

SAHANA S. KOWSHIK

 sahanakowshik.github.io

RESEARCH INTERESTS

Multimodal representation learning, medical imaging applications, computer vision, natural language processing

EDUCATION

Boston University | Boston, MA September 2023 – Present
Doctor of Philosophy in Computing & Data Sciences **CGPA:** 3.81/4.0

Boston University | Boston, MA January 2023
Master of Science in Computer Science **CGPA:** 3.93/4.0

RV College of Engineering | Bengaluru, Karnataka, India August 2021
Bachelor of Engineering in Electronics and Communication Engineering **CGPA:** 9.09/10.0

RESEARCH EXPERIENCE

Boston University, Kolachalama Laboratory February 2023 – Present
Research Fellow, with Prof. Vijaya Kolachalama Boston, MA

Working on multi-modal representation learning with an application in the assessment of neurodegenerative disorders.

- Currently working on developing a large language model based multi-modal foundation model to analyze clinical data, patient reports, and neuroimaging modalities such as MRIs, PET scans, CT scans, and EEGs for assessing dementia.
- Worked on developing an end to end transformer based pipeline for processing multi-modal data including routinely collected clinical data and brain scan MRIs for identifying different dementia etiologies (this work is published in *Nature Medicine* (2024) <https://doi.org/10.1038/s41591-024-03118-z>)

INDUSTRY EXPERIENCE

BU Spark February 2022 – December 2022
Machine Learning intern (Part-time) Boston, MA

- * Built a reliable machine learning framework using BERT backbone to recognize the semantic difference between mentions of race vs. mentions of color in non-racial terms in the media articles
- * Extracted racial keywords from a sentence using attention analysis of the trained model's hidden layers

Mentor Graphics January 2021 – June 2021
Embedded software development and QA intern Bengaluru, India

- * Worked on development and testing of embedded Linux Flex operating system
- * Automated the process of embedded testing using Unix test scripts and CI/CD tools like Jenkins and LAVA

SELECT GRADUATE COURSEWORK

- **CS505:** Introduction to Natural Language Processing
- **CS542:** Machine Learning
- **CS523:** Deep Learning
- **DS543:** Introduction to Reinforcement Learning
- **CS582:** Mathematical Statistics
- **CS585:** Image and Video Computing
- **CS611:** Object-oriented software principles and design in Java
- **CS630:** Advanced algorithms

PROJECTS

CS 523 Course project: Visually Perspective Similarity Metric for Text-to-Image Models 2022

- * Formulated a robust similarity metric based on L2 norm, cosine similarity, and inception score to quantify the similarity and variance between the images generated by Stable Diffusion and Dall-E2 text-to-image models when there are perturbations in the text prompts
- * Demonstrated that despite visual differences, the images generated by these models for the same and modified prompts exhibit very high similarity scores

CS 505 Course project: Multilingual emoji prediction 2022

- * Fine-tuned various state-of-the-art discriminative and autoregressive language models such as multiBERT, XLM-Roberta, mDeBERTa, GPT-2, DistilGPT-2, and GPT-Neo to accurately predict emojis for English and Spanish tweets
- * The results outperformed the baseline set in the SemEval Competition-2018

PUBLICATIONS

- * Xue, C.*, Kowshik, S.S.*, Lteif, D. et al., **AI-based differential diagnosis of dementia etiologies on multimodal data**, *Nature Medicine* (2024) <https://doi.org/10.1038/s41591-024-03118-z>

ACHIEVEMENTS & OTHER PROFESSIONAL ACTIVITIES

- * Invited as a Guest speaker for the **BU AI4ALL** program where I gave a talk to high school students about AI in healthcare.
- * Won silver tier in the **3rd NeurIPS 2022 Neural MMO challenge** on Learning to Specialize in Massively Multiagent Open Worlds
- * **Grace Hopper Celebration Conference Scholarship 2022**, Boston University

SKILLS

- * **Programming Languages:** Python, C++, Java
- * **Relevant tools:** PyTorch, Tensorflow, NLTK, HuggingFace, wandb.ai, OpenCV, Numpy, Pandas, Scikit-Learn, Matplotlib, NetworkX, Git, Linux