SAMARTH YADANNAVAR

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EDUCATION

Indian Institute of Technology, Bombay **10/2020 - 05/2024**
*Bachelors in Metallurgical and Material Science - **CPI - 7.56*** *Mumbai, India*
Minor in Data Science and Artificial Intelligence

INTERNSHIPS

AI Research & Platform Intern | Fractal Analytics, Mumbai, India **04/2024 - 06/2024**

- Implemented **Med-Agents**, a chain-of-thought technique for medical reasoning on the NEET PG dataset, boosting **GPT-4o**'s accuracy from **77**% to **81.6**% using a zero-shot approach
- Further modified the given technique to resolve inconsistencies and confusion in the final decision making which led to **1.4**% increase in accuracy, amounting to an overall accuracy of **83**%
- Added Direct Preference Optimization (**DPO**) task for **LLava-Med** Multimodal LLM, enabling the model to learn and interpret unknown medical images autonomously

NLP Engineer | GetWork, Gurgaon, India **01/2024 - 04/2024**

- Developed a **Job Matching Agent** using **OpenAI API** to match students' resume content with job descriptions, streamlining the placement process for students from tier 2 and 3 colleges through automated assistance
- Implemented a **RAG** for enabling semantic search on **MongoDB** vector database, which calculates vector embeddings, and similarity scoring using cosine similarity function
- Utilized **LangChain** Framework for improving the speed and accuracy of matching student resumes with job opportunities, resulting in **200**ms user-query response time

Computer Vision Engineer | Ezynest, USA **04/2023 - 07/2023**

- Converted CCTV data of parking lots into tailored **YOLOv8** dataset on Roboflow, ensuring accurate annotations
- **Fine-tuned** Ultralytics' YOLOv8 model, maximizing the accuracy of detection of empty parking space
- Integrated **real-time** parking availability model with company's website, enabling customers to find and book vacant spots before arriving

Microexpressions and User Engagement | Research Intern, IIT Bombay **12/2023 - 02/2024**

- Curated an online learning dataset comprising data from **10** college students, generated **943,520** frames at **60** frames per second (fps) to facilitate in-depth analysis of learner engagement and behaviour patterns
- Achieved **84**% accuracy in detecting emotions such as happiness, sadness, repression, etc using Motion Magnification Technique for analyzing "microexpressions"
- Attained an accuracy of **95**% on affective state engagement and identified a negative correlation of **-0.76** between learner's emotions and engagement by conducting correlation analysis

AI Summer Intern | Fogteams, Bengaluru, India **04/2022 - 07/2022**

- Developed an AI assistant for Slack and Fogteams website using **Rasa**, automating note-taking and minutes summarization for enhancing efficiency of meetings
- Leveraged Rasa's **extractors**, **Spacy NLU** to process employee data and Facebook's Duckling extractor to extract date and time, enabling personalized communication and timely reminders
- Efficiently coordinated meetings through conversational interactions through **Dialog Management** by fine-tuning on over **1000+** examples, ensuring alignment of employee and client schedules

PUBLICATION

Multimodal Analysis of Learning-Centered Emotions | Prof Ashwin T.S., Vanderbilt University, USA

Samarth Yadannavar, Ashwin T.S., Manjunath, Ramkumar Rajendran *"Multimodal Analysis of Learning-Centered Emotions and Cognitive Processes in Open-Ended Learning Environments"*, *IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE)*, December 2024

- Reannotated the DAiSEE dataset to provide frame-by-frame emotion labels and fine-tuned the **Inception V2** model, achieving an accuracy of **85.7**% in emotion recognition tasks
- High performers exhibited **30**% higher engagement levels, while low performers showed **25**% more frequent transitions into boredom
- Conducted a **Chi-square test** indicating a strong association ($p < 0.01$) between performance levels and emotional responses among **6** engineering students

KEY PROJECTS

Cancer Cell Detection | Prof. Amit Sethi **02/2024 - 05/2024**

- Lead a research project on Cancer Detection employing **Vision Transformer** and **KimiaNet** model, training on diverse data from four organs, for early detection.
- Implemented **domain generalization** techniques for classification by applying **transfer learning** on the models, leveraging datasets from multiple organs to enhance model robustness across varying organ tissues
- Employed techniques like synthetic data generation, transformations, and using **Weighted Cross Entropy** and **Focal loss** to handle the imbalance in the dataset

Spiking Neural Network | Prof. Udayan Ganguly **08/2023 - 11/2023**

- Spearheaded research project on Spiking Neural Networks utilizing Liquid State Machines(**LSM**), focusing on enhancing classification accuracy of Neuromorphic MNIST dataset
- Implemented **Gabor Filters**, that mimics the human visual cortex, to extract complex spatial features from the dataset using Convolutional Neural Networks(CNN)
- Achieved a notable increase in classification accuracy from **95**% to **97**% through the integration of Gabor filters within LSM, demonstrating the efficacy of biologically inspired models for real-world applications

IoT: Home Automation | Institute Techincal Summer Project **05/2023 - 07/2023**

- Developed **voice-controlled home automation** system using Raspberry Pi; used ESP32 microcontroller with relay modules to control home appliances effortlessly
- Used **Google Firebase** Realtime Database to enable real-time data storage and retrieval between RPi and ESP32, reducing the response time from **1**s to **600**ms
- Engineered an AI Conversational **Chatbot** integrated with **ChatGPT** API, Wikipedia and facial recognition feature

Self-Supervised GANs | Prof. P. Balamurgan **08/2022-11/2022**

- Used **CIFAR-10** dataset with addition of **Deshuffle** task, ensuring unbiased input by random shuffling of the dataset
- Improved the training using state-of-art **data augmentation** techniques like translation, rotation & noise addition
- Achieved **10%** accuracy gain, outperforming classical GANs, showcasing effectiveness of label augmentation & deshuffling tasks

POSITION OF RESPONSIBILITY

Department Placement Coordinator | Placement Team, IITB **07/2023 - 05/2024**

- Unanimously elected to serve as representative for **350+** students, Assisting job placements for **1900**+ students, bridging the gap between the placement cell and students effectively
- Devised and implemented an efficient plan of action for **20**+ upskilling activities, aligning students with industry standards across various portfolios
- Streamlined company pitching with personalized preferences from **350+** students, ensuring maximum placements

TECHNICAL SKILLS

Programming Languages: Python, C, C++, SQL, LaTex, MATLAB, R

Developer Tools: MS PowerPoint, MS Excel, Jupyter, MySQL, Google Cloud Platform, NVIDIA GPU CUDA, VS Code, GitHub, Linux, Docker, ChatGPT, Kaggle, Google Colab

Libraries and Frameworks: PyTorch, Tensorflow, Scipy, Sklearn, Numpy, Pandas, Transformers, Seaborn, Keras, Matplotlib, OpenCV, Firebase-admin, SpeechRecognition

EXTRACURRICULARS

Scholastic Achievements	Awarded an **AA** (grade 10) in DS303 (Introduction to Machine Learning) under CMINDS [01/22-04/22] Bagged **3rd** rank in Institute Technical Summer Project (ITSP'22) among **150**+ students [05/22-07/22] Secured Letter of Recommendation(**LOR**) for outstanding performance in **AI Bootcamp** [07/21-08/21]
Social Work	Contributed **80**+ hours for teaching in **Educational Outreach** programme of **NSS**, IITB [10/20-06/21] Volunteered in **Blood Donation** & Powai Lake Cleanup drive by **UNICEF** & Abhyuday, IITB [04/23,06/22] **Volunteered** in Food Distribution Drive organized by Robinhood Army(**RHA**) [10/22-Present]
Others	Organized a **14000 ft Trek** for **20** members with IndiaHikes to Bhrigu Lake, Himachal Pradesh [07/21] Performed thematic **hip-hop dance** in Gyrations, Inter-hostel Dance General Championship [02/22-03/22]