Balaji R — Curriculum Vitae

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Github Pages: blackscreen-whitetext.github.io

Experience:

Redtree.AI: I finetuned LLama3 8B on various datsets and evaluated on various benchmarks. Also I worked on reproducing the results of using monte carlo tree search to get comparable performance on benchmarks from LLama3-8B as GPT-4

Projects:

(Ongoing) Portflio Hedging Using Options, with Prof. Shashi Jain: Using Variable Volatility models such as Dupire's local volatility, Heston models and Breeden Litzenberger's formula in the CVaR minimization problem for calculating the optimal portfolio comprising of options on NIFTY 50 index. Github Repo

(Ongoing) Path Planning Of Autonomous Underwater Vehicles In A Stochastic Dynamic Environment with Prof. Deepak Subramani: I'm working on building a forecaster of the oceanic environmental state that will encode information of the realization of the flow to a decision transformer which will decode the past history of movements and ocean representations to navigate the AUV from a starting location to a target minimizing overall travel time.

(Ongoing) Modelling Execution Time Of Deep Learning Models On GPUs with Prof. Parimal Parag: Currently I'm working on understanding the GPU architecture and working with GPU simulators. Github Repo

Online Certifications:

Generative AI with LLMs: Course Certificate

- Learnt About the various classes of transformer architectures and the usecases of various LLMs(GPT, BERT, ELMo, BART, T5, Llama)
- Used Amazon Sagemaker and experimented these concepts with FLAN-T5: Prompt Engineering, Prompt Tuning, Fine-Tuning LLMs(Parameter Efficient Methods(PEFT)), Reinforcement Learning From Human Feedback, Retrieval Augmented Generation
- Learnt about program aided models like copilot and the ReAct paper that uses chain of thought reasoning and Action Words to make the LLM generate better outputs.

Short course On LangChain: Course Page

Natural Language Processing Specialization: Course Certificate

- Implemented Naive Bayes Classifier and Hidden Markov Models for Parts Of Speech Tagging.
- Implemented An Autocomplete System using N-grams
- Implemented a Continuous Bag Of Words Model for Word Embeddings
- Used Deep Neural Networks For Sentiment Analysis
- Used RNNs, GRUs, LSTMs in Named Entity Recognition
- Used attention with LSTM for Neural Machine Translation
- Learnt about metrics to evaluate language models like ROUGE, BLEU, perplexity and benchmarks like GLUE, SuperGLUE to compare language models.
- Implemented a transformer for text summarization.
- Used the huggingface transformers library for question answering

Generative Adversarial Networks Specialization: Course Certificate

GAN Implementations: DCGAN, CycleGAN,W-GAN, Pix2Pix, StyleGAN, Data Augmentation using GANs, Conditional And Controllable Generation

Deep Learning Specialization By Andrew NG: Course Certificate

Selected Concepts: CNNs, transfer learning, RNNs, GRUs, LSTMs, Attention Models, Word Embeddings(word2vec,GLoVE), Transformers
Selected Applications: Object detection(YOLO), Image Recognition, Image Segmentation(UNet) Speech Translation

Short Course On Diffusion Models: Course Page

Short Course On ChatGPT Prompt Engineering For Developers: Course Page

Machine Learning Specialization By Andrew NG: Certificates

Selected Concepts: Anomaly Detection, Recommender Systems, Deep-Q Reinforcement Learning, Support Vector Machines, K-means Clustering, PCA.

Kaggle certifications:: Certificates

Key UG Courses:

Artificial Intelligence And Machine Learning::

- Wrote a term paper and presentation to explore diffusion models' capabilities to generate images.
- Learnt to solve convex optimization problems using cvxopt in python.

Data Structures And Algorithms:: Implemented algorithms for various problems in C++ and python.

Probability And Statistics:: Learnt statistical inference in MATLAB.

Numerical Analysis:: Implemented methods to numerically solve ODEs,PDEs in python.

Algorithms And Programming:: Learnt problem solving in C

Computer Systems:: Learnt about operating systems, hardware, memory

Skills

Languages: Python, C, C++ MATLAB, LaTeX, R, SQL, HTML, CSS, JavaScript(React)

ML Frameworks:: Tensorflow, Keras, Pytorch

LLMs:: **APIs:** Huggingface Transformers, OpenAI **Models:** T5,BERT,Llama,GPT **Coding Platforms:** AWS Sagemaker Jumpstart, Google Colab, Jupyter Notebook

Libraries: Numpy, scipy, Pandas, Matplotlib, Seaborn, Scikit-learn, cvxopt

Tools: Git, Linux, VS Code

Volunteering:

- **CNI Summer School 2024:** Participated in the summer school held by Prof. Jean Francois Chamberland and Prof. Parimal Parag from Texas A&M University on the topic of "Algorithmic Structures For Emerging Wireless Networks And Statistical Inference In Large Dimensional Spaces". Certificate
- **(Ongoing) Human Practices For IGEM Software And AI:** I'm part of a team that will be conducting hackathons and workshops as part of human practices for the upcoming IGEM jamboree.
- **Team Vicharaka:** Currently on the team of students building a mars rover for the university rover challenge amongst many other projects.
- **Databased(The undergraduate Computer Science club):** Explained prompt engineering to students as part of our club on open day.
- **Counselling:** Volunteered to be a part of the Q&A session of the counselling process for the incoming batch of students.

Education

Indian Institute Of Science **Bangalore**
Bachelors Of Technology In Mathematics And Computing, CGPA–9.0/10.0 *2022–current*
Secured admission through JEE Advanced
Expected to graduate in 2026

PSBB KK Nagar **Chennai**
School *2007–2022*
12th Percentage–96.8%
10th Percentage–95%

Achievements

JEE Advanced: AIR 225

KVPY SA: AIR 175

JEE Mains: AIR 1005