

Ahmed Imtiaz Humayun

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

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

Exact Visualization of Deep Neural Network Geometry and Decision Boundary
AI Humayun, R Balestrieri, 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 Balestrieri, R Baraniuk
CVPR 2022 (Oral Presentation) [\[url\]](#)

MaGNET: Uniform Sampling from Deep Generative Network Manifolds without Retraining
AI Humayun, R Balestrieri, R Baraniuk
ICLR 2022 [\[url\]](#)

No More than 6ft Apart: Robust K-means via Radius Upper Bounds
AI Humayun, R Balestrieri, 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 Balestrieri, 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 Filter-banks

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, meta-data rich ML datasets for Bengali Vision-NLP. To expedite research, we crowdsource solutions The datasets are open-sourced through AI competitions on [Kaggle](#). On 2020, Bengali.AI launched a featured competition supported by a Kaggle research grant. In 2022, Bengali.AI won the community competition award from Kaggle for a Bengali Speech Recognition Challenge, based on our recently crowdsourced 500 hour Bengali ASR dataset. [\[url\]](#)

**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.	
	Reviewer , Symmetry and Geometry in Neural Representations, NeuRIPS 2022 Workshop.	
	Reviewer , TOPML Workshop 2021.	
	“What Is the Future of Signal Processing?”, IEEE Signal Processing Magazine , Nov 2017	[url]
INVITED TALKS	Founding Moderator , Bengali.AI Community of 5k+ AI/ML enthusiasts from Bangladesh	[url]
	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 Daily Star , Nov 2022, on Bengali.AI 2000 hrs Speech Rec. Dataset	[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 AudioVisor- wearable blind-aid	[url]
	The Asian Age , Oct 2016, Falling Walls Lab award winner	[url]
SKILLS	Python, Tensorflow, Pytorch, JAX, C/C++, Matlab, Mitsuba, Blender, QT, Manim	