

# Dawn E. McKnight

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## EDUCATION

- University of Alberta 2019-2022  
**M.Sc. Computer Science** research-based, *GPA 4.0*  
Research in NLP and machine learning under Alona Fyshe  
Best thesis nominee: "Age Differences in Similarity Judgment through Neural Embeddings"
- University of Oklahoma 2014-2019  
**B.S. Mathematics** *magna cum laude*  
**B.S. Computer Engineering** *GPA 3.7*, with **Minor in Computer Science**  
Undergraduate research in linear algebra pedagogy under Sepideh Stewart

## EMPLOYMENT

- University of Alberta** Edmonton, Alberta  
**Research Associate** Jan 2023–Jan 2024  
**Graduate Research Assistant** April 2020–October 2022
- Machine learning and NLP research
  - Used PyTorch, pandas, cloud computing, stats (parametric and nonparametric) and more to
    - Characterize transformer-based large language models' decision-making with interpretable embeddings. Deployed HuggingFace models and used OpenAI's GPT APIs to generate over ten million completions
    - Elicit age-based differences in object-similarity judgment by designing and training preference vectors
    - Determine COVID-19 social-media sentiment trends by scraping millions of tweets and using GloVe, ElasticSearch, and support vectors to derive and quantify sentiment-characteristic language
  - Nominee for department's "Outstanding MSc Thesis" award
- Graduate Teaching Assistant** August 2019–April 2020
- TA for Machine Learning; Discrete Maths; Game Algorithms; author for Neuromatch's Deep Learning course
  - Wrote and delivered lectures to 100+ students; created reference sites, Jupyter notebooks
- MiTek USA, Inc.** St. Louis, Missouri  
**Software Engineering Intern** Summers 2017, 2018
- Created an incident report-viewing/editing application using C#, WPF, and Entity Framework that interfaced with the company's e-mail databases. Application still used by managers for tickets a year later
  - Refactored SQL CRUD tests with C# and mocked with NSubstitute to eliminate dependencies
- Iowa State University VR Application Center** Ames, Iowa  
**Research Intern** Summer 2016
- Collaborated to create a military simulation for the U.S. Army in Unity with C# as part of an Intelligent Team Tutoring project. Designed 3D models with Blender and AutoCAD

## LANGUAGES AND TECHNOLOGIES

- Proficient in Python, Java, C++, C#, and SQL. Familiar with R, MATLAB, JavaScript, and Bash
- SWE/DB: SQLAlchemy, Entity Framework, Docker, VCS (Git/TFS), CI/CD, MVVM/MVC (WPF/Swing)
- ML/NLP: PyTorch, Pandas, Gensim, NLTK, SciPy, statsmodels, HuggingFace transformers, FAISS and wandb

## SELECTED PROJECTS

- Determined age-based differences in adult similarity judgment via a novel **interpretable ML** architecture
- Worked with a cross-Canada team to discover online depressive language trends during COVID-19 in various cities. Used **ElasticSearch**, **GloVe** and **VADER** on scraped geocoded tweets and Reddit posts
- Developed a **Python** bitfield/binary serialization library with **continuous integration** and **PyTest**
- 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.

## LEADERSHIP

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- **President** of **UAlberta's Computing Science Graduate Students' Association** (Sum. 2021–Sum. 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** (Fall 2017–Spring 2019)

## PUBLICATIONS

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### Forthcoming

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

### Published

- **McKnight** & Fyshe. "Characterizing human and zero-shot GPT-3.5 object-similarity judgment". *Find. 2024 Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*, 2024. <https://openreview.net/pdf?id=FLXFS4S5Ccv>
- **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>