

Charles Cooper

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EDUCATION

University of Illinois Urbana-Champaign, M.S. Computer Science, GPA 4.0 **May 2027**

- Investigating quantization and encoding methods for efficient data transfer between split neural networks, where computation happens both on-device and on the cloud, looking at signal processing and audio applications
- Modifying a scalable pipeline for community detection, improving robustness and accuracy of network community identification methods by enforcing different definitions of well-connectedness.

University of Illinois Urbana-Champaign, B.S. Mathematics & Computer Science, GPA 3.91 **May 2025**

- Chancellor's Scholar (1 of 125 total students selected) and Vincent O. Greene Scholarship recipient
- Relevant Coursework: Machine Learning, Natural Language Processing, Deep Learning for Computer Vision, ML for Signal Processing, Computer Graphics, Computer Systems, Statistical Analysis, Probability and Statistics

SKILLS

Cloud & Distributed Systems: AWS, Google Cloud, Apache Spark, PySpark

Programming Languages: Python, Java, JavaScript, C, C++, SQL

WORK EXPERIENCE

Univ. of Illinois Urbana-Champaign Dept. of Computer Science | Teaching Assistant **Aug 2025 - Present**

- Facilitating two discussion forums for CS 225: Data Structures, providing timely, accurate guidance for 972 students.
- Delivering in-person sessions for 100+ students, developing C++ and Docker assignments to reinforce core concepts and give them hands-on experience with lecture material.

Handshake AI | Model Validation Specialist **Aug 2025 - Oct 2025**

- Engineered adversarial multimodal prompts (text, images, and equations) to test LLM reasoning limits and expose reliability gaps in pre-production models.

RESEARCH EXPERIENCE

Mean-Field Last-Passage Percolation for the Illinois Mathematics Lab **Aug 2024 – May 2025**

- Collaborated with a team of six to write a 20-page research paper and present at two IML symposiums.
- Developed a greedy algorithm to find maximal length paths in graphs with special properties, reducing the computational time by 94% as compared to a naive exponential algorithm.

Migration Networks for the Univ. of Illinois Urbana-Champaign Dept. of Economics **Oct 2024 - Jan 2025**

- Developed an ETL pipeline for employment data from IPUMS that enables scalable analysis of exposure to minimum wage across age groups and produced four data visualizations that support ongoing economic research.

Social Network Modelling using Preferential Attachment **June 2022 – Jan 2023**

- Designed and implemented a probabilistic model in Python that explains the evolution of large-scale networks consisting of over 10,000,000 individual nodes, e.g., citation or follower networks.
- Acknowledged on two published papers and presented at the UIC Undergraduate Mathematics Symposium.

PROJECTS

Codenames Webgame AI | Python, JavaScript, Vector Databases, Flask, React, Node.js, OpenAI API

- Employed AGILE methodology, delivering features iteratively for a web app while collaborating with three others.
- Improved the initial vector database-based algorithm by using AI Agents, reducing suggestion time by 80%.

Generative Adversarial Networks | Jupyter Notebook, PyTorch, NumPy, CUDA

- Implemented, trained, and tuned the hyperparameters of LSGAN and DCGAN models, generating realistic images.
- Experimented with modern methods in machine learning, such as self-attention and latent space traversal techniques.

Deep Learning Object Detection | Computer Vision, Google Cloud, PyTorch, CUDA, TensorRT, cuDNN

- Utilized the YOLO computer vision algorithm, achieving high accuracy on benchmark datasets.
- Leveraged the Google Cloud Compute Engine and GPU acceleration to reduce training time by 99%.

Playlist Sentiment Analysis | Python, JavaScript, Requests, React, Transformers, Git

- Built a pipeline to scrape 5000+ song lyrics and applied HTML parsing techniques to clean and structure the data.
- Built an application with a React interface and a Transformer-based model to visualize playlist mood.