BHARGAV JOSHI

Machine Learning Engineer | Data Scientist

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EXPERIENCE AND RESEARCH

Graduate Assistantship

Auburn University

Sep. 2017 - Present Auburn, AL

- **Exploiting vulnerability in Reinforcement Learning, GRA**
  - Used gradient based attacks on Reinforcement Learning (RL) models trained using state of the art methods (PPO, SAC) to detect vulnerability in decision making of the agent for applications such as self driving cars.
  - Implemented these algorithms using PyTorch and TensorFlow.
- **Exploring applications of Spiking Neural Networks, GRA**
  - Researched to find potential applications of third generation of neural network a.k.a. Spiking Neural Networks (SNN).
  - Discovered that SNNs can contribute to low power applications, thus better prosthetics, as well as more biological inclined dynamic makes them resistant to adversarial attacks.
  - Implemented spiking dynamics from scratch in NumPy.
- **Neuro-PLC, GRA**
  - Implemented and trained a neural network in MATLAB using the port data of a programmable logic controller (PLC) to detect hacks or alteration in PLC's operation.
  - Developed a data collection system between PLC's physical ports and local computer using Rasperry Pi and Shift Registers.
- **Graduate Teaching Assistantship, GTA**
  Machine Learning, Artificial Intelligence, and Assembly Language Programming

EDUCATION

M.Eng. in Data Science Engineering (Under Progress)

Auburn University

Aug, 2021 - May, 2022

M.S. in Computer Science and Software Engineering

Auburn University

Jan, 2017 - 2019 Auburn, AL

B.Tech. in Electronics and Communication Engineering

Dharmsinh Desai University

Aug, 2012 - 2016 Gujarat, India

RELEVANT COURSEWORK

Machine Learning, Statistical Learning, Deep Learning, Reinforcement Learning, Advanced Algorithms, Operating System, Data Mining, Database Systems, Probability and Statistics, Computer Networks

PROJECTS

- **Reinforcement Learning |** *Keras-rl*, *OpenAI-Gym*, *PyTorch Agents*: Compared soft actor-critic, Deep Deterministic policy-gradient (DDPG), Proximal Policy Optimization (PPO), and DQN algorithms for training an agent to play the LunarLander-v2, Atari Breakout-v0, CartPole-v1, and MountainCar-v0 games in OpenAI Gym.
  - Used Google Compute Engine NVIDIA p100 for GPU workloads.
  - Modified PyTorch agent to use pyNEST's Spiking Neural Networks to beat MountainCar-v0 game.
- **Image Classification with Spiking Neural Networks|** *TensorFlow*, *TensorBoard*, *Nengo*: Trained a spiking neural network (SNN) to perform the classification of CIFAR-10 and MNIST images in a simulation of lower power AI computational platform.
- **Classic Image Classification |** *Pytorch*: Implemented Guided Feature Inversion with a pretrained vgg19 model to first find the saliency map for the input image, and second find the class discriminative mask for the target object.
- **Authorship Attribution System |** *Sklearn*, *SciPy*, *NumPy*: Created a stacking ensemble of three machine learners (LSVM, RBFSVM, and ANN) that learn about different authors' writing styles using the extracted features of each author's writing style. The feature set isevolved using Genetic & Evolutionary Feature Selection (GEFeS) to make the system more accurate and resistant to adversarial attacks.
- **Evolving feed-forward deep neural network architecture |** *NumPy*, *Keras*: Created a method to automatically adjust the dimension of deep neural network's hidden layers using a modified Genetic & Evolutionary Feature Selection (GEFeS) technique in which feature selection was swapped with selection of number of neurons, for the classification task of MNIST images and achieved the accuracy of 97% without parameter tuning.

PROGRAMMING & SOFTWARE SKILLS

Python Packages: PyTorch, TensorFlow, Keras, NumPy, Nengo, PyNEST, Sklearn, Scipy, OpenAI-Gym, openCV, Django
Programming languages: Python, C, C++, MATLAB, R, SQL, Java, Assembly Language
Developer Skills: Kubernates, KubeFlow, MLFlow, Docker, MariaDB, MYSQL, HTML, NGINX, Google cloud, Shell Scripting, Linux, Git

AREA OF INTEREST

Machine Learning, Reinforcement Learning, Artificial Intelligence, Data Collection, Data Processing, GPU programming for ML computations, ML pipelines, Unsupervised learning, Semisupervised learning, Generative Neural Networks