

D. Estes McKnight

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Motivated software developer with 4 years of full-time ML development/research & cross-stack experience.

EDUCATION

University of Alberta	2019–2022
M.Sc. Computer Science research-based, <i>GPA 4.0</i> Research in NLP and data science with Prof. Alona Fyshe's Representations Lab	
University of Oklahoma	2014–2019
B.S. Mathematics <i>magna cum laude</i> B.S. Computer Engineering <i>GPA 3.7</i> , with Minor in Computer Science	

EMPLOYMENT

Physics Dept., University of Alberta	Edmonton, Alberta
Research Machine Learning Developer	Feb 2025–Present
<ul style="list-style-type: none">▪ Prepared space weather datasets, libraries and algorithms for downstream machine learning.▪ Trained models to clean/label auroral image datasets. Used PyTorch, pandas, wandb, and compute clusters.	
Computing Science Dept., University of Alberta	Edmonton, Alberta
Research Assistant (ML/AI)	Jan 2023–Jan 2024
Graduate Research Assistant	Apr 2020–Oct 2022
<ul style="list-style-type: none">▪ ML, data science, & NLP research. Published & presented papers, incl. at the NLP-top-3-venue NAACL▪ Designed/analyzed/trained hundreds of user models on multimillion-scale datasets. Used Python, PyTorch, pandas/Dask, scikit-learn, statsmodels, HPC, and wandb. Indexed data with ElasticSearch.▪ Used Python, Flask, JavaScript, HTML, and CSS to design response-annotation webpages hosted on GCP	
Graduate Teaching Assistant	Aug 2019–Apr 2020
MiTek USA, Inc.	St. Louis, Missouri
Backend Software Engineering Intern	May–Aug 2018
<ul style="list-style-type: none">▪ Refactored SQL CRUD tests with C# and mocked with NSubstitute to eliminate dependencies.	
Frontend Software Engineering Intern	May–Aug 2017
<ul style="list-style-type: none">▪ Used C#, WPF, and Entity Framework to create an incident report-editing application that interfaced with the company's e-mail databases. Application part of manager's workflow a year later.	
Iowa State University VR Applications Center	Ames, Iowa
Research Intern	Jun–Aug 2016

CONTRACT WORK

Ballpark Housing	Edmonton, Alberta
Backend/NLP Development	May–Jul 2024
<ul style="list-style-type: none">▪ Collaborated to design an LLM-based RAG system using Pinecone and OpenAI's GPT-4. Prepared a scraping server and PostgreSQL database on GCP using SQLAlchemy.	
Alberta Machine Intelligence Institute	Edmonton, Alberta
ML Educational Material Development	Jun–Aug 2023

LANGUAGES AND TECHNOLOGIES

Languages	Proficient in <u>Python</u> , <u>C#</u> , <u>C++</u> , <u>Java</u> , <u>SQL</u> , & <u>R</u> . Familiar with <u>JavaScript</u> & <u>Bash</u>
SWE	Version control (<u>Git</u> , <u>TFS</u>), cloud (<u>GCP</u>), ORM (<u>Entity Framework/SQLAlchemy</u>), CI/CD (<u>GH Actions</u>), MVVM/MVC (<u>WPF</u> , <u>Swing</u>), containerization (<u>Docker</u>), build tools (<u>Gradle</u>)
ML/NLP	<u>PyTorch</u> , <u>pandas/Dask</u> , <u>LangChain</u> , <u>scikit-learn</u> , <u>NLTK</u> , <u>Gensim</u> , 🤖 <u>transformers</u> , & <u>wandb</u>

SELECTED PROJECTS

- Determined interpretable semantic similarities and differences between humans and LLMs using **PyTorch**, **pandas**, **bootstrapped statistics** and **sparse neural networks**
- Developed a **Python** bitfield/serialization library for ROM-hacking with **CI/CD**, **PyTest**, and **Sphinx docs**
- Built a Q&A RAG chatbot for documentation/codebase questions for the Archipelago multi-game randomizer framework. Used **Python**, **QDrant** sparse embeddings and vector stores, **OpenAI** dense embeddings and LLM calls, **Gradio** for the frontend and **HuggingFace Spaces** for hosting.
- Created a **GCP**-hosted self-updating website to track statistics for a multi-month 1500-vote **video-game music contest** using a **LASPy** (**Debian**, **Apache**, **SQLite**, and **Python**) stack and BeautifulSoup4

LEADERSHIP

President of UAlberta's Comp. Sci. Graduate Students' Association Edmonton | Jul 2021–Jun 2022

President of UOklahoma's Math Club (Fall 2016–Spring 2019), **VP** (Spring 2016), **Treasurer** (Fall 2015)

Captain of UOklahoma's ACM-ICPC Programming Competition Club Norman | Jun 2017–May 2019

PUBLICATIONS

Forthcoming

- **McKnight** et al. "Adult age and object-similarity judgment: Differences between 25–35- and 50–60-year-olds concerning interpretable neural-embedding dimensions".
- **McKnight** & Fyshe "Taxonomic–thematic preference differences between adults and young children through sparse object-similarity embeddings".

Published

- **McKnight** & Fyshe. "Characterizing Human and Zero-Shot GPT-3.5 Object-Similarity Judgment". *Find. 2024 Conf. of the North American Chapter of the Assoc. for Computational Linguistics (NAACL)*, 2024. https://demcknight.com/served_files/919-characterizing-human-and-zero.pdf
- **McKnight**. "Age-Related Differences in Object-Similarity Judgment". Master's thesis, The University of Alberta, 2022. <https://doi.org/10.7939/r3-mz1n-v607>
- Davis, **McKnight**, et al. "Quantifying Depression-Related Language on Social Media During the COVID-19 Pandemic". *International Journal of Population Data Science (IJPDS)*, 2020. <https://doi.org/10.23889/ijpds.v5i4.1716>
- Stewart, Epstein, Troup, **McKnight**. "A Mathematician's Deliberation in Reaching the Formal World and Students' Views of the Eigentheory". *Proc. 11th Congress of the European Society for Research in Mathematics Education (CERME)*, 2019. <https://hal.science/hal-02459875/>
- Stewart, Epstein, Troup, **McKnight**. "An Analysis of a Mathematician's Reflections on Teaching Eigenvalues and Eigenvectors: Moving between Embodied, Symbolic and Formal Worlds of Mathematical Thinking". *Proc. 22nd Annual Conference on Research in Undergraduate Mathematics Education (RUME)*, 2019. <http://sigmaa.maa.org/rume/crume2019/Papers/147.pdf>