Khandokar Md. Nayem

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TECHNICAL EXPERTISE

• Speech Enhancement, Processing & Recognition • Machine Learning • Deep Learning • Natural Language Processing (NLP) • Classification & Regression • Deep Neural Network (DNN) • Recurrent Neural Network (RNN) • Long-Short Term Memory (LSTM) • Convolutional Neural Network (CNN) • Machine Learning Models (Bayesian Network, HMM, Clustering, Decision Tree, Ensemble Methods) • Deep Learning Libraries (TensorFlow, Keras) • NLP Libraries (NLTK, Scikit-Learn) • Human Survey Platform (Qualtrics, Amazon MTurk) • Computer Vision and Graphics Libraries (CImg, OpenCV, OpenGL) • Python • Matlab • C\C++ • Java • HTML, CSS & Javascript • SQL • R • Shell Script

EMPLOYMENT

Indiana University, Bloomington, IN, *Research Assistant, ASPIRE research lab* Fall 2016 - Present

- Developed an attention-based monaural speech enhancement model that aims to maximize human perceptual rating of the enhanced speech by incorporating embedding vectors from a human Mean-Opinion Score (MOS) prediction model and jointly training the models on real-world noisy speech data. (INTERSPEECH-2021)
- Proposed and implemented a quantized speech prediction model that classifies speech spectra into a corresponding quantized class and applies a language-style model to ensure more realistic speech spectra. Acceptable quantization level is determined by a listener study ran in Amazon MTurk designed in Qualtrics. (ICASSP-2021, poster, slides, video)
- Designed a recurrent layer named Intra-Spectral Recurrent (ISR) layer that captures spectral dependencies within the magnitude and phase responses of the noisy speech using Markovian recurrent connections, and successfully deployed in a LSTM-based single-channel speech enhancement model. (ICASSP-2020, slides, video)
- Formulated a new type of recurrent output layer that enforces spectral-level dependencies within each spectral time frame modeling the Markovian assumption along the frequency axis in both uni-directional and bi-directional ways, and tested in a magnitude speech enhancement model. (MLSP-2019, poster)
- Engineered a deep architecture named Recurrent Stacked Generative Adversarial Network (RSGAN) which generates video clips based on a pre-condition like a sentence description, action classes, or fMRI signals. (IU-VISION-2017, poster)

Microsoft Corporation, Redmond, WA, *Incoming Audio & Acoustics Research Intern* Summer 2022

- Focus on analyzing and improving performance of advanced algorithms on large-scale datasets and cutting-edge research in machine intelligence and machine learning applications.

Amazon Services LLC, Cambridge, MA, *Incoming Applied Scientist Intern, Alexa AI* Fall 2022

- Research on improving existing and incorporating additional services for Alexa working with real-world large-scale data.

BOSE Corporation, Boston, MA, *Machine Learning/Neural Signal Processing Intern* Summer 2020

- Researched enhancing speech in remote microphone applications by self-speech removal to provide better quality sound with low latency to the hearing aids and voice-assistive wearable devices. LSTM-based architecture with speaker dependent d-vector is used for real-time operation.

United International University (UIU), Dhaka, *Lecturer, Department of CSE* August 2016

- Taught courses of Computer Science curriculum, like C++ Programming language, Algorithms, Digital Logic Design and Pattern Recognition courses in classes of more than 90 undergrads.

REVE Systems, Dhaka, *Jr. Software Engineer, Team Media Gateway* January 2015

- Programmed media gateway controller to facilitate both calls and faxes between the telephone network and VoIP network or another telephone network via Megaco 1.0 protocol. Also designed front-end panel by .JSP framework for VoIP administrators and customers for easy use.

EDUCATION

Ph.D. in Computer Science, January 2023 (Anticipated)
Indiana University, Bloomington, IN Advisor: Prof. Donald S. Willamson

M.Sc. in Computer Science, December 2019
Indiana University, Bloomington, IN

B.Sc. in Computer Science & Engineering (CSE), July 2014
Bangladesh University of Engineering & Technology (BUET), Dhaka, Bangladesh