Rahim Hossain

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LinkedIn | GitHub | Google Scholar

Research Interests

Machine Learning | Deep Learning | Computer Vision | Natural Language Processing | Robotics

Education

SUNY Binghamton — Binghamton, New York
MS in Computer Science — Jan 2023–May 2024
CGPA: 3.81/4.0

Bangladesh University of Engineering and Technology — Dhaka, Bangladesh
B.Sc. in Electrical and Electronic Engineering — Apr 2016–Jan 2022

Work Experience

SUNY Binghamton — Binghamton, New York
Research Assistant, RT Lab — May 2023 –Current

- Developing an algorithm called 'Adaptive Real Time Object Detection using advance optical flow algorithm'
- Developed Deep Neural Network Architecture for Detecting Spotted Lanternfly Using Energy Efficient Wide Area Network

Cobalt Speech and Language,Inc — Remote
Research Scientist — Mar 2022–Dec 2022

- Specialized in Natural Language Processing (NLP) and Understanding (NLU), contributing significantly to the company's ambitious "Call Summarization" project.
- Trained large language models including BART, BERT, and LED, gaining extensive experience with transformer models and enhancing expertise in developing advanced NLP solutions.

Research Experience

Investigating Linear Neural Network's Vulnerability — May 2023–Current
Supervisor: Dr. Adnan Siraj Rakin

- In this research, the primary objective is to investigate the effect of elimination of non linear activation in the DNN in terms of robustness.

Security Threat in Source Free Domain Adaptation — Jan 2023–March 2023
Supervisor: Dr. Adnan Siraj Rakin

- We investigated the effect of a source adversary which may inject a hidden malicious behavior (Backdoor/Trojan) during source training and potentially transfer it to the target domain even after benign training by the victim (target do-main owner). We also built a defense method for the attack as well.

Weight Pruning — May 2021–Dec 2021
Supervisor: Dr. Manar Samad

- We investigated the effect of weight pruning in unsupervised learning setup. We also proposed a weight perturbation method.

Publications

1. Sabbir Ahmed, Abdullah Al Arafat, Mamshad Nayeem Rizve, **Rahim Hossain**, Zhishan Guo, Adnan Siraj Rakin,**"SSDA: Secure Source-Free Domain Adaptation,"** International Conference on Computer Vision(ICCV), 2023. [Paper]

2. M. D. Samad, **R. Hossain** and K. M. Iftekharuddin,**"Dynamic Perturbation of Weights for Improved Data Reconstruction in Unsupervised Learning,"** 2021 International Joint Conference on Neural Networks (IJCNN), 2021, pp. 1-7, doi: 10.1109/IJCNN52387.2021.9533539. [Paper]

3. **R. Hossain** and M. D. Samad,**"A Hybrid Clustering Pipeline for Mining Baseline Local Patterns in 3D Point Cloud,"** 2021 6th International Conference for Convergence in Technology (I2CT), 2021, pp. 1-6, doi: 10.1109/I2CT51068.2021.9418095.[Paper]

Significant Projects

- **Third Eye**: In this project, I extended my previous smart stick project. I added LoRa to communicate with a host. The camera module detects the objects and we then send the objects to a receiver node using LoRa .[details]
- **Reinforcement Learning for autonomous navigation using CARLA**: In this project, we presented a RL-based navigation system for autonomous vehicles using the CARLA simulation platform. The proposed system employs a Q learning RL algorithm method, to learn the optimal actions for navigating a complex urban environment. [details]
- **Source Hypothesis Transfer for Unsupervised Domain Adaptation**: In this project, we investigated the benchmark results achieved in SHOT(Source hypothesis transfer for unsupervised domain adaptation) paper. Furthermore, we evaluated the effectiveness of SHOT in closed-set domain adaptation for various benchmark datasets to demonstrate its effectiveness. [details]
- **Smart Stick for blind people Using Raspberry pi**: It uses two ultrasonic sensors HC SR 04 to detect the depth below or the obstacles in between. Along with that it uses Arduino and Raspberry pi as the main controller. Whenever there is any obstacle in the path. The sensor detects the distance from the obstacle and send to the controller. We used a camera module which is controlled by raspberry pi. The camera detects the yellow line to tell the blind person whether he is on the track or not. [details]
- **Stock increment or decrement prediction from stock data**: We used a Stock data set which had multiple stock data stacked together in a list of data frames. Each stock data had columns they are (Open, High , Low, Close, Volume). We had to make the labels ourselves and classify it using a LSTM model. [details]
- **Voice Controlled Vehicle**: Design and implementation of a robot that follows voice commands based on speech recognition algorithms. [details]
- **Line Following Bot**: Design of a robot capable of line following based on Digital Logic Design [details]

Skills

- **Programming Languages:** Python, MATLAB, C, C++, Golang, Intel-8086 Assembly
- **Simulation & Design Tools:** ROS, PSpice, Simulink, AutoCAD, Verilog
- **Machine Learning Libraries:** PyTorch, Tensorflow, Keras, Scikit-Learn

Relevant Graduate Course-works

Machine Learning | Deep Learning | Intelligent Mobile Robotics | Design and Analysis of Algorithm | Computer Architecture | IoT | OS | HPC

Awards and Honors

- **Ebay ML Challenge 3rd Position (2023)**
- **Industrial Automation Challenge (Robotic Competition) Bangladesh University of Engineering and Technology**, Won 2*nd* position among many teams from the whole country.
- **Technical Scholarship, Bangladesh University of Engineering and Technology (2016 and 2018)**
- **Bangladesh Education Board Scholarship in Higher Secondary Certificate (HSC) Examination (2015)**