Bennett Zug

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Education

North Carolina State University August 2024 – Present
B.S in Computer Science, Minor in Mathematics | 3.6 GPA, 3.9 Major GPA *Raleigh, NC*
Relevant Coursework: *Automated Learning and Data Analysis, Mathematics of Scientific Computing, Operating Systems, Natural Language Processing, Dynamic Systems and Multivariate Control*

Appalachian State University August 2022 – May 2024
Studied Computer Science, Minor in Mathematics | 3.9 GPA *Boone, NC*
Relevant Coursework: *Data Structures, Introduction to Theoretical Computer Science, Discrete Math, Linear Algebra*

Projects

class-search.com | *Python, Flask, PyTorch, PostgreSQL*
- Developed a web application to search and discover relevant university courses by computing vector embeddings for over 30,000 gathered course descriptions from multiple institutions using PyTorch and pre-trained language models.
- Built a Flask backend to efficiently match user queries against the corpus of course embeddings by leveraging PostgreSQL with the pgvector extension for fast approximate nearest neighbor search.
- Designed an interactive frontend with dynamic content updates to provide a seamless user experience.
- Deployed the Flask web server to production using Gunicorn and Nginx, ensuring high availability and sub-200ms search latency through optimized vector search without external API calls.

MatrixOCR | *Python, OpenCV, Tesseract, SymPy*
- Developed a Python command-line tool to automatically extract mathematical matrices from images by integrating OpenCV for image pre-processing and Tesseract OCR engine, enabling efficient data extraction from screenshots.
- Optimized image pre-processing pipeline using OpenCV functions like thresholding and contour detection to improve matrix detection accuracy to $>$95%

Self-Supervised Learning with SimCLR | *Final Project – CSC 422, North Carolina State University*
- Evaluated the SimCLR framework on STL-10 using a provided PyTorch implementation, modified the codebase to log learned embeddings and generate t-SNE visualizations across training epochs.
- Co-authored a NeurIPS-style research paper summarizing methodology, results, and relevance to data-scarce domains like medical imaging.

Experience

Information Technology Assistant Summers, 2018–2023
St Timothy's School *Raleigh, NC*
- Managed online accounts and prepared education hardware for over 550 students and 100 faculty members.
- Demonstrated strong problem-solving abilities by independently troubleshooting and resolving technology issues reported by staff while providing clear guidance.
- Grew into a leadership role over successive summers by proactively identifying process improvements to enhance overall technology support efficiency.

Youth Coach and Event Belayer October 2021 – January 2023
Triangle Rock Club *Raleigh, NC*
- Effectively communicated safety instructions and climbing techniques to youth and adult climbers in a clear and engaging manner to ensure a secure and enjoyable experience.
- Managed after-school youth programs by coordinating activities, delegating tasks to staff, and ensuring a structured yet fun experience for participants.

Organizations

FTC 2901 Member August 2018 – May 2020
Cardinal Gibbons High School *Raleigh, NC*
- Contributed as a programmer on the FIRST Tech Challenge robotics team to develop autonomous driving capabilities for the competition robot using Java.
- Collaborated in a team environment to enhance the robot's movement code quality through code refactoring
- Played a key role in enabling the team to qualify for FTC Nationals by delivering robust autonomous navigation software adhering to competition guidelines.

Technical Skills

Languages: Java, Python, R, SQL, HTML/CSS, LaTeX
Frameworks/Libraries: Svelte, Flask, PyTorch, NumPy, Pandas, OpenCV
Tools/Platforms: Git, Vim, VS Code, PostgreSQL