Jay Royal Orten

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JayOrten • JayOrten

Education

Computer Science: Machine Learning Emphasis — **Brigham Young University**
Bachelors of Science, Provo, UT — *April 2025*
Full Tuition BYU Academic Scholarship (4 Years), GPA: 3.95

Research Interests

Improving the safety and robustness of deep learning models through **evaluation metrics**, **grounding**, and **mechanistic interpretability** techniques, in order to explicitly quantify internal **model knowledge and capabilities**.

Research & Professional Experience

Sandia National Laboratories
Research & Development Intern — *May 2024 - Current*

- Built high-performance computing research pipeline for generating large amounts of synthetic data in parallel, achieving 20x speedup on generation tasks
- Developed image processing features that vastly reduced memory consumption on open-source data annotation tool for large images, enabling low-grade consumer hardware to label 30GB+ images
- Implemented parallelization capabilities for an automatic model evaluation pipeline, facilitating efficient algorithm testing across many compute nodes

BYU DRAGN Lab
Research Assistant — *January 2023 - Current*

- Researched novel method for improved machine translation and controlled generation with language models via injected embeddings, composed first-author conference submissions
- Primary contributor on open-source research pipeline for efficiently training 1B+ parameter large language models on university HPC clusters, improving research productivity for several other lab projects
- Mentored research team of ten undergraduates, conducting in-depth evaluation of alternative attention mechanisms for language models to identify trade-offs in time and memory complexity
- Developed research proposals for reducing hallucinations in LLMs through probing and improving understanding through Natural Language Environments

BYU Bean Lab
Research Assistant — *September 2023 - April 2024*

- Researched novel method for semantic retrieval via the composition of translated text, improving quality of embedding-based search
- Worked with team to engineer research framework for text embedding investigation, including data analysis tools such as cosine similarity, clustering, and user studies
- Built and presented web tool for semantic search to Technology Division Director of Gospel Library, a scripture study app with over 10 million downloads

Lumen

Data Production Support Engineer Intern *June – August 2023*

- Acted as Hadoop Administrator over large scale production and development clusters, managing tools such as Hive, YARN, and Impala, and assisting developers and data scientists with their support tickets
- Coordinated with admin team to respond effectively to cluster and environment issues, achieving a near constant service up-time

FamilySearch

Software Engineer Intern *June – August 2022*

- Utilized Spring Boot, PostgreSQL and AWS to engineer scalable REST APIs in a CI/CD system, helping team to deliver products effectively in an Agile environment
- Provisioned Amazon S3 bucket and built endpoints for efficient image storage/retrieval via presigned URLs, allowing large amounts of metadata to be stored server-side
- Wrote a PySpark script for compiling lists of persons from a data collection of almost 70 million records, enabling app to display thousands of interesting cemetery sites

Research Outputs

Orten, J., Schurtz, A., & Fulda, N. (2024). Neuron-Level Language Tag Injection Improves Zero-Shot Translation Performance. *Manuscript in progress.*

Galbraith, D., Tappen, J., **Orten, J.**, Prisbrey, N., Jardine, K., Searle, J., Lin, R., Eardley, J., Seamons, C., & Fulda, N. (2024). Attention Evolution: A Comparative Analysis of Attention Variants. *Manuscript in progress.*

Orten, J., & Fulda, N. (2024). Improving Controlled Text Generation via Neuron-level Control Codes. *ICAART 2025. Under review.*

Orten, J. (2024, February). *Exploring Internal Representations in Language Models through Structured Language Environments*. BYU Student Research Conference, Provo, Utah.

Albrecht, R., Moore, G., **Orten, J.**, & Wright, B. (2024, February). *Exploring Scriptural Connections via Neural Text Embeddings*. BYU Student Research Conference, Provo, Utah.

Orten, J. (2023, February). *Controlling RNN Language Model Output via Distributed Input of Task Codes*. BYU Student Research Conference, Provo, Utah.

Technical Skills

Skilled in:

- Python
- Hugging Face
- Pandas
- AWS/GCP
- PyTorch
- HPC/Slurm
- Bash
- LaTeX

Experience with:

- Java
- C/C++
- Hadoop
- Docker

Coursework

- Deep Learning
- Machine Learning
- Language Modeling
- Artificial Intelligence
- Linear Algebra
- Probability
- Statistical Modeling
- Database Systems
- Data Structures
- Algorithm Design
- Computer Systems
- Advanced Algorithms