Vijay Sadashivaiah

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Summary

PhD candidate in computer science with research experience in model interpretability, transfer learning, and computational medicine. Demonstrated industry expertise in training and deploying large language models (LLM) and vision-language models (VLM). Seeking a Machine Learning Researcher role to leverage and expand my skills.

Education

Rensselaer Polytechnic Institute — Troy, NY
PhD in Computer Science — May 2025 (Expected)
MS in Computer Science — December 2022

Johns Hopkins University — Baltimore, MD
MS in Biomedical Engineering — May 2017

PES Institute of Technology — Bangalore, India
BS in Electrical Engineering — May 2017
- Visiting student with Prof. Ramesh Raskar at Massachusetts Institute of Technology (4 mo.) — 2014

Research Experience

Bosch Center for Artificial Intelligence — Pittsburgh, PA
Research Intern (Hosts: Dr. Wan-Yi Lin, Dr. Semedo Joao) — May 2024 – Present
- Instruction fine-tuned VLMs for autonomous driving agents (LLaVA-Llama3, LLaVA-Phi3)
- Developed automated pipelines to generate approximately 700k automotive image-text instruction data
- Enhanced VLMs to support multiple images, resulting in over 5% improvement in downstream performance on several benchmarks

Research Intern (Hosts: Dr. Wan-Yi Lin) — May 2023 – August 2023
- Extended CLIP models to incorporate RADAR and LIDAR data
- Designed and implemented transformer-based encoders for radar point clouds
- Achieved more than 20% improvement in downstream object retrieval scores compared to existing baselines

Rensselaer Polytechnic Institute — Troy, NY
Graduate Research Assistant (Advisor: Profs. James A. Hendler) — January 2022 - Present
- Created a framework for generating natural language explanations for decisions made by medical image classifiers, utilizing the joint-embedding space of CLIP-style models
- Built a novel method to quantify and suppress semantic concepts in latent representations, which has important implications for data privacy
- Developing a framework for aligning latent representation to background knowledge for improved model interpretability and finetuning performance
- Authored a successful two-year grant of $400,000 for research and development with researchers at IBM
- Led a collaborative effort involving industry experts, academics, and clinicians

IBM Thomas J. Watson Research Center — Remote (Troy, NY)
Research Intern (Hosts: Dr. Keerthiram Murugesan, Dr. Amit Dhurandhar) — May 2021 – September 2021
- Developed a reinforcement learning-based approach to enhance transfer learning in convolutional networks (CNN)
- Achieved over 10% accuracy improvement on downstream image recognition tasks

Johns Hopkins Medical Institute — Baltimore, MD
Staff Scientist — August 2017 - January 2021
- Built an open-source automated pipeline to unmix, segment and label multi-spectral smFISH images
- Developed multi-modal algorithms to integrate structural MRI, functional MRI, and genetic data for applications in schizophrenia research

Skills

Programming	Python (numpy, pandas, scikit-learn), PyTorch, Tensorflow, C/C++
DevOps	Bash, Git, CI/CD, Unit/Integration Testing, Docker, Poetry
BigData	CUDA, MPI, Azure, High-Performance Computing
Communication	Experienced speaker at international conferences and workshops; adept at presenting project ideas and results to peers, leadership, and stakeholders
Writing	Proficient in scientific writing and experienced in drafting R&D proposals
Collaboration	Skilled in working with cross-functional teams

Fellowships & Awards

- Amazon TrustNLP DEI award for NAACL — 2024
- RPI-IBM AI research collaboration (AIRC) grant ($400,000 over two years) — 2022 - 2023
- Finalist with wait-list at Quad Fellowship — 2022
- Best poster at International Semantic Web Summer School — 2022
- Distinguished BME Fellowship at JHU (full tuition waiver + monthly stipend) — 2015–2017
- Foundation Leenaards' summer research fellowship at EPFL — 2017
- MHRD scholarship at PESIT (full tuition waiver) — 2011–2015
- Code something that matters scholarship by Vecna Robotics — 2014

Selected Presentations

- (Invited Speaker) Bosch Center for Artificial Intelligence on "Explainable Transfer Learning" — August 2023
- (Poster) ICLR on "Auto Transfer: Learning to Route Transferable Representations" — 2022
- (Poster) International Semantic Web Summer School on "Knowledge Enabled Transfer Learning" — 2022
- (Oral) Society for Neuroscience on "Using ML to identify neuroimaging phenotypes in Schizophrenia" — 2018
- (Poster) Society of Biological Psychiatry on "Exploring shared brain cognitive networks using parallel ICA" — 2017
- (Oral) IEEE EMBC on "Mathematically Modelling Interactions in Mammalian Nerve Fiber" — 2017, 2018

Selected Publications

1. **Sadashivaiah V**, Yan P, Hendler JA., Explaining chest x-ray pathology classifiers using textual concepts. *arXiv, 2024*

2. Mohbat F, **Sadashivaiah V**, Murugesan K, Dhurandhar A, Luss R, Chen PY., Beyond Visual Augmentation: Investigating Bias in Multi-Modal Text Generation. *NAACL TrustNLP 2024*

3. **Sadashivaiah V**, Murugesan K, Luss R, Chen PY, Sims CR, Hendler JA, Dhurandhar A., To Transfer or Not to Transfer: Suppressing concepts from source representations. *TMLR 2024*

4. **Sadashivaiah V**, Tippani M, Page SC, Kwon SH, Bach SV, Bharadwaj RA, Hyde TM, Kleinman JE, Jaffe AE, Maynard KR., SUFI: An automated approach to spectral unmixing of fluorescent biological images. *BMC Neuroscience 2023*

5. Murugesan K*, **Sadashivaiah V***, Luss R, Shanmugam K, Chen PY, Dhurandhar A., Auto-transfer: Learning to route transferrable representations. *ICLR 2022 **

6. Brate R, Dang MH, Hoppe F, He Y, Meroño-Peñuela A, **Sadashivaiah V.**, Improving language model predictions via prompts enriched with knowledge graphs. *ISWC DL4KG 2022*

7. **Sadashivaiah V**, Sacré P, Guan Y, Anderson WS, Sarma SV., Modeling the interactions between stimulation and physiologically induced APs in a mammalian nerve fiber: dependence on frequency and fiber diameter. *Journal of Computational Neuroscience 2018*

8. **Sadashivaiah V**, Sacré P, Guan Y, Anderson WS, Sarma SV., Studying the interactions in a mammalian nerve fiber: A functional modeling approach. *IEEE EMBC 2018*

9. **Sadashivaiah V**, Sacré P, Guan Y, Anderson WS, Sarma SV., Electrical neurostimulation of a mammalian nerve fibers: A probabilistic versus mechanistic approach. *IEEE EMBC 2017*

*equal contribution