ABHISHEK VARSHNEY

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(*F-1 Student | Eligible for OPT Work Authorization*)

EXPERIENCE

AI Researcher | 8 months
(Sep 2024 - Apr 2025)

Kolachalama Lab, Boston University — *Boston, MA*

Multimodal Modeling of Digital Voice for Cognitive Assessment

- Designed AI model for early **dementia** detection, using ∼ 1 hr long neuropsychological interviews **transcribed by Whisper**
- Learned joint **acoustic-linguistic** representations via a custom **TCN, BERT-based & Cross-Attention multimodal encoder** model, leading to **0.92 AU-ROC** and **0.86 accuracy** - a ∼**7% improvement** over baseline in dementia classification

Associate Data Scientist | 2+ Years
(Jun 2021 - Aug 2023)

Morningstar — *Mumbai, India*

- **Built ML pipelines** for financial data extraction from tables and paragraphs in **HTML documents**, using **TF-IDF** and **XGBoost**, integrated with **DL / rule-based methods** tailored to market-specific formats, **achieving 60–70% recall**
- Pretrained **BERT models** on financial corpora using **MLM** and **NSP techniques**, and fine-tuned on **token classification task (NER)**, enhancing **entity extraction F1-score to 0.97**
- Prototyped a **Retrieval-Augmented Generation (RAG) pipeline** using **transformer-based LLMs**, reducing **development cycles from 3-4 weeks to 1 week**, and significantly accelerating the iteration of **document extraction capabilities**
- Boosted **table classification accuracy** from **70% to 75%** by fine-tuning **LayoutParser** object detection models on a custom table dataset (**FinTabNet**), enabling robust **table detection in PDFs** and seamless **OCR integration via AWS Textract**
- Collaborated with **Quantitative Research Analysts** and **QA teams** to incorporate **domain-specific feedback** into model improvements and **validate document pipeline outputs**
- Contributed to **NLP and CV systems development** for automating **financial data extraction**, **reducing manual processing time by 15% and FTE costs** through production-ready solutions

ACHIEVEMENTS

- Secured **3rd Place (Globally)** - **EReL@MIR Track 1 Challenge**, **WebConf 2025, Sydney, Australia**
  1st Workshop on Efficient Representation Learning for Multimodal Information Retrieval (EReL@MIR)
- **Research Week With Google, 2022** - Selected to attend an exclusive AI Symposium hosted by Google Research India

PERSONAL PROJECTS

Multimodal RAG Retrieval System for Document Search PDF Retrieval | Wikipedia Search *(Feb 2025 – Mar 2025)*

- Built a scalable retrieval system for **PDF documents and Wikipedia articles**, supporting multimodal queries by leveraging **ColPali-based embeddings** for both **textual content** and **visuals (images, tables, charts)**
- Improved search accuracy over traditional text-only methods, effectively retrieving **document page numbers** and **relevant articles**

Brain MRI Segmentation Generalized to Unseen Labels using UniverSeg Code *(Feb 2024 – Apr 2024)*

- Trained UniverSeg model on **2D Brain MRI coronal slices** with 24 labels (20 for training, 4 for testing), using diverse augmentations and **TensorBoard** to improve generalization and monitor training progress
- Leveraged **query-support learning** to segment unseen anatomical labels **without any fine-tuning**, achieving a **Dice score of ∼0.738** and demonstrating strong few-shot generalization

TECHNICAL SKILLS

Programming	Python, PyTorch, Transformers, scikit-learn, Java, MATLAB, C
Data Processing	Pandas, Seaborn, Matplotlib, NumPy, NLTK, OpenCV, Librosa, Beautiful Soup
Technologies	AWS (EC2, ECS, Lambda, S3), Distributed Training, HPC Clusters, Docker, Linux (Bash), Git

EDUCATION

Boston University (Boston, MA, US)
Master of Science in Computer Science - GPA: 3.78/4 *(Sep 2023 - May 2025)*

Birla Institute of Technology and Science Pilani (Hyderabad, India)
B.E. (Hons.) Electrical and Electronics Engineering - CGPA: 9.28/10 *(Aug 2017 - Jul 2021)*
Minor in Data Science

PUBLICATIONS (Google Scholar)

1. Varshney, A.; Ghosh, S.K.; Padhy, S.; Tripathy, R.K.; Acharya, U.R. Automated Classification of Mental Arithmetic Tasks Using Recurrent Neural Network and Entropy Features Obtained from Multi-Channel EEG Signals. Electronics 2021, 10, 1079 (Link)
2. A. Varshney, R. Loka and A. M. Parimi, Fast Frequency Response Using Model Predictive Control for A Hybrid Power System, 2021 IEEE 9th International Conference on Smart Energy Grid Engineering (SEGE), 2021, pp. 104-110 (Link)