Khandokar Md. Nayem

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Computer science Ph.D. student doing research on machine learning and deep network architectures on speech applications. Experienced in working on speech recognition, natural language processing (NLP), computer vision for around 4 years of experience in the software industry, and academia.

EDUCATION

Ph.D. in Computer Science,   May 2022 (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

EMPLOYMENT

Indiana University, Bloomington, IN, *Research Assistant, ASPIRE research lab*   Fall 2016 - Present
- Researched noise cancellation techniques to filter out a wide range of noises from human speech using a masking approach by applying deep neural network models. Also developed a quantized end-to-end speech enhancement model by incorporating language models and evaluated by human with survey. (Python, Matlab, DNN, RNN, LSTM, Qualtrics)
- Formulated prediction models to detect gestational diseases like preeclampsia and hypertension, and to track the physical activity of nulliparous pregnant women. (Python, Random forest, DNN)
- Investigated human emotion detection techniques in speech using deep neural models. (CNN, RNN)

BOSE Corporation, Boston, MA, *Machine Learning/Neural Signal Processing Intern*   Summer 2020
- Researched on enhancing speech by self-speech removal to provide better quality sound with low latency to the hearing aid and voice-assistive wearable devices. (Python, TensorFlow)

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. Also designed front-end panel for VoIP administrators and customers for easy use. (Back-end: protocol megaco 1.0, Java; front-end: .JSP framework, Javascript, Ajax, MySQL)

PUBLICATIONS

- ***Khandokar Md. Nayem***,Donald Williamson, "Towards an ASR approach for Speech Enhancement to generate more realistic spectra across time and frequency", in Proc. ICASSP 2021. (in review)
- ***Khandokar Md. Nayem***,Donald Williamson, "Monaural speech enhancement using intra-spectral recurrent layers in the magnitude and phase responses", in Proc. ICASSP 2020. (paper, slides, video)
- ***Khandokar Md. Nayem***,Donald Williamson, "Incorporating Intra-Spectral Dependencies with a Recurrent Output Layer for Improved Speech Enhancement", in Proc. MLSP 2019. (paper, poster)
- Shujon Naha, ***Khandokar Md. Nayem***, Md. Lisul Islam, "RSGAN: Recurrent Stacked Generative Adversarial Network for Conditional Video Generation", presented at IU computer vision project showcase, 2017. (paper, poster)

PROGRAMMING SKILLS

Languages	Python, C++, Matlab, C, Java, HTML, CSS, Javascript, R, SQL, Assembly, Shell Script
Frameworks & Libraries	TensorFlow, Keras, NLTK, CImg, Cmake, OpenCV, Scikit-Learn, OpenGL, Qualtrics
Machine Learning	Regression, Clustering, Decision Tree, Ensemble Methods, Naive Bayes, SVM, HMM, GMM, DNN, Autoendoer, CNN, RNN, LSTM, CRNN

SELECTED PROJECTS

- Speech enhancement and separation using auxiliary information like phonemic structure or textual information without alignment to boast performance and speech quality. (*Python, TensorFlow, Attention model*; code)
- Automatic classification of rhetorical questions with stress detection on our own collected dataset using Recurrent Neural Network (RNN) and Convolutional Recurrent Neural Network (CRNN) models. (*Python, Keras, NLTK*; code)
- An end-to-end speech recognition system for the English language using bi-directional recurrent neural network architecture without any frame wise labeling. (*Python, Keras, NLTK*; code)
- Image Matching to match images that are taken from different viewpoints of the same object; detect object like car from aerial snapshot; create a panoramic image stitching multiple images. (*C++, CImg, OverFeat packages*; code)