Desh Raj

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Education

The Johns Hopkins University — Baltimore, US
Ph.D. in Computer Science — 2018–2023 (anticipated)

- Advisors: Sanjeev Khudanpur, Dan Povey
- Research interests: Multi-talker speech recognition and speaker diarization

Indian Institute of Technology Guwahati — Guwahati, India
B.Tech. in Computer Science and Engineering, GPA: 9.35/10 — 2013–2017

Selected Publications

[1] **D. Raj**, L. Lu, Z. Chen, Y. Gaur, and J. Li, "Continuous Streaming Multi-talker ASR with Dual-path Transducers", *Submitted to IEEE ICASSP*, 2022.

[2] M. Wiesner, **D. Raj**, and S. Khudanpur, "Injecting Text and Cross-lingual supervision in few-shot learning from self-supervised models", *Submitted to IEEE ICASSP*, 2022.

[3] **D. Raj**, P. Denisov, Z. Chen, H. Erdogan, Z. Huang, M. He, S. Watanabe, J. Du, T. Yoshioka, Y. Luo, N. Kanda, J. Li, S. Wisdom, and J. R. Hershey, "Integration of speech separation, diarization, and recognition for multi-speaker meetings: system description, comparison, and analysis", *IEEE SLT*, 2021.

[4] **D. Raj**, P. Garcia, Z. Huang, S. Watanabe, D. Povey, A. Stolcke, and S. Khudanpur, "DOVER-Lap: A method for combining overlap-aware diarization outputs", in *IEEE SLT*, 2021.

[5] A. Arora, **D. Raj**, A. S. Subramanian, K. Li, B. Ben-Yair, M. Maciejewski, P. Zelasko, P. Garcia, S. Watanabe, and S. Khudanpur, "The JHU Multi-Microphone Multi-Speaker ASR System for the CHiME-6 Challenge", *CHiME-6 Workshop at IEEE ICASSP*, 2020.

See Google Scholar for a complete list of publications.

Experience

Microsoft Corporation — Redmond, US
Research Intern, AI Cognitive Services — May 2021 –August 2021

- Extended Streaming Unmixing and Recognition Transducer (SURT) model for long-form meeting transcription
- Obtained $>$ 20% WER reduction using dual-path LSTM and Transformer models

Samsung Research — Bengaluru, India
Research Engineer in Advanced Technology Lab (ATL) — June 2017 –June 2018

- Context engine for conversational assistant

Microsoft India — Hyderabad, India
Software Developer Intern — Summer 2016

Selected Projects

Overlap-aware diarization Spring 2021

Advisors: Paola Garcia (JHU), Sanjeev Khudanpur (JHU), Andreas Stolcke (Amazon)

- Proposed novel overlap-aware spectral clustering algorithm using the constrained optimization formulation of multi-class clustering. Reduced DER on AMI dataset by 15.2% relative over AHC baseline.
- Proposed a method for combining overlap-aware diarization system outputs (DOVER-Lap), and released it as a `pip` package. Used by top teams at DIHARD-3 and VoxSRC 2021 challenges.

Integration of separation, diarization, and ASR JSALT 2020

Collaborators: Zhuo Chen (Microsoft), Hakan Erdogan (Google)

- Created modular Kaldi pipeline integrating speech separation, diarization, and ASR.
- Evaluated the pipeline with different variants of each module, obtaining 12% speaker-attributed WER (close to single-speaker systems).

CHiME-6 challenge Spring 2020

Advisors: Paola Garcia (JHU), Shinji Watanabe (CMU), Sanjeev Khudanpur (JHU)

- Created baseline Kaldi recipe for challenge; led diarization efforts for JHU team's participation with overlap-aware VB resegmentation system.
- Final WER improved by 10% absolute compared with baseline – finished top 2 in "diarization + ASR" track.

Teaching

- **Course Assistant** at Johns Hopkins University Fall 2021
  Information Theory (520.447/647)
- **Teaching Assistant** at Johns Hopkins University Fall 2020
  Introduction to Human Language Technology (601.467/667)

Mentorship & Professional Services

- Volunteer for ISCA SIG Robust Speech Processing
- **Reviewer**: IEEE SLT 2021, Elsevier CSL, ICLR 2022
- CLSP Graduate Admissions Committee: 2021, 2022
- CLSP Student Recruitment Committee: 2019, 2020

Skills

- **ML/DL Toolkits:** PyTorch, Scikit-learn
- **ASR Frameworks:** Kaldi, ESPNet, Lhotse, K2
- **Other:** Audacity, Git

Languages

- **Programming:** Python, C++, Bash
- **Natural:** English, Hindi, French (beginner)
- **TOEFL:** 119/120

Achievements

- JHU nominee for Microsoft Research Fellowship and Apple Scholars in AI/ML 2021
- **ISCA Travel Grant** (registration + membership + travel funds) for attending Interspeech 2021
- Member of Hitachi-JHU team which placed **top 2** in the DIHARD-3 challenge 2020
- Member of JHU team which placed **top 2** in the CHiME-6 challenge track 2 (diarization + ASR) 2020
- **INAE Travel Grant** by Govt. of India (worth INR 50,000) 2017
- **Kalyani Research Scholarship** from Alumni Affairs, IIT Guwahati 2017