Sarthak Banerjee **Blacksburg, Virginia 24060** **317-515-4389**
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Education

Virginia Tech, Blacksburg, VA
Master of Engineering in Computer Science and Applications Jan 2023 – Dec 2024
CGPA 3.7

Relevant Courses

- Machine Learning
- Artificial Intelligence
- Natural Language Processing
- Deep Learning
- Software Engineering
- Big data Engineering
- Virtual Environment

Skills

Programming Skills: Python, C, C++, SQL, TensorFlow, Neural Networking
Soft Skills: Problem Solving, Teamwork, Easily Adaptable, Communication
Certification: Neural networking and Deep Learning by DeepLearning.AI Coursera, June 2024
Generative AI with Large Language Models by DeepLearning.AI & AWS Coursera, Feb 2024
Machine Learning A-Z: AI, Python, and R 2023 Udemy, Summer 2023

Projects

Performing LoRA for a Spanish image captioning task Virginia Tech, Blacksburg (Spring 2024)

- A group project, part of Introduction to Deep Learning course.
- Applied LoRA on the Blip transformer for an image captioning task, using the Flicker30k dataset from Hugging Face.
- Conducted a comparative analysis of complete LoRA vs. partial LoRA. Fine-tuned methods, evaluated their performance differences and highlighted significant benefits.

Fake News Detection System: Virginia Tech, Blacksburg (Fall 2023)

- A group project, part of Machine Learning course.
- Used an online fake news dataset, analyzed the data, and structured it for easy use for the machine learning model.
- Trained a Naive Bayes classifier, an LSTM and BERT to classify between fake news and real news from the dataset.

English to French translator: Virginia Tech, Blacksburg (Fall 2023)

- A group project, part of Natural Language Processing course.
- Used an online English to French dataset to train an encoder decoder RNN and fine tune Flan-T5 for translation.
- Employed TensorFlow for training the RNN and used PyTorch and Hugging Face to fine-tune the Flan-T5 small model.

Time Series Analyses for Hotel Receipts in Texas Virginia Tech, Blacksburg (Fall 2023)

- A group project, part of Introduction to AI Course.
- Performed feature extraction on a private dataset, adding information about the population size, population growth and popularity to predict total room receipts of hotels in Texas.
- Used the SARIMA model to execute a time series analysis to predict the future total room receipts depending on past values.

An Anomaly Detection Pipeline Virginia Tech, Blacksburg (Spring 2023)

- A group project, part of Big Data Engineering Course.
- Used a python producer to convert log data into dictionary format, using Kafka to transfer data into a Scala Spark.
- Used pipelines in Scala Spark to label logs that are anomalies and created test data for the decision tree machine learning algorithm.

A GitHub Bot in Discord Virginia Tech, Blacksburg (Spring 2023)

- A group project, part of the Software Engineering course.
- Programmed in NodeJS using Replit as the server on which the bot was hosted.
- Enabled users to view information about their GitHub repository without leaving the Discord server.

A VR Keyboard Virginia Tech, Blacksburg (Spring 2023)

- A group project, part of Virtual Environment course.
- Designed a new keyboard that would be secure against shoulder surfing attacks.
- Used Blender to design the keyboard and Unity to program the keyboard as well as implement a random orientation feature.
- Researched on past VR keyboards and created a working prototype as well as performed a user study to describe the advantages of the prototype.

Work Experience

DP2Ventures Corporation, Remote

Intern Machine Learning Engineer June-Aug 2024

- Developed and fine-tuned an AI Co-Pilot using AI agents, connected to a semiconductor fab's digital twin, aimed to accelerate workforce growth and efficiency.
- Conducted research on creating an AI lane, explaining the different facets of AI in the industry, which companies are the topmost players and how AI is contributing towards a complete market transition.
- Contributed as co-author to a paper about utilizing AI and Metaverse technology to improve career navigation in the innovation economy.

Boost Consulting LLC, Remote

Intern Cybersecurity Engineer July – Aug 2023

- Researched on different pain points and opportunities in the cybersecurity landscape at an enterprise level.
- Researched and interpreted how cybersecurity could be improved with the use of AI technology.
- Designed a value stream map describing the changes in cybersecurity landscape due to the popularity of AI.

Personal Statement – Sarthak Banerjee

With the dawn of the AI era, the world is changing at an unprecedented pace. Firms across industries are rethinking workflows and reinventing operations for AI-powered digital transformation. Nearly 32% of global companies are integrating AI into multiple departments, making a deep understanding of artificial intelligence and large language models essential for competitiveness.

My experiences as a master's student at Virginia Tech, focusing on AI and neural networking, has inspired me to pursue a PhD. This opportunity will allow me to deepen my understanding of AI fundamentals and contribute to innovations in this exciting field.

My fascination with computers began in high school, sparked by video games and their ability to create vast digital worlds. This interest propelled me into software development and computer engineering. My educational journey, from high school in Singapore to my undergraduate degree in computer engineering at Purdue University, revealed how software plays a crucial role across different cultures, fuelling my desire to become a full-stack developer.

However, in January 2023 the advent of ChatGPT and its transformative impact altered how the world previously worked. Being able to simulate human-like intelligence and generating intelligent responses from a machine made me rethink my view on software and what was possible within the realms of computing. This realization prompted me to not only change my ‘Concentration Area’ from ‘Software Engineering’ to ‘Data Analytics and Artificial Intelligence’ during my master’s degree, but also aroused an urge to delve deeper into AI models and aspire to become a computer scientist specializing in deep learning and artificial intelligence.

I started pursuing courses in “Natural language processing”, “Machine learning” and “Deep learning” to gain a better understanding of the fundamentals of AI. During my ‘Introduction to Deep Learning’ and ‘Machine Learning’ projects, my team spent most of our time on deciding the best model for our use case, leaving the dataset selection for the last. This ended up hurting our overall accuracy, teaching me the importance of a data first approach in AI. These projects along with my internship in embedding AI with Large Language Models for the semiconductor industry, has helped sharpen my practical application skills and knowledge of AI.

Personal Statement – Sarthak Banerjee

During my recent internship, I helped to create and fine-tune an AI Co-Pilot using AI agents, connected to a semiconductor fab's digital twin. This innovative approach is aimed towards accelerating workforce growth. I have also co-authored a paper on utilizing AI and Metaverse technology to improve career navigation in the innovation economy.

Despite my experiences, I am cognizant of the various complexities in AI that I need to understand to create efficient solutions. I believe pursuing a PhD is crucial to gaining the theoretical foundation and deepening my mastery of AI and LLMs. This will enable me to better comprehend the linkages to digital connectivity of various device types and computer vision engines and prepare me to drive innovations in AI transformation across a broad range of industries.

Columbia University, renowned for its engineering programs, state-of-art facilities and excellent research opportunities is my ideal university to pursue the PhD program. I believe I can learn and make an important contribution to the academic experience here. I am particularly interested in Professor Zhou Yu's work on multimodal sensing and analysis but would also be equally interested in Professor Peter Belhumeur's work on Computer Vision and Machine Learning or Professor Shih-Fu Chang and Professor John Kender's work on Multimedia and Computer Vision. These areas align perfectly with my academic interest and long-term career goal.

I sincerely wish I get the opportunity to be admitted into the PhD program of Columbia University. It would be a dream come true for me to work on original ideas, expand on my theories, create industry presentations, publications, patents and join the ranks of distinguished alumnus.