Michael Capriotti

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Education

Northwestern University - Bachelor's degree in Computer Science & Mathematics — *Evanston, IL*
2024 - 2028

- **GPA:** 3.93. **Coursework:** Computer Programming I, MENU Linear Algebra

Illinois Mathematics and Science Academy (IMSA) - High School Diploma — *Aurora, IL*
2021 – 2024

- **GPA:** 3.95. **Coursework:** Computer Science Inquiry, Calculus, Differential Equations, Statistics, Calculus-Based Physics I & II, Modern Physics, Physical Chemistry

Work Experience

Software Development Intern - Hudson Design House — *Oswego, IL / Remote*
August 2024 – Present

- Creating frontend using HTML, CSS, and JavaScript, designing dynamic, responsive user interfaces for product catalogs, shopping carts, and checkout pages.
- Using Square APIs to process transactions, manage customer data, and track sales, improving transaction efficiency and security. Also improving website load times and responsiveness using image optimization.
- Developing and integrating a custom AI chatbot using natural language processing the ChatterBot Python library for natural language processing (NLP).

HVAC Technician Assistant - Cap's Electric and Refrigeration — *Bourbonnais, IL*
June 2024 – Sept 2024

- Installed/Repaired air conditioners, furnaces and ventilation pipes.

Academic Tutor - Amikka Learning — *Remote*
May 2024 – October 2024

- Tutored math and physics & assisted students with SAT preparation.

Research Experience

Quantum Computing Research Intern - Los Alamos National Laboratory ***Github*** — *Remote*
March 2024 – Present

- Contributed to a research study focusing on Quantum Computing, the paper is in preparation.
- Helped to develop a new method of applying semidefinite programming (SDP) warmstarts to solve Quadratic Unconstrained Binary Optimization (QUBO) problems via the Quantum Approximate Optimization Algorithm (QAOA) by using a mapping from QUBOs to Max-Cut problems as an intermediate step. Benchmarked this approach on a variety of QUBO problems, including Random QUBOs, TSP, Portfolio Optimization, and MIS, comparing the results to a non-convex warm-start method (QUBO Relaxed).
- Identified the optimal SDP warm-start method: Goemans-Williamson projection onto 2 dimensions (GW2), with a rotation applied to the auxiliary variable introduced during the QUBO to Max-Cut mapping. Investigated the performance of QUBO Relaxed, noting that its optimization sometimes depends on the number of random initializations. Analyzed the relative performance of QAOA between GW2 warm-starts and QUBO Relaxed, concluding that performance is problem and metric dependent.

Data Science Research Intern - Kellogg School of Management ***Github*** — *Evanston, IL*
August 2022 – June 2024

- Contributed to two research studies on top executives, presented at IMSA research conferences.
- Helped conduct a study analyzing the educational backgrounds of 100,000 executives at top firms in 1960 and 2005, revealing shifts in the influence of university prestige on career advancement. Used AI to examine demographic changes in gender and ethnicity over time, providing new insights of university prestige.
- Contributed to a study identifying key leadership traits essential for top executives Examined how a companies market price fluctuations after an executive death correlate to the executive's traits. Analyzed over 1000 executive obituaries, the main focus was on identifying an executive's career path: founded, family founder, or career.
- For previous study, developed an optical character recognition (OCR)-based data extraction method utilizing Pytesseract to digitize obituary text from images. Integrated Pyppeteer for UI automation, streamlining the process of inputting digitized data into a large language model (LLM), thereby automating the data analysis. Employed Pandas for robust data sorting and manipulation, and utilized Openpyxl to structure and organize Excel files.

Academic Contributions

Executive's Firm Relations and Implications of Exogenous Death (Conference) — *Digital Commons 2023*
Frydman C, **Capriotti M**, Sun D.

Undergraduate University's Prestige on Top Firm Executives (Conference) — *Digital Commons 2024*
Frydman C, **Capriotti M**, Sun D.

QUBO to Max-Cut (Paper in Preparation) — *2025*
Capriotti M, Bhattacharya B, Tate R.

Additional Information

Languages: Python, MySQL, Javscript, HTML/CSS, Racket

Libraries: Pandas, NumPy, Matplotlib, Openpyxl, Pyppeteer, Pytesseract, Qiskit, Scikit-learn, ChatterBot

Technologies: Visual Studio Code, Jupyter Notebook, Google Colab, Git, Excel, Wordpress/WooCommerce

Programs: MIT Introduction to Engineering, and Science (MITES), Goldman Sachs Engineering Possibilities Summit