Desh Raj

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Education

The Johns Hopkins University — Baltimore, US
Ph.D. in Computer Science — 2018–Present

- 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] **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.

[3] **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.

[4] **D. Raj**, Z. Huang, and S. Khudanpur, "Multi-class spectral clustering with overlaps for speaker diarization", *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.

[6] **D. Raj**, D. Snyder, D. Povey, and S. Khudanpur, "Probing the information encoded in x-vectors", *IEEE ASRU*, 2019.

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 (paper in preparation for ICASSP 2022)

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

Informed target-speaker ASR   JSALT 2020
Advisors: Marc Delcroix (NTT, Japan), Shinji Watanabe (JHU)

- Used overlap-aware spectral clustering with target speaker ASR to recognize multi-speaker overlapping speech.
- Improved DER from 16.3% TO 9.3% and WER from 27.9% to 16.6% on LibriCSS baseline.

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, Shinji Watanabe, Sanjeev Khudanpur

- 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
- CLSP Graduate Admissions Committee: 2021
- 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

- **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
- **INSPIRE Scholarship for Higher Education (SHE)** from DST, Govt. of India (refused)   2013