Md Tanvirul Alam

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Research Interests

Deep Learning, Explainable AI, Cybersecurity, Computer Vision, Natural Language Processing.

Education

Ph.D. **Rochester Institute of Technology,** Rochester, NY, USA,
2021–Present *Concentration – Computing and Information Science*
Advisor – Dr. Nidhi Rastogi .

B.Sc. **Bangladesh University of Engineering & Technology,** Dhaka, Bangladesh,
2011–2016 *Concentration – Electrical and Electronic Engineering*
Advisor – Dr. Mohammed Imamul Hassan Bhuiyan.

Publications

Published [1] **Tanvirul Alam**, Akib Khan, and Firoj Alam, "Punctuation Restoration using Transformer Models for High- and Low-Resource Languages," in *Proceedings of the 6th Workshop on Noisy User-generated Text (W-NUT 2020)@EMNLP*. 2020.   [PDF]
[2] **Tanvirul Alam** and Akib Khan, "Lightweight CNN for Robust Voice Activity Detection," in *International Conference on Speech and Computer(SPECOM)*. Springer, 2020, pp. 1–12.   [DOI]
[3] Firoj Alam, Ferda Ofli, Muhammad Imran, **Tanvirul Alam**, and Umair Qazi, "Deep Learning Benchmarks and Datasets for Social Media Image Classification for Disaster Response," in *International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*. IEEE, 2020.   [PDF]
[4] Firoj Alam, **Tanvirul Alam**, Md. Arid Hasan, Abul Hasnat, Muhammad Imran and Ferda Ofli, "MEDIC: A multi-task learning dataset for disaster image classification," in *Neural Computing and Applications*.   [PDF]

Under Review [1] **Tanvirul Alam**, Nidhi Rastogi, Dipkamal Bhusal, and Youngja Park, "Looking Beyond IoCs: Automatically Extracting Attack Patterns from CTI".
[2] Firoj Alam, Md. Arid Hasan, **Tanvirul Alam**, Akib Khan, Jannatul Tajrin, Naira Khan, and Shammur Absar Chowdhury, "A Review of Bangla Natural Language Processing Tasks and the Utility of Transformer Models".

Experience

August **Graduate Research Assistant**, *Rochester Institute of Technology*.
2021–Present I am currently working on knowledge graph generation from unstructured data, emphasizing the cybersecurity domain. I am researching named entity and malware attack patterns extraction from unstructured threat reports, and semi-supervised learning for relation extraction between cybersecurity entities using machine learning.

May **Senior Software Engineer**, *BJIT Limited*.
2018–June I led the development of multiple machine learning projects from project conception to completion in diverse
2021 application domains. I developed a novel approach for facial attribute recognition from video streams to render them with a 3D avatar. I researched toward improving pedestrian safety near level crossings by employing machine learning and heuristics. I trained neural networks for voice activity detection, environmental sound classification, webpage classification from texts, and pedestrian attribute detection.

December **Software Engineer**, *Semion Limited*.
2016–April I researched computer vision for medical image analysis and applied state-of-the-art convolutional neural networks
2018 for abnormality detection from x-ray images. I developed the system to run inference in real-time on edge devices to assist radiologists in making informed decisions. I also researched natural language processing for sentiment analysis, question answering, and interpretable text classification with neural networks.

Skills

Languages Python, C/C++, Java, Matlab, C#
Frameworks PyTorch, Keras, TensorFlow
Libraries NumPy, Pandas, Scikit-learn, OpenCV, Matplotlib, OpenVINO

Utilities	Jupyter Notebook, PyCharm, Visual Studio, Git, Gerrit

Graduate Courses

Quantitative Foundations, Deep Learning, Statistical Machine Learning, Software Engineering.

Selected Professional Projects

2017 **SemInfer: Desktop Application to Run Inference on Captured Screenshot**, *C++.*
- Developed a dependency free deep neural net inference library using C++
- Supported layers: Conv, Pool, Dense, Batch Norm, Activation, NMS, RoI Pool, Depthwise, LRP
- Added data parallelism support with OpenMP and SIMD (SSE, AVX) instructions
- Implemented CNN models (VGG, ResNet, DenseNet, MobileNet, Faster RCNN etc.) in C++

2017 **Machine Log Data Analysis for Fault Prediction**, *C++, Python.*
- Trained deep neural network model for fault prediction from log history
- Implemented layer-wise relevant propagation to identify trigger phrases for future fault

2018 **SemRad: A Teleradiology Solution**, *Java, JavaFX.*
- Developed client app for radiologist to communicate with server and report studies
- Implemented drawing and image analysis tools for assisting radiologists

2018 **Web Filtering using Deep Neural Network**, *C++, Python.*
- Trained a multilingual (English and Japanese) text based website classification model using neural network
- Developed a windows app using C++ for monitoring and controlling outbound traffics

2019 **Voice Activity Detection using Convolutional Neural Network**, *C++, Python.*
- Designed and trained a lightweight CNN model for voice activity detection on Android

2019 **POC on Level Crossing Safety**, *C++, .NET.*
- Developed a POC for detecting and tracking pedestrian and vehicles near level crossing
- Applied heuristics to identify potentially dangerous situations
- Selected as the best POC among multiple competitors by Japan Railways Group

2020 **Facial Attribute Recognition and Rendering on 3D Avatar**, *Python.*
- Defined data collection strategy for mapping facial expression to 3D model
- Trained ML model combining geometric and appearance features

2020 **Pedestrian Attributes Recognition**, *Python, C++.*
- Developed a unified pedestrian attributes recognition application
- Supported features: pose estimation, gender detection, face blurring, smartphone usage detection

2021 **Smart Meeting Application**, *Python, C#.*
- Developed a meeting application that detects and tracks active speakers in the meeting
- Incorporated face detection and voice activity detection models that run real time on CPU

Accomplishments

Paper	SPECOM, 2020, *Virtual*.
Presentation	6th Workshop on Noisy User-generated Text (W-NUT), @EMNLP 2020 *Virtual*.
Reviewer	6th Workshop on Noisy User-generated Text (W-NUT), 2020.
Programming Contests	Advanced to Round 2 in Google Code Jam 2016(Top 7% globally). TopCoder, Codeforces.
AI Contests	Finalist in Russian AI Cup 2016 — CodeWizards. Kaggle contest Mechanism of Action prediction, placed 572 (top 14%).
Training	Worked as the lead instructor in AI training organized by LICT, BCC. Conducted a two week long training in Thailand on introductory Deep Learning.
Employment	Awarded employee of the year in Fintech & AI department in 2020.
Scholarships	Admission Test Excellency Scholarship, BUET, 2011. Education Board Scholarship, Government of Bangladesh, 2008 & 2010.