Megh Thakkar

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Education

2016 - 2020 **Birla Institute of Technology and Science, Pilani (BITS), Pilani Campus, India.**
Bachelor of Engineering in Computer Science. **CGPA:** 9.23/10.

Relevant Courses: Neural Networks and Fuzzy Logic, Information Retrieval, Data Mining, Linear Algebra, Calculus, Probability and Statistics, Linguistics, Object Oriented Programming, Data Structures, Algorithms, Database Systems, Operating Systems, Computer Programming.

Publications

EMNLP '21 **HypMix: Hyperbolic Interpolative Data Augmentation.**
Ramit Sawhney*, **Megh Thakkar***, Shivam Agarwal, Di Jin, Diyi Yang, Lucie Flek: In Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing (*Oral presentation*).

SIGIR '21 **Hyperbolic Online Time Stream Modeling.**
Ramit Sawhney*, Shivam Agarwal*, **Megh Thakkar***, Arnav Wadhwa, Rajiv Ratn Shah: In Proceedings of the 44th International ACM SIGIR Conference on Research and Development in Information Retrieval.

Experience

Jun '21 - Present **Neural Voice Cloning and Tabular Question Answering.**
Machine Learning Engineer: Avaamo, Bangalore, India

- Led the work on **voice cloning** from **low resource recordings** using state-of-the-art synthesizers and vocoders.
- Currently focusing on semantic parsing and **question answering** over **tabular data**.

Dec '20 - Present **Online Text Stream Modeling and Interpolative Data Augmentation.**
Research Assistant: Multimodal Digital Media Analysis Lab (MIDAS), IIIT Delhi, India
Advisors: Dr. Di Jin (Amazon Alexa AI, Sunnyvale), Dr. Rajiv Ratn Shah

- Proposed a **time-aware LSTM** operating in the **hyperbolic space** for modeling online financial text streams.
- Designed a novel **model**, **dataset** and **modality agnostic** interpolative regularization method using the Riemannian manifold for effective representation of complex latent embeddings for text, speech, and vision.
- Extended the work on data augmentation to an **adaptive** and **intelligent sampling strategy** of inputs for efficient interpolations as compared to vanilla mixup (paper to be submitted to **ACL '22**).
- Exploring latent **interpolations** in the **multilingual embedding space** for zero-shot cross-lingual transfer.

Sep '20 - Present **Open Domain Question Answering and Chart-based Text Generation.**
Research Assistant: NTU-NLP Group, Nanyang Technological University (NTU), Singapore
Advisors: Dr. Shafiq Joty, Dr. Enamul Hoque (York University, Canada)

- Developed a hybrid **graph+text** encoder model using **contrastive learning** for open domain question answering.
- Proposed a **multi-modal neural network** using image encoders fine-tuned with **self-supervised learning via redundancy reduction** for summarization of chart images (benchmark paper to be submitted to **ACL '22**).
- Working on **graph-to-text** architectures for large scale pre-training over **knowledge-infused representation of charts** and its application for downstream tasks such as **summarization** and **question answering**.

Aug '19 - Dec '19 **Speech Emotion Detection and Deep Learning API Gateway.**
Research Intern: Speech and Language Laboratory, Nanyang Technological University (NTU), Singapore
Advisors: Dr. Yashvardhan Sharma (BITS, Pilani), Dr. Chng Eng-Siong

- Created a **standardized API Gateway** to access various deep learning modules such as **NER** (Name-Entity Recognition), **SUD** (Sentence Unit Detection), and **summarization** through a standard interface.
- Built a resource efficient **CNN based model** for **speech emotion detection** and deployed it to production.

May '19 - Jul '19 **Language Model for Query Auto-completion.**
DAAD-WISE Scholar: Language Technology Group (LT), University of Hamburg, Germany
Advisor: Dr. Chris Biemann

- Developed a bi-LSTM based **character-level language model** coupled with word embeddings such as GloVe, ELMo, and Flair, as well as a combination of FastText and sent2vec.
- Used decoding methods like **beam search** and **top k** sampling along with reranking methods such as **LambdaMART** and tensorflow-ranking.
- Improved the state-of-the-art MRR on the **AOL Search Query Log** dataset by **2.2%**

May '18 - Jul '18 **UAV Flight Planner with Shadow Exclusion.**

Research Intern: Photogrammetry and Remote Sensing Department (PRSD) , Indian Institute of Remote Sensing (IIRS), Indian Space Research Organization (ISRO), Dehradun, India

Advisor: Dr. Shefali Agarwal

- Developed a software for automatically **generating the path of a UAV**, with **planimetry** and **altimetry**.
- Calculated terrain regions under a shadow using **ray tracing** and **Bresenham's Line Drawing** algorithm, which were subsequently minimised to increase the UAV's efficiency.

May '18 - Aug '18 **BioJS Webapp Backend.**

Summer Intern: **Google Summer of Code, 2018** (Project Link), India-Australia-United Kingdom

- Led the development of a new website for BioJS, a community-based project compiling JavaScript widgets and **modular components** to visualize and process biological data using web technologies.

Projects

Jan '20 - May '20 **Survey on Multimodal Learning Methods**

Project supervisor: Dr. Yashvardhan Sharma

- Conducted literature review and studied various methods of **multimodal deep learning** and its applications in downstream tasks such as **TextVQA**, **Visual Grounding**, and **Visual Commonsense Reasoning**.
- Identified approaches to enhance the baseline model of TextVQA by improving the **OCR module**.

Aug '18 - Dec '18 **Visual Question Answering**

Project supervisor: Dr. Dhiraj Sangwan

- Implemented a basic **visual question answering system** for the MS COCO Dataset.
- Used the pretrained **VGG-16** model for image feature extraction and **LSTM** layers for text feature extraction.
- Experimented with combining the multimodal feature vectors using naive **concatenation** and **Hadamard product** approaches to get the combined features for the final answering.

Oct '18 - Dec '18 **Feedback-based Retrieval System with Sentence Ranking**

Course Project: Information Retrieval, *Instructor*: Dr. Poonam Goyal

- Designed and implemented an efficient, configurable, and intelligent **retrieval framework** for text documents.
- Used NLP methods and concepts such as **stemming**, **tf-idf scores**, **BM25 scores** and **nltk** for text processing.
- Implemented a **click-based feedback system** to improve suggestions to re-rank documents based on current retrieval.

Oct '18 - Nov '18 **Convolutional Neural Networks in Scala**

Course Project: Principles of Programming Languages, *Instructor*: Dr. Lavika Goel

- Developed a two layer deep convolutional neural network in Scala using **functional programming**.

Skills

Languages: Python, C, Java, C++, SQL, Scala

Libraries and Frameworks: PyTorch, pytorch-geometric, Keras, scikit-learn, NLTK, networkx, Django, REST

Publishing: LaTeX

Achievements

2018 Awarded the **DAAD-WISE** scholarship to pursue summer research in Germany and the **mitacs Globalink** scholarship to pursue research in Canada.

2016-2018 Awarded the **Institute Merit Scholarship** given to the top 3 percentile of students across all the departments.

2016 Secured **All India Rank 105** out of about 1.2 million candidates in the JEE Mains Entrance Examination.

Positions of Responsibility

Council of Students for Academic Activities (CoStAA) - ***Member***

- I was responsible for managing all **the technical aspects** of APOGEE (one of India's largest student-run tech fests), including registrations, accommodation allocation, online payments, and mobile applications, while coordinating with fellow elected members for the overall functioning of the fest, by **leading a team** of more than **40 members** and overlooking a student volunteering body of 1000+ members.
- Introduced a **QR based ticketing system** to reduce paper usage, a **mobile wallet** for the ordering from the food stalls and an **event management system** for efficiently conducting over 90 events.

Student Faculty Council (SFC, BITS Pilani) - *Member*

- Core team member of the SFC, a group of department faculties and selected students who conduct meetings and discussions in order to ensure proper structure of the programme and provide feedback for different courses.