Hugh Flournoy Van Deventer V

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EDUCATION

Harvard University **Expected May 2027**
S.M. Data Science *Boston, MA*

University of Michigan **May 2025**
B.S. Mathematics & Interdisciplinary Physics, Minor: Computer Science GPA: 3.9 *Ann Arbor, MI*

EXPERIENCE

Honeywell **June. 2025 − PRESENT**
AI/ML Engineering Intern *Atlanta, GA*
- Developing **computer vision** and **OCR**-based floor plan digitization system for automated corporate building bidding pipeline, enabling downstream sensor placement optimization and cost estimation.
- Leading R&D evaluation of **open-source**, **academic**, and **foundation models** for floor plan semantic segmentation.
- Identified brittleness of heuristic-based segmentation on corporate floor plans and proposed labeled dataset creation with polygon based room representations to enable efficient human corrections, supervised model training, and quantitative evaluation metrics.

UM Center for Academic Innovation **Oct. 2023 − PRESENT**
Data Science Fellow *Ann Arbor, MI*
- Developed novel two-stage **RAG methodology** addressing semantic gap in retrieval by generating ideal descriptions as intermediate query representations, improving course recommendation relevance over direct embedding similarity.
- Built and deployed **LLM-powered course recommender** (**FastAPI**, **AWS**) serving **10K+ courses** to university community, with bias analysis and network visualization validating embedding space semantic relationships across academic domains.
- Led research culminating in **first-author publication** and collaboration with Michigan Online for professional certification recommendations. Currently developing advanced **agentic search capabilities** with constraint extraction (prerequisites, distribution requirements, scheduling) and multi-vector search for complex queries.

Michigan Tech Research Institute **May. 2024 − Aug. 2024**
Machine Learning Research Intern *Ann Arbor, MI*
- Led literature review on ML for super resolution and image registration for a **Ford** automotive camera project.
- Designed and trained a CNN with a custom loss function to predict warping parameters for 128x128 image chips, reducing LBFGS optimizer iterations by **30%** and accelerating image registration processing times.
- Implemented framework enabling custom gradients for functions incompatible with MATLAB autodifferentiation.

Neurabuild **Jul. 2023 − Aug. 2023**
Machine Learning Intern *Capetown, South Africa*
- Developed ML solutions to automate sky visibility for portable astronomical sites, including a W-net for semantic segmentation of clear vs. cloudy skies and a CNN classifier achieving **95%** accuracy in night sky condition detection.
- Improved existing neuromorphic satellite detection and tracking model performance by **10%** using edge detection and KerasTuner for hyperparameter optimization.

PUBLICATIONS AND PRESENTATIONS

"From Interests to Insights: An LLM Approach to Course Recommendations Using Natural Language Queries"
- First author, presented poster at MIDAS x ADSA Annual Data Science and AI Summit, Michigan AI Lab AI Symposium, and MIDAS Mini-symposium: "Generative AI: From Theory to Scientific Applications" (2024).

PROJECTS

Unembedding Steering in Large Language Models | *PyTorch, Transformers, Mechanistic Interpretability*
- Developed novel steering method using averaged token unembedding vectors, comparing against linear probing and CAA on Gemma-2-2b with contrastive evaluation framework. Demonstrated competitive performance with learned methods while requiring no training, revealing alignment between token representations and internal model activations.

optiMaizer: Optimization Algorithm Benchmarking Suite | *Python, Numerical Optimization, Performance Analysis*
- Implemented and benchmarked 10 optimization algorithms including Newton methods, trust region, and quasi-Newton variants across diverse test functions. Conducted systematic L-BFGS memory analysis revealing intermediate memory sizes often outperform large configurations on complex landscapes.

SHLIME: Adversarial Robustness for Explainable AI | *Python, Adversarial ML, XAI*
- Replicated adversarial attacks against LIME and SHAP, developing novel combined defense method improving robustness while maintaining explanation quality.

TECHNICAL SKILLS

Languages: Python, C++, Matlab, TypeScript, SQL, LaTeX | **Dev/Cloud Tools**: Git, Docker, AWS (ECS, S3), MLflow, Weights & Biases, Google Cloud, Azure ML, CUDA
Frameworks/Libraries: PyTorch, TensorFlow, Transformers, Hugging Face, LangChain, OpenAI API, Scikit-learn, XGBoost, Pandas, NumPy, SciPy, Matplotlib, Plotly, Jupyter, FastAPI, React