

Braden K. Webb

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WORK EXPERIENCE

Machine Learning Research Associate

May 2023 - Present

AI & Data Analytics Division, Pacific Northwest National Laboratory

Remote from Boston, MA

- Pattern-of-life modeling and algorithmic anomaly detection through graph analytics for national security threat prevention on the Sigma+ program; sponsors include DARPA and other government agencies
- Develop full-stack web app with TypeScript, React, and Next.js, contributing to renewal of \$5M contract
- Leverage lab-internal cluster for distributed LLM training, deploying to the cloud (AWS ECS & SageMaker)
- Implement RAG pipeline to automate mappings between related taxonomies for cyber-physical threat modeling
- Publish and empirically validate formal mathematical model to maximize security of cyber-physical systems
- Define PostgreSQL schemas for data ingestion into AWS-hosted Elasticsearch indices via Apache NiFi
- Produce rigorously analyzed statistical reports on document embedding clusters using unsupervised ML

Machine Translation Research Assistant

Sep. 2022 - May 2023

MaTRIX Labs, Department of Computer Science, Brigham Young University

Provo, UT

- Built data cleaning pipeline for dynamically processing and aligning translation memory files for 90+ languages
- Prepared multilingual machine translation corpus for publication in Linguistic Data Consortium
- Trained 24-language neural MT model to investigate effects of tagging the language family on translation quality
- Harnessed distributed HPC GPUs to train 800M-parameter encoder-decoder transformer from scratch, matching state-of-the-art performance on several language pairs across multiple metrics

NLP Research Assistant

April 2022 - Jan. 2023

DRAGN Labs, Department of Computer Science, Brigham Young University

Provo, UT

- Fine-tuned generative LLMs with domain-specific text obtained through extensive web-scraping
- Developed novel metric for evaluating relevance of procedurally generated NPC dialogue to quest objectives, and validated its correlation to human preferences through surveys and user studies resulting in academic publication

Single Sign-On Technology Consultant

June 2021 - April 2022

Qualtrics International, Inc.

Remote

- Provided support integrating SAML, CAS, LDAP, and Google OAuth SSO protocols, successfully completed 50+ B2B client tickets

Computational Research Assistant

Dec. 2020 - April 2022

Department of Mathematics, Brigham Young University

Provo, UT

- Evaluated open-source tools for English to IPA transliteration, detected and traced surname transcription errors in historic census data, and processed millions of records using Pandas, NumPy, and Epitran

EDUCATION

B.S. Mathematics | Brigham Young University

April 2023

Minors: Computer Science, Linguistics, & Formal Logic

Provo, UT

- GPA: 3.9/4.0, 4-Year Full-Tuition Academic Scholarship, National Merit Scholarship
- Coursework including deep learning, predictive modeling, natural language processing, algorithm design & analysis

PUBLICATIONS

- [1] A. Shurtz, L. Sorenson, **B. Webb**, et al. *MMMC: A Massively Mult-way-aligned Multilingual Corpus*. In progress.
- [2] **B. Webb**, R. Meyur, S. Purohit. *IEEE Big Data '24*. Under review. [Link](#)
- [3] R. Meyur, S. Purohit, **B. Webb**. *AAAI-24 Workshop on AICS*, Feb 26, 2024, Vancouver, Canada. [Link](#)
- [4] T. Ashby, **B. Webb**, et al. *CHI '23*, April 23–28, 2023, Hamburg, Germany. [Link](#)

SKILLS

Computer Languages: C++, Python, Java, SQL, R (limited), TypeScript (limited)

ML Frameworks: PyTorch, JAX, NumPy, Pandas, SciPy, spaCy, scikit-learn, Hugging Face, OpenNMT, NLTK, Neo4j

Other Tools: Docker, Unix shell, Git, Android, Azure AI Services, Excel, Slurm, SSO, L^AT_EX, AWS (EC2 & SageMaker)

Foreign Languages: Slovak (proficient), Czech (proficient), Russian (basic reading ability)