JACK LONGWELL

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ABOUT ME

I'm an enthusiastic machine learning engineer and researcher with full stack experience creating fully deployed deep learning clinical and legal decision support systems. I spend my time designing, leading, and implementing novel machine learning projects end-to-end such as OCTess. My background is in computer engineering and statistics, with a strong focus on their intersection in **artificial intelligence**. I am looking for roles in machine learning and data science to expand my skill set and repertoire of projects.

EDUCATION

Master of Engineering - Electrical and Computer Engineering September 2023 – June 2025

Concentration in artificial intelligence

Toronto Metropolitan University/Ryerson, Toronto, ON

- 4.21/4.33 cumulative GPA
- Thesis focused on RAG in LLMs with knowledge graphs for Q/A tasks *(Published in ACM SIGIR-AP 2024)*

Honours Bachelor of Science - Mathematics and Statistics September 2018 – June 2023

Minor in Economics

McMaster University, Hamilton, ON

- 3.6/4.0 GPA in final two years, met standards for McMaster dean's list 2021, 2022

SKILLS

- Software creation and deployment, statistical analysis and modeling, data presentation
- **Technical stack:** Python (PyTorch, TensorFlow, Transformers, XGBoost, OpenCV, SciPy/Scikit-learn, Pandas, Flask), R (Tidyverse, Torch, Caret, Shiny), MATLAB, SAS, Stata, SQL, SPARQL, Git, Bash, HTML, CSS, JS, TS, Spark
- HPCC, slurm, Cloud computing and ML with AWS(Bedrock), GCP(Vertex), Azure(Azure ML).
- Expertise in neural network models such as CNNs, RNNs, LSTMs, GANs and Transformers
- Extensive knowledge of LaTeX, Markdown

WORK/RESEARCH EXPERIENCE

MACHINE LEARNING ASSOCIATE May 2025 – Present

Vector Institute/Smith + Andersen, Toronto, ON (Contract full-time)

- Working in shared services to assist proposal team with RFP responses
- Creating ETL and chunking pipelines to index vast amounts of company data
- Deploying internal AI tool to streamline proposal creation and eliminate excessive redundant work
- Aiming to reduce turnaround time by 5 hrs and increase custom content reuse by 35%

MACHINE LEARNING ASSOCIATE January 2025 – May 2025

Vector Institute/Hivelighter inc., Toronto, ON (Contract full-time)

- Worked on LLM-based recommendation systems and agentic research tools
- Created and maintained large scale ETL pipelines, training embedding and language models
- Deploying and scaling AI servers, optimizing content serving throughput
- Improved user content ratings by 24%, increased throughput by 17%

MACHINE LEARNING ENGINEER August 2024 - Present

Formic AI, Toronto, ON (Contract part-time)

- Implemented an improvement feedback loop through user feedback analysis on evolving needs
- Established a continuous training system to refine the algorithm and improve search accuracy
- Achieved a 24% increase in search accuracy and a 38% boost in user satisfaction within six months.

MACHINE LEARNING ASSOCIATE May 2024 – August 2024

Vector Institute/Formic AI, Toronto, ON (Contract full-time)

- Developed, trained and implemented an AI-power legal-tech search algorithm
- Led the project from conception to deployment, conducting thorough research on user needs
- Identified key performance metrics and system improvements, addressed client pain points
- Improved search performance by 43% over baseline metrics, leading to a 14% increase in user engagement

GRADUATE RESEARCHER September 2023 - Present

Toronto Metropolitan University/Ryerson, Toronto, ON (Part-time)

- Thesis exploring novel question-answering algorithms with large language models
- Generating knowledge graphs queries to respond to natural language questions
- Leveraged RAG with facts from Wikidata and DBpedia (LC-QuAD-2.0, QALD)
- Increased F1 Score by 4% and accuracy by 6% over previous state-of-the-art

RESEARCHER January 2023 - May 2024

Princess Margaret Cancer Centre, Toronto, ON (Contract full/part-time)

- Validated popular large language models in highly specialized fields
- Led a team of oncologists and organized the creation of massive clinical cancer datasets
- Collected model results, performed statistical analyses, delivered intuitive visualizations
- Results exceeded baselines by 10%, traveled to present results at an academic conference

RESEARCHER May 2022 - Present

St. Michael's Hospital, Toronto, ON (Contract full/part-time)

- Developed automation techniques to segment and quantify the subretinal fluid that appears in clinical scans of diseased eyes
- Trained and validated computer vision algorithms such as Chan-Vese, CNNs, and ViTs
- Improved F1 Score by 3% over state-of-the-art, presented results at an academic conference

SELECTED PUBLISHED PAPERS AND CONFERENCES

- Automated segmentation of subretinal fluid from optical coherence tomography: A vision transformer approach with cross-validation: published in Ophthalmology Science, 2025
- IoT Data Fusion Techniques: a Systematic Review and Meta-Analysis: presented at IEMTRONICS 2025, Best Paper Based on Reviewers' Choice, to be published in Springer Nature 2025
- Triple Augmented Generative Language Models for SPARQL Generation from Natural Language Questions: presented at ACM SIGIR-AP, 2024

- Performance of Large Language Models on Medical Oncology Examination Questions: published in Journal of the American Medical Association Network Open, 2024
- Validation of M-CHARTS for Quantitative Assessment of Metamorphopsia Following Rhegmatogenous Retinal Detachment Repair: published in Retina, 2024
- OCTess: An Optical Character Recognition Algorithm for Automated Data Extraction of Spectral Domain Optical Coherence Tomography Reports: published in Retina, 2023
- Large language models encode medical oncology knowledge: Performance on the ASCO and ESMO examination questions: presented at American Society of Clinical Oncology Quality Symposium, 2023
- Segmentation and volume calculation for subretinal fluid using OCT images, OpenCV, and scikit-learn: presented at Vit Buckle Society, 2023

OTHER PROJECTS

- Automated patient data extraction by creating an optical character recognition algorithm
- Validated a novel diagnostic test for retinal metamorphopsia
- Fine-tuned and implemented a GPT-based chatbot in a Telegram group used by over 700 MDs
- Developing a deep learning network to recommend medication orders to oncologists
- Created a database to track medical trial enrollment and store sensitive patient information
- Formed relationships with large medical technology companies and integrated new-age software to extract high quality patient images for further study and research
- Developed a webapp to diagnose mal-referred eye diseases with a Vision Transformer

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