Arjun

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Education

New York University, Courant Institute of Mathematical Sciences **September 2023 – May 2025**
Masters of Science in Computer Science *New York, United States*

Indian Institute of Technology Palakkad **September 2018 – May 2022**
Bachelor of Technology in Electrical Engineering ***8.06/10 GPA*** *India*

Technical Skills

Languages: C++, Python, Java, C, HTML/CSS, JavaScript, SQL
Tools: VS Code, Git, MongoDB, Heroku, Slurm, Blender
Technologies/Frameworks: Pytorch, Tensorflow, Numpy, Pandas, Keras, React.js, Node.js, Singularity

Experience

New York University Grossman School of Medicine **December 2023 – Present**
Research Associate, Advisor: Dr. Leon Axel and Dr. Dimitri Metaxas *New York, NY, USA*

- Developing high-fidelity synthetic cardiac MRI videos to accurately simulate the cardiac cycle across diverse heart conditions, leveraging the 4D XCAT medical software for anatomical precision.
- Applying advanced generative modeling techniques, including GANs (Generative Adversarial Networks) and Diffusion models, to imbue the XCAT-derived cardiac anatomical structures with realistic textures. This innovative approach seeks to bridge the gap between synthetic and real cardiac imaging, offering a new dimension in medical training, research, and diagnostic simulation.

Serre Lab, Brown University **July 2021 – July 2023**
Research Assistant, Advisor: Dr. Thomas Serre *Providence, RI, USA*

- Integrated deep learning techniques with the HMAX model, closely emulating primate rapid object categorization, which served as a bridge between computational methods and biological cognition insights.
- Utilized Python scripts within advanced 3D tools like Blender to systematically generate large-scale synthetic data, significantly enhancing the robustness and depth of neural network training experiences.
- Crafted and fine-tuned neural networks for predicting mouse visual cortex activity; this led to a notable 4th place achievement in the renowned NeurIPS 2022 Sensorium Challenge, highlighting model precision and competitive edge.

Cognitive & Neural Computation Lab, UC-Irvine **October 2021 – February 2022**
Research Assistant, Advisor: Dr. Megan Peters *Irvine, CA, USA*

- Contributed to Project CoGraph, tracing idea evolution across cognitive science, neuroscience, and computer science.
- Assisted in curating a multi-decade scientific literature database, enhancing research accessibility and depth.

Publications

- Arjun et al., **"Introducing Attention Mechanism for EEG Signals: Emotion Recognition"**, IEEE Engineering in Medicine Biology Society (EMBC), 2021. [Link]
- Arjun et al., **"CoGraph: Mapping the Structure of the Cognitive Sciences, Neurosciences, AI"**, Conference on Cognitive Computational Neuroscience (CCN), 2022. [Link]
- Arjun et al., **"Subject Independent Emotion Recognition using EEG Signals Employing Attention Driven Neural Networks"**, Elsevier Biomedical Signal Processing and Control (BSPC). [Link]

Projects

Geo-Notes: Geographical Memory Anchor Web App | *React.js, Node.js, MongoDB, Heroku* **Website** | **GitHub**

- Designed a web platform allowing users to associate and retrieve notes based on specific geographical locations, enhancing the experience of travel and memory recall.
- Crafted using React.js for frontend, Node.js for backend, integrated with MongoDB Atlas for data storage, and fully deployed on Heroku.

Advanced Music Synthesis using Transformer Architectures | *Python, Colab* **GitHub**

- Developed a Transformer-XL based generative model for advanced multi-instrument music composition using MIDI data available online.
- Enhanced this by integrating Hierarchical Vector Quantised Variational Autoencoder with Sparse Transformers, achieving high-fidelity raw audio synthesis on a diverse, self-curated dataset.

Leadership & Achievements

- **Coordinator**, Carrier Development Cell, *IIT Palakkad* (2019-2021).
- Ranked in the top **0.006%** of **1.2 million** aspirants, *IIT JEE Advanced Entrance Examination*, 2018.