DESH RAJ

(443)824-3377 ⋄ draj@cs.jhu.edu ⋄ desh2608.github.io
1 E University Pkwy, Unit 904, Baltimore 21218

EDUCATION

Johns Hopkins University *ongoing*
Ph.D. in Computer Science
Advisors: Sanjeev Khudanpur, Dan Povey
Research Interests: Speech recognition

Indian Institute of Technology Guwahati *June 2017*
B.Tech. in Computer Science & Engineering
GPA: 9.35/10
Thesis: Relation extraction in clinical text using deep learning

PROJECTS

CHiME-6 challenge Ongoing

- Created baseline Kaldi recipe for the challenge: TDNN-stats based SAD (5.1% error rate on dev) and x-vector + PLDA backend for diarization (∼36% DER on dev)
- Working on array selection methods for combining multi-array diarization outputs.

Noise-adaptive training of acoustic models for hybrid ASR Ongoing

- Proposed noise vectors (comprising mean of speech and silence frames) for utterance-level noise adaptation.
- Performs better than i-vector based adaptation on Aurora4 and AMI SDM datasets, while requiring no additional extractor training.
- Working on a Bayesian model of noise vector estimation for online decoding.

Sub-word based methods for OCR Fall 2018

- Experimented with subword modeling methods such as BPE, unigram probability, and LZW compression, for OCR applications.
- Implemented a subword-based hybrid HMM-DNN system for Bentham dataset, improving SOTA by 7% relative WER.

Relation classification in biomedical text Bachelor Thesis
Guide: Prof. Ashish Anand, Dept. of CSE

- Implemented a novel CRNN model to learn long and short term dependencies and evaluated attention-based pooling
- Achieved state-of-the-art performance on two benchmark datasets (i2b2 and DDI) without any manual feature engineering
- Recently devised a Graph CNN model to leverage information from dependency parse of the sentence; this outperforms earlier model.

EXPERIENCE

Samsung Research Institute Bangalore June 2017 - June 2018
Research Engineer *Bangalore, India*

- Conceptualized and implemented several key features like undo, selective delete, etc., as part of Context Engine team in Conversational Intelligence
- Devised a bit truncation method to reduce word embeddings size for on-device AI; achieved 75% compression with 95% correlation in word similarity task

Microsoft India May 2016 - July 2016
Software Development Engineering Intern *Hyderabad, India*

- Developed a cross-platform mobile application in Xamarin Forms for OEM digital contracting system
- Conceptualized statistics APIs to improve business efficiency

SELECTED PUBLICATIONS

D.Raj, D.Snyder, D.Povey, S.Khudanpur , *Probing the information encoded in x-vectors.* IEEE Workshop on Automatic Speech Recognition and Understanding (ASRU) 2019.

D.Raj, S.K.Sahu, A.Anand, *Learning local and global contexts using a convolutional recurrent network model for relation classification in biomedical text.* SIGNLL Conference on Computational Natural Language Learning (CoNLL) 2017. PP 311–321

D.Raj, A.Gupta, B.Garg, K.Tanna, F.C.H.Rhee, *Analysis of data generated from multidimensional type-1 and type-2 fuzzy membership functions.* IEEE Transactions on Fuzzy Systems.

S.Majheed, A.Gupta, **D.Raj**, F.C.H.Rhee, *Uncertain Fuzzy Self-organization based Clustering: Interval Type-2 Approach to Adaptive Resonance Theory.* Information Sciences 424 (2018). PP 69–90

ACHIEVEMENTS

Recepient of **INAE Travel Grant Scheme** by Govt. of India for oral presentation at WCCI 2016

Recepient of **Kalyani Research Scholarship** from Alumni Affairs (IIT Guwahati) for publishing at an international conference during B.Tech.

TECHNICAL SKILLS

Programming Languages	Python, C, C++, Bash
Libraries & Frameworks	Kaldi, ESPNet, PyTorch, Tensorflow

GRADUATE COURSEWORK

ML courses	Machine Learning, Data to Models, Information Extraction
Math courses	Bayesian Statistics, Matrix Analysis, Nonlinear Optimization
Other	Parallel Programming, Causal Inference, Information Theory