Ahmed Imtiaz Humayun

CONTACT INFORMATION

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EDUCATION

Rice University 2019-

Ph.D. Student, Electrical and Computer Engineering

Advised by Prof. Richard Baraniuk

Bangladesh University of Engineering and Technology (BUET) 2017

Bachelor, Electrical and Electronic Engineering

RESEARCH INTERESTS

Deep Learning Theory, Spline Approximations, Generative Modeling, Synthetic Data Training

PUBLICATIONS

SplineCam: Exact Visualization and Characterization of Deep Neural Network Geometry and Decision Boundary
AI Humayun, R Balestriero, G Balakrishnan, R Baraniuk
Pre-print (Submitted) [url]

Exact Visualization of Deep Neural Network Geometry and Decision Boundary
AI Humayun, R Balestriero, R Baraniuk
NeurIPS 2022 Workshop on Symmetry and Geometry in Neural Representations [url]

Polarity Sampling: Quality and Diversity Control of Pre-Trained Generative Networks via Singular Values
AI Humayun, R Balestriero, R Baraniuk
CVPR 2022 (Oral Presentation) [url]

MaGNET: Uniform Sampling from Deep Generative Network Manifolds without Retraining
AI Humayun, R Balestriero, R Baraniuk
ICLR 2022 [url]

No More than 6ft Apart: Robust K-means via Radius Upper Bounds
AI Humayun, R Balestriero, A Kyrillidis, R Baraniuk
ICASSP 2022 [url]

Bengali Common Voice Speech Dataset for Automatic Speech Recognition
S Alam, A Sushmit, Z Abdullah, S Nakkhatra, MD Ansary, SM Hossen, SM Mehnaz, T Reasat, **AI Humayun**
ArXiv, 2022 [url]

Detection of Junctional Ectopic Tachycardia by Central Venous Pressure
X Tan, Y Dai, **AI Humayun**, H Chen, G Allen, P Jain
AI in Medicine Conference, 2021 [url]

Wearing a MASK: Compressed Representations of Variable-Length Sequences Using Recurrent Neural Tangent Kernels
S Alemohammad, H Babaei, R Balastriero, MY Cheung, **AI Humayun**, D Lejeune, L Luzi, R Baraniuk
ICASSP, 2021 [url]

A Large Multi-Target Dataset of Common Bengali Handwritten Graphemes
S Alam, T Reasat, AS Sushmit, SM Siddique, F Rahman, M Hasan, **AI Humayun**
ICDAR 2021 [url]

A Novel Algorithm for Early Detection of Junctional Ectopic Tachycardia in Patients With Congenital Heart Disease
H Babaei, S Barua, R Patel, Y Dai, **AI Humayun**, M Paciuc, M Stauffer, V Gagne, C Rusin, P Jain
Pediatric Critical Care Medicine, 2020 [url]

Towards Domain Invariant Heart Sound Abnormality Detection using Learnable Filterbanks
AI Humayun, S Ghaffarzadegan, Z Feng and T Hasan
IEEE Journal of Biomedical Health Informatics, 2020 [url]

End-to-end Sleep Staging with Raw Single Channel EEG using Deep Residual ConvNets
AI Humayun, AS Shahriyar, T Hasan and MIH Bhuiyan
IEEE Conf. of Biomedical Health Informatics, 2019 [url]

X-Ray Image Compression Using Convolutional Recurrent Neural Networks
AS Shahriyar, S Zaman, **AI Humayun**, T Hasan and MIH Bhuiyan
IEEE Conf. of Biomedical Health Informatics, 2019 [url]

An Ensemble of Transfer, Semi-supervised and Supervised Learning Methods for Pathological Heart Sound Classification
AI Humayun, MT Khan, S Ghaffarzadegan, Z Feng and T Hasan
INTERSPEECH 2018 [url]

Learning Front-end Filter-bank Parameters using Convolutional Neural Networks for Abnormal Heart Sound Detection
AI Humayun, S Ghaffarzadegan, Z Feng and T Hasan
IEEE EMBC 2018 [url]

NumtaDB - Assembled Bengali Handwritten Digits
S Alam, T Reasat, RM Doha, **AI Humayun**
ArXiv 2018 [url]

Predictive Real-time Beat Tracking from Music for Embedded Application
IA Hussaini, **AI Humayun**, SI Foysal, S Alam, R Hyder, SS Chowdhury and MA Haque
IEEE Multimedia Information Processing and Retrieval (MIPR), 2018 [url]

Patents

Method and System for Detecting Abnormal Heart Sounds
S Ghaffarzadegan, Z Feng, **AI Humayun**, T Hasan
Assignee Robert Bosch GmbH in US, Germany and China, 2019 [url]
Regarding novel contributions on Linear Phase 1DCNNs and their application as learnable filter banks.

Leadership Experience

Founder and Chief, Bengali.AI Dec 2017-

Bengali.AI is a non-profit initiative from Bangladesh that is focused on building crowdsourced, metadata rich ML datasets for Bengali Vision-NLP research. The datasets are open-sourced through AI competitions, e.g., on Kaggle. In 2020, Bengali.AI launched a featured competition supported by a Kaggle research grant worth 80,000 USD. In 2022, Bengali.AI won the community competition award from Kaggle for a competition based on our recently crowdsourced 2000 hour Bengali ASR dataset. Bengali.AI is co-organizing BNLP workshop at EMNLP 2023.

Honors and Awards

D2K Fellowship, Rice University Fall 2022.

Kaggle Community Competition Host Award, for Bengali.AI Speech Rec. Comp. 2022.

Loewenstern Fellowship, Graduate Student Recipient, 2019-20.

Kaggle Research Grant for Bengali.AI Grapheme Rec. Comp. 2019-20

D2K Project Showcase Winner, Rice University 2019

ISCA Student Travel Grant for INTERSPEECH 2018

IEEE Signal Processing Cup 2017 Honorable Mention for Real-Time Beat Tracker

Young Innovator of the Year, Falling Walls Lab 2016, Berlin.

Community Service

Reviewer, CVPR 2023, NeuRIPS 2022 Workshop, TOPML Workshop 2021.

"What Is the Future of Signal Processing?", **IEEE Signal Processing Magazine**, Nov 2017 [url]

Founding Moderator, Bengali.AI Community of 5k+ AI/ML enthusiasts from Bangladesh [url]

Invited Talks

Polarity Sampling: Controllable Generation For Free, FAIR, Montreal, Oct 2022

Controlling Generative Models via Spline Theory, FAIR, NY, Mar 2022

Breaking the Wall of Blindness with Wearables, Academy of Arts, Berlin, Dec 2016

Featured News

The Business Standard, Dec 2022, Bengali.AI: Democratizing AI Research in Bengali [url]

The Daily Star, Nov 2022, Meet the Bengali.AI [url]

Somoy TV Bangladesh, Nov 2022, on Bengali.AI 2000 hrs Speech Rec. Dataset [url]

Somoy News, Nov 2022, on Bengali.AI 2000 hrs Speech Rec. Dataset [url]

NVIDIA Dev Blog on Bengali.AI, Dec 2020, Grandmaster Series by Bojan Tunguz [url]

Technology.org, Dec 2019, Bengali.AI Grapheme Recognition Challenge [url]

IEEE SP Magazine, July 2017, Embedded Systems Feel the Beat [url]

BBC Media Action, Jan 2017, Project AudoVisor- wearable blind-aid [url]

The Asian Age, Oct 2016, Falling Walls Lab award winner [url]

Skills

Python, Tensorflow, Pytorch, Graph-tool, python-igraph, JAX, Pytorch JIT, C/C++, Matlab, Mitsuba, Blender, QT, Manim