

ABHINAV GANESH

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EDUCATION

The University of Texas at Austin, Austin, TX

Bachelor of Science in Computer Science

Bachelor of Science in Mathematics

May 2025

GPA: 3.9220/4.0

Relevant Coursework: Algorithms; Probability; Data Science; Matrices; Stochastic Processes; Quantitative Finance; Information Retrieval; Simulation; Machine Learning; Essentials of AI; Applied Statistics; Speech Processing; Mathematical Statistics; Parallel Computing

National University of Singapore - Semester Exchange

Jan 2023 - May 2023

EXPERIENCE

Esri, Redlands, California (Software Development Intern, Field Maps Team)

May 2024 - August 2024

- TypeScript, Playwright, StencilJS, Ember, OpenAI API, Python, Selenium
- Created framework to automate **end-to-end testing** workflows for web applications from Natural Language (NL) descriptions using **Reinforcement Learning (RL)** and **Large Language Models (LLMs)**. Evaluated performance using LLM-as-a-judge and submitted **first-author research paper** to conference.

Esri, Redlands, California (Software Development Intern, Field Maps Team)

May 2023 - August 2023

- TypeScript, StencilJS, ArcGIS, Python, LangChain, Chroma, FAISS, OpenAI API, LLaMA, HuggingFace
- Created **NL interfaces** to simplify tasks such as creating maps and building forms; created **Retrieval Augmented Generation (RAG)** systems with **~90% correctness**. Experimented with combinations of chunking algorithms, Information Retrieval systems, and LLMs.

UnitedHealth Group/Optum, Remote (Intern - Data Engineer Team)

June 2022 - August 2022

- Full-stack development (Java, Spring, HTML/CSS/JavaScript), SQL
- Developed internal tool with in-line editing for efficient **comparison of databases** during migration from on-prem to cloud. Took lead on webpage creation and Spring Boot API. Estimated to reduce time spent on developing queries **by 40%**.

RESEARCH

Quantitative Criticism Lab, Austin, Texas (Undergraduate Research Assistant)

December 2023 - Present

- Python, Tensorflow, BERT, NumPy
- Implemented **context-based quote retrieval model** for Latin corpus to facilitate analysis of evolving perspectives on social constructs (e.g. equality, loyalty, etc.) through literature. **Replicated study** using Contextualized Construct Representation for Text Analysis.

Seton Stroke Institute/Department of Neurology, Austin, Texas (Undergraduate Research Assistant)

January 2022 - August 2024

- Python, R, pybids, nilearn, ANTs, OpenCV, Docker, multiprocessing
- Developed Computed Tomography (CT) **image processing** pipeline used on clinical stroke data to determine sex differences in stroke outcomes. Implemented customized **Machine Learning (ML)** techniques to process **low resolution image data**. Performed statistical analysis on results.
- Contributed to **open source** image processing libraries (ANTs, CT BET) and built **Quality Assurance modules** to validate image segmentation results for other teams in lab. Created **error correction algorithm** to correct/normalize text (medical statistics) extracted from images; parallelized algorithm (OpenMP, C++) to be **over 35x faster** than sequential code with **same accuracy**. Tested configurations across multiple levels of parallelization, caching, and data sizes.

Hutter Research Group, Austin, Texas (Undergraduate Research Assistant)

August 2021 - August 2023

- Python, Scikit-learn, Seaborn, Pandas, NumPy, Matlab
- Performed **data analysis** and built customized **visualization tools** to investigate gas ionization characteristics and sensor data to aid with design of portable gas sensor. **Second-author paper** submitted to journal.

PROJECTS

HMM-based Word Recognizer (Speech-to-Text)

March 2024 - April 2024

- Python, PyTorch, NumPy
- Built MFCC **acoustic feature extraction** pipeline followed by **isolated word recognizer** utilizing Hidden Markov Models (HMM's) to predict spoken words based on audio input (.wav).
- Implemented **core algorithms** from scratch: sequence scoring (forward algorithm), state-level decoding (Viterbi algorithm), and transition matrix optimization (Viterbi training with Maximum Likelihood Estimation).

Legal Documents Retrieval System

April 2023

- Python, NLTK
- Developed **legal case retrieval system** supporting boolean and free text queries using Boolean Retrieval and Vector Space Model (TF-IDF). Optimized indexing for over **17,000** documents in **<450 MB** with text preprocessing and gap-encoding compression. Computed quality score based on court date/priority and implemented query expansion and pseudo-relevance feedback (Rocchio algorithm) to enhance retrieval performance.

Sentiment Analysis to Compare Characters across Translations of Homer's *Odyssey*

Nov 2022 - Dec 2022

- R, Tidyverse, ggplot, Python, Pandas, TextBlob, NLTK
- NLP to assess statistical relationship between descriptions of characters and their demographics across translations of the *Odyssey*; found evidence suggesting potential significant differences in character portrayal across translations.