S M Kushal
Aerospace Engineering
Indian Institute of Technology Bombay

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B.Tech
Gender: Male
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SCHOLASTIC ACHIEVEMENTS

- **JEE Advanced:** Achieved a rank of **807** in JEE Advanced | **264** in JEE Mains Examination. *(2020)*
- **KVPY : Cleared level-1** of the Kishore Vaigyanik Protsahan Yojana (KVPY) Examinatoin. *(2020)*

PROJECTS

Fine Tuning a LLM on a Curated Dataset | GPT2

- **Fine-Tuned GPT2** pretrained on **28,000** paragraphs from **Paul Graham's** Essays using **Hugging Face** API.
- Achieved a **Perplexity** of **2.47,** Generated **text infused** with Paul Graham's **wisdom** and writing style.
- **Scraped** the data, **Tokenized** and **Trained** the model. Built a **Gradio App** to interact with the model.

Computer Vision | CS231n

- Implemented **Image Captioning**(CNN + RNN/ Transformers/ LSTM) and improved the test, validation **accuracy by 15% using Dropout**, **LayerNorm** and tuning hyper parameters on **COCO dataset**; `GitHub`
- Individually **Coded BatchNorm**, Entropy, **Softmax with Numpy,** grasping **Intuition in Back-Prop.**
- Studied **Ian J. Goodfellow** research paper: **GANS** and coded **Generator**, **Discriminator** update functions.

Natural Language Processing (NLP) and Transformer Architecture

- Implemented a **Transformer** on Shakespeare's writings, **generated Shakespeare like dialogue** & scene.
- Developed **`Micrograd`** package for Transformers, Wrote **Multi-Head Attention**, Position Embedding, **query, key, value** vectors from **scratch using Numpy,** gained **intuition for attention mechanism** `Github`.

Algorithms & Data Structures | Udemy Course by Colt Steele Certification.. *(Self Project)(Summer 2023)*

- Programmed **Quick, Merge, Radix Sort.** Incorporated practices to **write efficient and elegant code.**
- Learnt about Trees, Binary Heaps, Graphs **coded Dijkstra's Algorithm** and solved leetcode problems.

Tilt control of a Magnetically Levitated Train system | Aerospace Engineering, IIT Bombay
Guide : Prof. Arnab Maity *(Course Project)(Autumn 2022)*

- **Designed a controller** for a magnetic levitated train system to get **Overshoot 10%**, **Ramp-error >4.0.**
- Used **Matlab** to design, test the controller for closed-loop sys, Plotted **root-locus to check the stability.**

Data Analysis | Aerospace Engineering, IIT Bombay
Guide : Prof. Amuthan A. Ramabathiran, Prof. Prabhu Ramachandran *(Course Project)(Spring 2021)*

- **Collaborated with team of 5**, analyzed RCB scores across IPL history, using **Matplot for visualization.**
- Gained **solid foundations in numpy and pandas** by coding **linear regression** with mean square loss.

Website Development | Udemy Course by Angela Yu Certification. *(2022)*

- Developed a full-stack blog website using **React, Node.js, MongoDB and RESTful API** interaction.
- Overcame **project roadblocks** by actively searching, reading **MDN** docs and Framework API docs.

TECHNICAL SKILLS

- **Programming Languages**: **C++,** Bash, Git, **Python,** PHP, LaTeX, css, **JavaScript**, mojo, Markdown.
- **Framework & Libraries**: **PyTorch**, Numpy, Pandas, **Hugging Face**, **LangChain**, **Matplot**, React.

RELEVANT COURSES

- **Mathematics:** Linear Algebra, Calculus I & II, Differential Equations, Intro to Numerical Analysis.
- **Computer Science:** CS747 Foundations of **Intelligent and Learning Agents**, CS781 **Formal Methods in Machine Learning**, CS101 Computer Programming&Utilization, AE102 Data Analysis&Interpretation.
- **Miscellaneous: Economics,** Capitalism:theories histories, Philosophy, **Micro-Biology.**, Quantum Physics.

HOBBIES & EXTRA-CURRICULAR ACTIVITY

- Reading **Books, Research Papers**, Practicing Guitar Riffs, **Writing, Listening to Podcasts**, Dancing.
- Participated in AIDS'23(**Annual Insync Dance Show**) and Aero Department **Volleyball** Competitions.

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