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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) Examination. (2020)

## PROJECTS

### Fine Tuning a LLM on a Curated Dataset | GPT2

(March 2023)

- **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.

### Reinforcement Learning

(Autumn 2023)

- Coded **Howard's policy iteration**, Value Iteration, and LP algos. Used that to solve a 3-player 4x4 grid football problem with an **encoder, planner and decoder**. Optimal  $\pi$ , Bellman eqs in MDPs [GitHub](#)
- RL prediction-control problem; Monte-Carlo, **Boot-Strapping**; **Q-learning**, Sarsa; Function-approx  $\infty$  states.
- Gained a deep understanding in the taxonomy of **model-based/free**; **On/Off-line** algos in **DeepRL**.

### Formal Methods for Robustness Verification and Adversarial Analysis in DNNs

(Autumn 2023)

- Proficient in methods like **DeepPoly**,  $\alpha$ -CROWN,  $\beta$ -CROWN, and **Reluplex**, which are used to rigorously assess the robustness of DNNs. Used **Eran** to implement these techniques on **MNIST dataset**.
- Explored logical abduction techniques **generating** explanations, **counterexamples** & **adversarial** examples to understand the vulnerabilities of NNs. **Reading Research papers** to understand these concepts.

### Computer Vision | CS231n

(Nov-Jan 2022)

- 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

(Jan 2023)

- 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](#).

### Amphibious Drone for Payload Deployment Underwater

(Autumn 2023)

- Wrote lot of **Python code** implementing **Blade Element Hover**, **Forward Flight** theory, and **optimization of interdependent** variables in a **modular** fashion, **saving much time** and being easy to replicate [Github](#).
- Designed **Hub and Tail Rotors** for **100 kmph Forward**, **5mps Hover in Air** & **5mps forward, hover in Water**. Using plots with **Thrust, Roll/Pitch Moments** vs. cyclic pitch, tinkered the inputs to **reach Trim**.

### Algorithms & Data Structures | Udemy Course by Colt Steele *Certification*.

(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.

### Website Development | Udemy Course by Angela Yu *Certification*.

(May 2022)

- Built full-stack website using **React, Node.js, MongoDB & RESTful API**. Email list using **MailChimp**.
- **Coded and Deployed** a *website* built using **Astro** a SSG to document my work, thoughts, & interests.

## 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.

## 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** Competition.