

Md Awsafur Rahman

RESEARCH ASSISTANT IN IRAB (INSTITUTE OF ROBOTICS & AUTOMATION, BUET)

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Education

Bangladesh University of Engineering and Technology (BUET)

Dhaka, Bangladesh

B.SC IN ELECTRICAL AND ELECTRONICS ENGINEERING

Apr. 2018 - Present

- CGPA : 3.43/4.0 (3.70 in last semester)

Research Experience

Research Assistant, IRAB (Institute of Robotics & Automation BUET)

BUET

SUPERVISOR: DR. SHAIKH ANOWARUL FATTAH (BUET)

Feb. 2022 - Present

- Visual-Language-Modeling: Zero-shot object detection-segmentation, Image captioning.
- Diffusion: Image-to-Image generation (Super-Resolution, Inpainting, Outpainting, etc).
- Self & Semi Supervised Learning: Image-based pretraining to gain NLP grade performance.

Undergraduate Thesis

BUET

SUPERVISOR: DR. SHAIKH ANOWARUL FATTAH (BUET)

Feb. 2022 - Present

- Fake Image Detection from both known & unknown generators; 1 paper accepted at IEEE ICIP'23 (1st author)
- Multi-task Learning for Depth & Semantics using Transformers; 1 paper under review at IEEE WACV'24 (1st author)
- Monocular Depth Estimation with Transformers; 1 paper under review at IEEE Sensors (1st author)
- Synthetic Speech Attribution from many sources; Won IEEE Sp Cup 2023
- Awarded ML Research Spotlight Award in August by Kaggle (Solo)

Undergraduate Research Assistant, Robotics Lab

BUET

SUPERVISOR: DR. SHAIKH ANOWARUL FATTAH & LECTURER TANVIR MAHMUD

Dec. 2019 - Present

- Abnormalities classification from Chest X-ray; 1 paper (400+ citations) published in Elsevier CBM [IF: 7.7, Q1] (2nd author)
- Localize and classify anomalies from CT Scan; 1 paper published in IEEE TAI [Q1] (2nd author)
- Arrhythmia identification from ECG signal; 1 paper published in IEEE EMBC'22) (1st author)
- Skin Cancer (Melanoma) detection from Dermoscopic images; 1 paper under review at Elsevier BSPP (1st author)

Professional Experience

Kaggle: Competitive Deep-Learning

San Francisco, USA (Remote)

1X GRANDMASTER & 3X MASTER

Nov. 2019 - Present


- Compete with top data scientists from companies like NVIDIA, HuggingFace, H2O.ai, etc
- Publish Open-Source kernels solving real-life problems on Data Science, Machine Learning & Deep Learning
- Won Grandmaster title, ranking 7th (best 5th) among 280K and 1st in Bangladesh at Code section.
- Won 34 Gold, 7 Silver and 15 Bronze medals in Code section
- Won 1 Gold, 3 Silver & 2 Bronze medals in Competition section

Collaboration

Santa Clara, USA (Remote)

NVIDIA

May. 2021 - Jul. 2021

- Collaborated with Chris Deotte , a senior data scientist at NVIDIA
- Worked on COVID-19 Detection and Localization from Chest X-Ray
- Won the Best Student Team Award and ranked 4th globally in theSIIM-FISABIO-RSNA COVID-19 Detection competition

Weights & Biases

California, USA (Remote)

DEVELOPER EXPERT

Aug. 2021 - Present

- Find breast cancers in screening mammograms; Won Gold Medal in Kaggle
- Detect single neuronal cells in microscopy images; Won Gold Medal in Kaggle
- Detect crown-of-thorns starfish in underwater images; Won Gold Medal in Kaggle
- Identify bird calls in soundscapes; Won Gold Medal in Kaggle
- Predict the popularity of shelter pet photos; Won Gold Medal in Kaggle

GitHub

San Francisco, USA (Remote)

OPEN SOURCE CONTRIBUTOR

Apr. 2020 - Present

- Contributed to popular open-source libraries such as TensorFlow, HuggingFace, YOLOv5, and TensorFlow-IO.
- Published original ML/DL projects including gcvit-tf, tensorflow_extra, TransUnet-tf, audio_classification_models.
- Participated in community repos such as vit_keras, keras_cv_attnion_models, and ConvNeXt-TF.

Teaching Experience

Machine Learning & Deep Learning I (MLDL-I) Course

INSTRUCTOR

IRAB, BUET

July. 2023 - Present

- Theory and hands-on coding for Machine Learning & Deep Learning.
- ML: Backpropagation, Gradient Descent, Linear/Logistic Regression, SVM, Tree-based model, KNN, K-Means Clustering.
- DL: DNN, CNN, Architectures (VGG, Residual, Inception, Efficient), Image Classification/Segmentation.
- Misc: Data Leakage, Cross-Validation, Augmentation, TensorFlow coding.

Publications

Sy-Tra: Depth estimation with Semi-supervised Semantic Symbiosis with Transformer and Dual-Compensating Augmentation

1ST AUTHOR - UNDER REVIEW (IEEE WACV 2024)

June 2023

- This paper introduces a dataset-invariant semi-supervised strategy to address the scarcity of semantic information
- It leverages the Symbiotic Transformer to achieve comprehensive mutual awareness between depth and semantic features
- A novel augmentation is introduced that compensates for both depth-semantic tasks using strategical blending.

DwinFormer: Dual Window Transformers for End-to-End Monocular Depth Estimation

1ST AUTHOR - UNDER REVIEW (IEEE SENSOR)

Jan. 2023

- Proposed novel transformers addressing the issues of consistency vs fine details in depth map by maximizing global information.
- It also mitigates the issues of semantic discrepancy by merging features with novel cross-attention transformers.

ArtiFact: A Large-Scale Dataset with Artificial and Factual Images for Generalizable and Robust Synthetic Image Detection

1ST AUTHOR - IEEE ICIP 2023 (ACCEPTED)

Nov 2022

- The paper presents ArtiFact, a large-scale dataset with 2.49 million images, covering diverse generators and object categories.
- It also proposes a novel method to effectively address the issue of detecting fake images from both known and unknown generators.

CIFF-Net: A Deep Neural Network with Contextual Image Feature Fusion for Skin Cancer (Melanoma) Diagnosis

1ST AUTHOR - UNDER REVIEW

Aug. 2022

- Proposed method integrates patient-level contextual information into the traditional approaches for improved Melanoma diagnosis.
- It incorporates contextual features from supplementary skin lesions with an novel and efficient approach offering better generalization.

A Deep Learning Scheme for Detecting Atrial Fibrillation Based on Fusion of Raw and Discrete Wavelet Transformed ECG Features

1ST AUTHOR - IEEE EMBC 2022

Apr. 2022

- Automatic AF detection scheme is proposed that utilizes both raw ECG signal and its dwt features.
- 1D CNN is employed for parallel processing of both raw and dwt features.
- A multi-phase training scheme is proposed which facilitates parallel optimization for efficient gradient propagation.

CovSegNet: A Multi Encoder-Decoder Architecture for Improved Lesion Segmentation of COVID-19 Chest CT Scans

2ND AUTHOR - IEEE TRANSACTIONS ON ARTIFICIAL INTELLIGENCE [Q1]

Mar. 2021

- A multi encoder-decoder architecture is proposed for accurate and efficient segmentation of Covid-19 Chest CT.
- Horizontal expansion mechanism is introduced for memory efficient lesion segmentation.
- A multiscale fusion module is introduced with a pyramid fusion scheme to reduce the semantic gaps between subsequent encoder/decoder modules.

CovXNet: A multi-dilation convolutional neural network for automatic COVID-19 and other pneumonia detection from chest X-ray images

2ND AUTHOR - COMPUTERS IN BIOLOGY AND MEDICINE [Q1]

Jul. 2020


- Introduced a deep learning aided automated scheme to diagnose COVID-19 and other pneumonia, utilizing a small amount of chest X-rays.
- Utilizes depthwise convolution with varying dilation rates for efficiently extracting diversified features from chest X-rays.
- Exploits Multi-Stage Transfer Learning to diagnose COVID-19 utilize the leanings from Pneumonia disease.

Honors & Awards


PROJECTS

2022 **Winner**, Kaggle ML Research Spotlight - GCViT: Global Context Vision Transformer 

Kaggle

2022 **Winner**, Google OSS Expert Prize: June 2022 - Fake Speech Detection 

Google

2022 **Winner**, Google OSS Expert Prize: May 2022 - GI Tract Image Segmentation 

Google

2022 **Winner**, Google OSS Expert Prize: January 2022 - Extraterrestrial signal detection from Deep Space 

Google

COMPETITIONS

2022	1st Place (on leaderboard) , IEEE VIP CUP 2022 - Synthetic Image Detection Challenge ↗	ICIP 2022
2022	1st Place , IEEE Signal Processing Cup 2022 - Synthetic Speech Attribution ↗	ICASSP 2022
2021	1st Place (jointly) , KaggleDays x ZbyHP Championship, Shanghai - Predict the yoga pose correctly ↗	HP
2021	1st Place , Deep Chimpact - Depth Estimation for Wildlife Conservation ↗	DrivenData
2021	1st Place (on test1) , IEEE VIP CUP 2021 - Privacy-Preserving In-Bed Human Pose Estimation ↗	ICIP 2021
2021	Best Student Team, 4th Place , SIIM-FISABIO-RSNA COVID-19 Detection and Localization from Chest X-ray ↗	Kaggle
2020	1st Place , DhakaAI - Traffic Detection in Dhaka (One of the Densest cities in the world) ↗	Dhaka, Bangladesh
2020	2nd Place , IEEE VIP CUP 2020 - Real-time vehicle detection and tracking at using fisheye camera ↗	ICIP 2020
2020	Silver Medal , NFL 1st Place and Future - Detect helmet impacts in videos of NFL plays ↗	Kaggle
2021	Silver Medal , BirdCLEF 2021 - Identify bird calls in soundscape recordings ↗	Kaggle
2021	Silver Medal , VinBigData - Chest X-ray Abnormalities Detection ↗	Kaggle
2021	Bronze Medal , Shopee - Determine if two products are the same by their images ↗	Kaggle
2020	Bronze Medal , Cassava Leaf Disease Classification ↗	Kaggle

Skills

DevOps	AWS, GCP, Azure
Programming	Python, C++, MATLAB, Linux, LaTeX, OpenCV
Framework	Tensorflow, Keras, PyTorch
DevTools	Git, Bash, WandB
Languages	English, Bangla, Hindi

Online Courses

2021	Build Basic Generative Adversarial Networks (GANs) ↗ , DeepLearning.AI	Coursera
2020	Convolutional Neural Networks in TensorFlow ↗ , Google	Coursera
2020	Natural Language Processing in TensorFlow ↗ , Google	Coursera
2020	AI for Medicine Specialization (3 Courses: Diagnosis, Prognosis, Treatment) ↗ , Stanford University	Coursera
2020	DL0101EN: Deep Learning Fundamentals with Keras ↗ , IBM	edX
2020	Introduction to TensorFlow for Deep Learning ↗ , Google	Coursera

Leadership Experience

IEEE EMBS Student Branch BUET Section [↗](#)

[Dhaka, Bangladesh](#)

CHAIRPERSON, SECRETARY

[Apr. 2021 - Jun. 2023](#)

- Ensuring that the society is engaging the members and supplementing their knowledge by informative meetings
- Organized meetings, seminar & workshop hosted by IEEE EMBS Society
- Assist speakers & guests during the seminars & workshops

Class Representative (CR)

SECTION B, BATCH 17, DEPT. OF EEE, BUET

[Nov. 2019 - Present](#)

- Maintain class in absence of teacher, schedule quizzes, make announcements.
- Assist teacher in taking class seamlessly.
- Communicate as a channel between teacher and class.