AR) in Microsoft Hololens 2 to identify the current package picked or stowed, based on the collision of the tracked package's hologram with a spatially anchored hologram mesh.
- **Qualcomm**, Bengaluru, India - *Software Engineer* — Jul. 2018 - Aug. 2021
  - *ADAS team* -Designed Minidump feature on a QNX Real-time operating system to capture a snapshot of a system post-crash. Brought down the download time by **70%** and the size from **12GB to 300 MB**, enabling faster analysis
  - Developed a GDB-based Python and C parser to extract debug information from the collected kernel dump.
  - Built FastRPC framework to offload high-compute tasks from CPU to Digital Signal Processors, improving performance

Research

- **Explainability for Proactive Robot Assistance via Semantic Object Tracking** — Aug. 2022 - current
  - *Advised by Prof. Sonia Chernova* - Developing explainability for a dynamic graph neural network (GNN) that performs spatio-temporal object tracking and models the future movement of daily-use objects in a home environment.
  - Implementing Layer-Wise Relevance Propagation and attention, to beat benchmarks GNNExplainer and PGExplainer.
- **Text-to-video generation using Latent Diffusion** — Aug. 2022 - Dec. 2022
  - Trained a transformer to generate future video frame embeddings on top of the Stable Diffusion encoder. **Link**
  - Outperformed the TGANv2 baseline by **26%** improvement in Frechet Video Distance score by using a novel combination of loss functions and video interpolation components.
- **Deep Reinforcement Learning (RL) based autonomous driving** — Jan. 2022 - May 2022
  - Built a model-free RL algorithm TQC (Truncated Quantile Critics) with experience replay and increased rewards by **17%** for navigation in self-driving simulator Donkeycar, outperforming benchmark algorithms DDPG, SAC, and PPO.
  - Improved rewards by **42%** by training a Variational Autoencoder to compress input into a latent space representation.
  - Generated a semantic segmentation mask using a pretrained autoencoder to visualize the model for interpretability.
- **Semantic Similarity and Toxicity Detection of Questions in Quora** — Sep. 2021 - Dec. 2021
  - Using PyTorch, compared the results of BERT, Bi-LSTM, Bi-RNN, and Bi-GRU models with NLP word-embedding techniques TF-IDF Vectorization and Word2Vec to predict intent similarity and toxicity of questions on Quora. **Link**
  - Achieved F1-score of **0.7** by fine-tuning BERT to predict question sincerity and accuracy **0.89** for questions' similarities.
- **Computer Vision Tools for Non-verbal Communication in Interviews** — Aug. 2021 - Dec. 2021
  - Devised a K-Nearest Neighbours(KNN) model to estimate head pose in videos with accuracy **83%**. Obtained features as the difference in minima and maxima of first-order pitch differences, from OpenFace Keypoints output on AMI corpus. **Link**
- **Low-cost intelligent vision in automotive (LIVA)** — Jun. 2019 - Oct. 2019
  - Collected dataset of depth images using Kinect V2 mounted on a moving car. Achieved object detection accuracy **85%** in real-time to recognize pedestrians and vehicles by fine-tuning YOLO V3 model with depth images and COCO dataset.
- **Real-Time Hand Gesture Recognition system** — Jan. 2018 - May 2018
  - Fine-tuned Inception V3 Architecture on ASL dataset to detect gestures with **98%** accuracy and controlled a custom-built robotic arm. Published a paper as the **first author**: Amirtha Varshini, A.S. and et.al, "Real-time Hand Gesture Recognition for Robotic Arm and Home Automation", **(ISEEIE 2021)** - **Link**

Achievements

- Runner-up at **Innovation Competition 2022**, an Entrepreneurial challenge of VentureLabs, Georgia Tech.
- Recipient of **K. C. Mahindra Scholarship** for Post Graduate Studies Abroad, 2021