Rohit Kumar

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Area of Interest

My research interests include signal processing, machine learning, deep learning, robust speech recognition, audio applications like information enhancement, extraction and end to end ASR.

Current Position

I am a **Senior Research Fellow at the LEAP Lab, Electrical Engineering, Indian Institute of Science, Bangalore**. I am working on **End to End ASR and Project COSWARA** i.e developing a diagnostic tool based on machine learning models for COVID-19.

Education

Indian Institute of Science **Bangalore, India**
M.Tech in Signal Processing(8.3/10.0) *July 2018-20*

Delhi Technological University(formerly Delhi College of Engineering) **Delhi, India**
B.Tech in Electronics and Communication(76.31%) *Aug 2013-17*

Publications

Conferences

- **Rohit Kumar**, Anirudh Sreeram, Anurenjan Purushothaman, Sriram Ganapathy, "UNSUPERVISED NEURAL MASK ESTIMATOR FOR GENERALIZED EIGEN-VALUE BEAMFORMING BASED ASR", ICASSP 2020.
- Anirudh Sreeram, Anurenjan Purushothaman, **Rohit Kumar**, Sriram Ganapathy, "LEAP Submission to CHiME-6 ASR Challenge", The CHiME-6 Challenge.
- Neeraj Sharma, Prashant Krishnan, **Rohit Kumar**, Shreyas Ramoji, Srikanth Raj Chetupalli, Nirmala R., Prasanta Kumar Ghosh, and Sriram Ganapathy, "Coswara – A Database of Breathing, Cough, and Voice Sounds for COVID-19 Diagnosis", INTERSPEECH 2020.
- Anurenjan Purushothaman, Anirudh Sreeram, **Rohit Kumar**, Sriram Ganapathy, "Deep Learning Based Dereverberation of Temporal Envelopes for Robust Speech Recognition", INTERSPEECH 2020.
- Ananya Muguli, Lancelot Pinto, Nirmala R, Neeraj Sharma, Prashant Krishnan,Prasanta Kumar Ghosh, **Rohit Kumar**, Shreyas Ramoji, Shrirama Bhat, Srikanth Raj Chetupalli,Sriram Ganapathy, Viral Nanda, "Acoustic Analysis of respiratory sounds - A Step towards sound based detection of COVID-19", ICASSP 2021(in proceedings)

Journals

- Anurenjan Purushothaman, Anirudh Sreeram, **Rohit Kumar**, Sriram Ganapathy, "Dereverberation of Autoregressive Envelopes for Far-field Speech Recognition", Computer Speech and Language Special Issue(under review).

Projects

Unsupervised GEV based Beamforming for ASR *Mtech Project - 1*

- Sequential deep learning models are being used to estimate the speech and noise mask.
- These masks are than being used to perform beamforming.
- Several experiments perform on REVERB and CHiME dataset.

Complex Mask Estimation *Mtech Project - 2*

- Complex transformer architecture being used for the mask estimation process.
- Motivation: For mask estimation, often neural mask estimator train deep learning models only on the magnitude STFT of an audio. In this project we use both magnitude and phase to train the model.
- Those mask estimator are further used to perform acoustic beamforming.
- Several experiments perform on REVERB and CHiME dataset.

Non Negative Matrix Factorisation *Sep 2019-Dec 2019*

- Course Project for **Foundation of Data Science(FDS)**
- It is survey project for the course **Foundation of Data Science**
- Implemented two of its application , one is **Hyperspectral Data Analysis** and another **Harmonic Percussive Source Separation**.

DMCCA denoising for DCCA methods *Sep'19 – Nov'19*

- Course Project for **Machine Learning for Signal Processing(MLSP)**.
- Deep Canonical Correlation Analysis(DCCA) is a technique used to analyse **EEG signals**.
- In this project using Deep Multiway Canonical Correlation Analysis(DMCCA) method we try to de-noise each observation matrix we have and than use DCCA to analyse our EEG signals

Speech dereverberation using variance-normalized delayed linear prediction *Feb'19 – April'19*

- Course Project for **Speech Information Processing(SIP)**.
- In Far Field Speech Recognition,we have to deal with noise and **reverberation**
- In this a blind **dereverberation** is being implemented to improve the speech quality.

Sparsity in Linear Prediction Coefficient *Feb'19 – April'19*

- Course Project for Sparse Signal Processing(SSP).
- Using various Sparsity introducing algo try to introduce sparsity in Linear Prediction Coefficient

Academic Honors & Awards

- **ISCA Grant**: The grant includes 1-year ISCA membership and cash amount to support travel costs
- **MHRD Scholarship**: Recieved montly stipend, from MHRD,India during the course of Masters.
- **Xaverian Excellence Award**: Awarded in St.Xavier School, three times in a row for all round performance

Skills

- **Languages and Tools:** Python, Matlab, LaTeX, C, SHELL Scripting
- **Framework:** Pytorch, Tensorflow, Kaldi-ASR, ESPNET
- **Operating System:** Linux, Windows

Courses Taken

- **Machine Learning for Signal Processing**, **Foundation of Data Science**, Time Frequency Analysis, **Detection and Estimation Theory, Sparse Signal Processing, Speech Information Processing**, Digital Image Processing, Digital Communication,**Random Process**, **Linear and Non Linear Optimisation**, Matrix Theory, Natural Language Processing(Audit).

Experience

Hindustan Petroleum Corp. Ltd. **India**
Automation Officer *July 2017 - July 2018*

National Institute of Electronics and Information Technology (NIELIT) **Delhi,India**
Summer Intern *June 2016 - July 2017*