Bennett Zug

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Education

Appalachian State University August 2022 – Present
B.S in Computer Science, Minor in Mathematics | GPA: 3.9/4.0 (Major), 3.5/4.0 (Overall) *Boone, NC*
Relevant Coursework: *Data Structures, Introduction to Theoretical Computer Science, Discrete Math, Linear Algebra*

Projects

EquiB | *React, Firebase* Hackathon Project

- Collaborated in a team to develop a React web app called EquiB at HackNC 2023 with the goal of demonstrating a blockchain-based banking concept.
- Won the "Best Use of Circle" prize category for utilizing Circle's USDC stablecoin platform in the proposed application design.

Predicting Median Housing Prices | *R, Python*

- Performed web scraping using Python and Selectolax HTML parser to collect structured data from websites into a CSV format, enabling efficient data acquisition for analysis.
- Developed a linear regression model in R to predict median housing prices across U.S. metropolitan areas based on various socioeconomic factors.
- Evaluated model performance using metrics like R-squared and RMSE, compared against other architectures like random forests, and visualized results with ggplot2.

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.
- Leveraged SymPy library to perform Gauss-Jordan elimination and other matrix operations on the extracted matrices.
- Optimized image pre-processing pipeline using OpenCV functions like thresholding and contour detection to improve matrix detection accuracy to $>$95%

class-search.com | *Python, Flask, PyTorch, Svelte, 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 instututions 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 Svelte frontend with features like university selection, course search within institutions, and 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.

Experience

Summer Technology Assistant Summers, 2018–2023
St Timothy's School *Raleigh, NC*

- Managed Google accounts and Chrome devices for the middle school of over 200 students, utilizing automated account provisioning to reduce manual effort by 80%.
- Demonstrated strong problem-solving abilities by independently troubleshooting and resolving technology issues reported by staff while providing clear guidance.
- Troubleshooted technology problems from other staff.
- 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