Darshan Deepak Prabhu

Computer Science & Engineering

Indian Institute of Technology, Bombay

Doctor of Philosophy (Ph.D.)

✉ darshanp@cse.iitb.ac.in

📱 (+91) 8884525282

Examination	University	Institute	Year	Grade
Post Graduation	IIT Bombay	IIT Bombay	2023	9.76
Graduation	JSS University	JSS University	2020	9.41
Intermediate	Karnataka Pre University Board	Dr. A.V. Baliga College	2016	95.33%

PUBLICATIONS AND AWARDS

- Darshan Prabhu, Preethi Jyothi, Sriram Ganapathy, Vinit Unni. **Accented Speech Recognition With Accent-specific Codebooks**. Accepted in Empirical Methods in Natural Language Processing (**EMNLP**), Main Conference, 2023. 📄
- Darshan Prabhu, Saiganesh Mirishkar, Pankaj Wasnik. **Efficient infusion of self-supervised representations in Automatic Speech Recognition**. Accepted in Efficient Natural Language and Speech Processing(ENLSP) Workshop, **NeurIPS** 2023. 📄
- Awarded with **Dr. George B Fernandes Award for Excellence in Research** by IIT Bombay for the work done during my M.Tech. *July 2023*

THESIS AND SEMINAR

Improving Accented Automatic Speech Recognition using Cross-attention *M.Tech Project*
Prof. Preethi Jyothi *Jul '22 - June '23*

- Objective: Building a novel accent adaptation approach for end-to-end ASR systems using **cross-attention** with a trainable set of **codebooks**.
- Experimented with the modified **Conformer** architecture and a **novel beam search** approach that yielded significant performance gains on both seen and unseen accents and in the zero-shot setting.

Domain Adverserial approaches for accented ASR *M.Tech Seminar*
Prof. Preethi Jyothi *Jan '22 - May '22*

- Reviewed approaches to accented speech recognition with an emphasis on **accent agnostic** approaches.
- Implemented few existing methodologies that focus on training **transformer** architecture for speech recognition with a **domain adversarial** objective.
- Explored enhancements to the existing architecture by introducing **contrastive loss** as a surrogate objective for the discriminator.

WORK EXPERIENCE

Research Intern | *Audio Content Analysis* *July '23 - May '24*
Sony Research India

- Objective: Improving the robustness of speech recognition models using **self-supervised pretrained** models like **Wav2Vec** and **Hubert**.
- Experimenting with a modified conformer architecture on Librispeech and Tedlium datasets that introduces **cross-attention** within the encoder, obtaining considerable reductions in WER on test sets.

Research Assistant | *CSE department Webteam* *Aug '20 - June '23*
Indian Institute of Technology, Bombay

- Redesigned and developed the **official website** for the CSE department using **Angular**.
- Developed, deployed, and maintained tools internal to the department using **Django** and **Nginx**. Notable among them are the grading portal, course management portal, etc.

Research Intern | *Prof. Sriram Ganapathy, LEAP Lab* *May '22 - Jul '22*
Indian Institute of Science, Bangalore

- Objective: Improving the accent robustness in speech recognition using **cross attention** between speech and accent embeddings.

- Experimented with a modified conformer architecture on Mozilla CommonVoice dataset that introduces **cross-attention** within the encoder obtaining a 10% relative reduction in the WER on some accents.
- The work is submitted to *"IEEE Spoken and Language Technology Workshop"* (SLT 2022) conference.

Course Projects

Interpretability of Convolution Layers for Image Processing *Autumn 2020*
CS725: Foundations of Machine Learning *Prof. Preethi Jyothi*
- Developed a pipeline to understand and visualize the **kernels** in a trained convolutional neural network.
- Designed a **user interface** in **Django** and **Semantic UI** to perform visualization of kernel behaviors for images using the VGG-19 model.
- Experimented with multiple datasets, namely Mnist digit, Dogs vs. Cats and Flower. Compelling conclusions were drawn based on visualizations and ablation studies.

Zero-shot Image Classification *Spring 2020*
CS726: Advanced Machine Learning *Prof. Sunita Sarawagi*
- Designed an architecture to perform **zero-shot** image classification by posing **image captioning** as a **classification** task.
- Conducted experiments with COCO dataset, integrated **LIME** explanability tool to interpret the model, and designed a user interface to showcase them.

Multi Task Learning for POS tagging and Chunking *Autumn 2020*
CS626: Speech, Natural Language Processing and the Web *Prof. Pushpak Bhattacharya*
- Objective: Performing POS tagging and chunking jointly in a **multi-tasking** setup.
- Experimented with CoNLL dataset, and obtained 2.5% and 2.8% relative improvements in POS tagging and chunking over baseline.

Technical Skills

Programming Languages	**Python**, Javascript, Typescript, SQL, C++
Toolkits	**ESPnet**, **Speechbrain**, Fairseq, Huggingface
Technologies	Linux, Git, Docker, LaTeX

Positions of Responsibility

Placement Web Coordinator, IIT Bombay *Jun '21 - Jul '22*
- Currently coordinating a team of 7 members to develop the new placement portal catering to the needs of **4000+ students, coordinators and recruiters** using **Angular** and **NestJS**.
- Responsible for ensuring the smooth functioning of the placement website and associated services.
- Migrated the legacy system to a **docker** orchestrated environment and updated portal functionalities prioritizing scalability and maintainability.

Technical Coordinator, Linux Campus Club, JSSSTU *Jul '17 - Jul '19*
- Worked with a team of 20 members that **taught 200+ students** various programming languages and trending topics in Computer Science, which were not covered in the course curriculum.
- Conducted unorthodox coding **competitions** and **hackathons** to develop student's reasoning ability and coding skills.

Achievements and Extracurriculars

- One of the **90** participants selected for the summer school '19 conducted by CSA department of IISc.
- Secured **district rank 2** in Debate competition conducted as part of Prathibha Karanji.
- Secured **college rank 1** and **city rank 3** in the secondary school board exams.
- Secured **college rank 1** in the pre university board exams.
- Secured a rank of **1163** amongst **1.7 lakh** candidates in Karnataka Common Entrance Test (KCET).
- Secured **All India Rank 312** with **99.68** percentile in GATE-2020 CS among **97481** candidates.
- **Interests and hobbies**: Badminton, Trekking, and Gaming.

Relevant Courses

- Foundations of Machine Learning
- Speech and Natural Language Processing and the Web
- Foundations of Intelligent and Learning Agents
- Advanced Machine Learning
- Deep Learning for Natural Language Processing
- Automatic Speech Recognition