Kathryn Carbone

+1 518-466-5157 | katncarbon@gmail.com | Ballston Spa, NY, USA

Education

University of Waterloo — Waterloo, ON, CA
Master of Mathematics in Computer Science — *Sep. 2023 – Sep 2025*
Thesis: "Visual Entity Linking through Promptable Segmentation: Applications in Medical Imaging"
Supervisors: Prof. Robin Cohen & Prof. Lukasz Golab

Rensselaer Polytechnic Institute — Troy, NY, USA
Bachelor of Science in Computer Science — *Aug. 2019 – May 2023*

Projects

VELCRO (Master's Thesis Project) | *Python, Pytorch Lightning* — Sep. 2023 – Sep. 2025

- Designed a deep learning image-text model for semantic reasoning over detected medical image artifacts
- Developed a custom multi-task loss function for visual artifact localization and text description alignment
- Trained at scale on 400k+ data samples with distributed training configurations (DDP, FSDP) on a multi-GPU, multi-node SLURM cluster
- Achieved 12.6%+ F1 increase over baselines

RibXpert | *Python, Pytorch Lightning* — Jan. 2024 – Apr. 2024

- Collaborated in 4-person cross-discipline team to design a rib fracture detection model for chest X-rays
- Led vision transformer model implementation and training, achieved 97% accuracy
- Implemented GradCAM to visualize model feature maps and attention weights for post-inference explainability

HEX: Hierarchical Explainable AI Engine | *Python, React* — Sep. 2024 – Nov. 2025

- Built an interactive web app with React and FastAPI to visualize explanations of AI model decisions at multiple conceptual levels to facilitate explanation summarization and expansion
- Leveraged GPT-3.5/4 to generate concept hierarchies and cluster structured data features under concepts
- Adapted OLAP-style database analysis operations to map feature-level explanations to hierarchies and support real-time explanation exploration along the hierarchical axis

Technical Skills

Languages: Python, C/C++, SQL (Postgres)
DL/ML: Pytorch, Pytorch Lightning, Tensorflow, HuggingFace
Libraries/Tools: SLURM, Weights & Biases, pandas, NumPy, Matplotlib, Git, Linux

Publications

1. **Carbone K**, Hebert L, Golab L, Cohen R. Visual Entity Linking with VELCRO. *Proceedings of the 5th Machine Learning for Health Symposium (ML4H)*. 2025.
2. **Carbone K**, Golab L, Szlichta J, Godfrey P. Cohen R. HEX: Hierarchical Explanations. *42nd IEEE International Conference on Data Engineering (ICDE)*. 2025. Accepted. *Available on request*

Posters and Presentations

1. **Carbone K**, Hebert L, Golab L, Cohen R. Visual Entity Linking with VELCRO. *Proceedings of the 5th Machine Learning for Health Symposium (ML4H)*. 2025. Poster.
2. **Carbone K**, Hebert L, Golab L, Cohen R. Visual Entity Linking through Promptable Segmentation: Applications in Medical Imaging. *Responsible AI Special Day, KDD*. 2025. Poster.
3. Carbone K, 3 Minute Thesis: The Invisible Library. *Responsible AI Special Day, KDD*. 2025. Presentation.

Awards and Involvement

Three Minute Thesis Competition First Place | *Responsible AI Special Day, KDD 2025* Aug. 2025

Student Poster Competition First Place | *Responsible AI Special Day, KDD 2025* Aug. 2025

Graduate Student Member | *NSERC Responsible AI Program* Sep. 2023 – Sep. 2025

Dean's Honor List | *Rensselaer Polytechnic Institute* All Semesters, 2019 – 2023

Research Experience

Graduate Researcher Sep. 2023 – Sep. 2025

AI For Social Good Lab, University of Waterloo *Waterloo, ON, CA*

- Conducted experiments and data analyses in multimodal learning and model explainability to further ongoing research initiatives in medical AI applications
- Presented lab research to undergraduate and graduate students as a guest speaker in courses and external program seminars, translating complex AI methods into accessible insights for audiences with varying technical backgrounds

Edison Intern Jun. 2023 – Aug. 2023

General Electric (GE Aerospace Research) *Niskayuna, NY, USA*

- Executed applied research in a corporate R&D setting, with a strong focus on independent problem-solving
- Developed an in-house computer vision tool with Python and OpenCV for *in situ* monitoring of additive manufacturing machine performance to ensure quality standards compliance
- Worked with machine technicians to collect downbeam camera video data for time-series analysis

Undergraduate Research Assistant Sep. 2021 – May 2022

Institute for Data Exploration and Applications (IDEA), Rensselaer Polytechnic Institute *Troy, NY, USA*

- Finetuned BERT NLP transformer models for unstructured clinical note information extraction
- Initiated experimentation with rule-based and deep learning-based clinical abbreviation normalization and data cleaning pipelines using the UMLS medical ontology

Teaching Experience

Graduate Teaching Assistant Sep. 2023 – Aug. 2025

University of Waterloo *Waterloo, ON, CA*

CS 492/692: Social Implications of Computing

CS 245: Logic and Computation

CS 115: Introduction to Computer Science

Graduate Instructional Assistant Jan. 2024 – May 2024

University of Waterloo *Waterloo, ON, CA*

CS 115: Introduction to Computer Science

Undergraduate Teaching Assistant Sep. 2022 – Dec. 2022

Rensselaer Polytechnic Institute *Troy, NY, USA*

CS 1100: Computer Science I