Jason Lunder

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Research Interests

Natural Language Processing, Artificial Intelligence, Machine Learning
Interested in utilizing structure-aware language representation, especially tree-based models that leverage linguistic structure.
Exploring how combining unstructured yet scalable linguistic representation and structured linguistic representation can improve efficiency, interpretability, and safety in AI systems.

Education

MS in Computer Science, Eastern Washington University Sep 2024 – Present

- Relevant Coursework: Machine Learning, Deep Learning, Advanced Algorithms, Parallelization and Cloud Computing, Data Mining
- GPA: 3.91

BS in Computer Science and Mathematics, Gonzaga University Aug 2019 – May 2023

- Relevant Coursework: Natural Language Processing, Machine Learning, Algorithms, DevOps

Research Experience

Graduate Research, Eastern Washington University Sep 2024 – Present

- Developing Tree Matching Networks (TMN) for ongoing thesis, a GNN architecture achieving 60.70% accuracy on SNLI benchmark (550K pairs), outperforming custom BERT baseline (35.38%) by 71%
- Built end-to-end data pipeline processing 7M+ sentences from WikiQS and AmazonQA using DiaParser and SpaCy with optimized embedding cache
- Implemented multi-objective InfoNCE loss for contrastive pretraining and 3-class NLI, enabling efficient learning with limited computational resources
- Identified scaling plateau in 36M-parameter model; thesis work investigates self-attention aggregation to replace mean pooling for improved scalability

Research Assistant, Gonzaga University Center for Complex Systems Oct 2020 – May 2023

- Developed novel lemma dependency tree-based machine translation system achieving ROUGE-1: 0.387, ROUGE-2: 0.092, ROUGE-L: 0.122 on English-Spanish translation
- Designed and trained 5 PyTorch models comprising complete translation pipeline: DiaParser, SpaCy, vector reduction, tree-to-tree, and tree-to-sequence models
- Built Dockerized REST API for model serving and bilingual tree-parallel dataset collection from human annotators
- Collaborated on research team of 4 students with 3 faculty advisors, presented proof-of-concept findings at Spokane Intercollegiate Research Conference 2021

Research Assistant, Gonzaga University HazARd Sep 2021 – Sep 2022

- Created a prototype system for real-time tripping hazard detection using Hololens and C#

Publications and Preprints

Lunder, J. (2025). *Tree Matching Networks for Natural Language Inference: Parameter-Efficient Semantic Understanding via Dependency Parse Trees.* arXiv preprint arXiv:2512.00204. https://arxiv.org/abs/2512.00204

Professional Experience

Founding Software/ML Engineer, Intellipat Inc. / Pangeon Corporation Jan 2024 – Present

- Led founding team of 5 developers building AI infrastructure for patent prior art search, processing 10K+ patents per search query
- Architected full-stack NLP pipeline combining sentence embeddings and LLMs, reducing prior art search time from 2 weeks to 3-4 hours (95%+ reduction)
- Built scalable cloud infrastructure on AWS/GCP with microservices architecture supporting enterprise patent law firms
- Implemented SOC 2 Type I compliance controls across authentication, data encryption, and audit logging; designed systems for novelty and invalidity search

Graduate Student Assistant (Teaching Assistant), Eastern Washington University Sep 2024 – Present

- Teaching assistant for computer science courses
- Assist with grading, lab sessions, and student support

Data Science Intern, Gestalt Diagnostics Jun 2022 – May 2023

- Contributed to team winning 1st place in 2022 ACROBAT Grand Challenge, achieving 98.97% mean distance reduction on tissue alignment
- Investigated OpenGlue architecture for keypoint registration on whole-slide images, implementing training pipeline with synthetic affine transformations
- Trained computer vision models on ¿400GB datasets of histology images for multi-stain tissue alignment and pathologist workflow integration
- Presented regular research findings to team including lead scientist Dr. Christian Marzahl, evaluating model viability against production baselines

Projects

Parsimony (p7y.ai) Jun 2024 – Present

- Team lead for designing and interacting with enhanced dependency trees in NLP

GU Robotics Team Sep 2019 – May 2023

- Led CS/ML subgroup; rebuilt ROS-based control systems reducing rover setup time by 90%

Technical Skills

Python, C++, PyTorch, TensorFlow, NLP, CV, Docker, AWS, Linux, MySQL, Redis, TypeScript, DevOps

Awards and Honors

- Cum Laude – Gonzaga University, 2023
- McDonald Research Work Award, 2020
- AP Scholar with Distinction, 2019
- Eagle Scout, 2018