Hugh Flournoy Van Deventer V

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EDUCATION

University of Michigan **Expected May 2025**

B.S. Mathematics & Interdisciplinary Physics, Minor: Computer Science GPA: 3.8 *Ann Arbor, MI*

Relevant Coursework: Machine Learning, Continuous Optimization, Linear Optimization, Numerical Linear Algebra, Theoretical Statistics, Complex Systems Modeling, Computational Physics, Probability Theory.

EXPERIENCE

UM Center for Academic Innovation **Oct. 2023 – PRESENT**

Data Science Fellow *Ann Arbor, MI*

- Developed an AI course recommendation system utilizing **Large Language Models** (LLMs) and **Retrieval Augmented Generation** (RAG) to facilitate equitable access to information for students during course selection.
- Deploying recommender system with **React** frontend and **FastAPI** backend using **AWS** containerized architecture (Elastic Beanstalk, EC2, Docker), serving **50,000+** potential users.
- Developed bias testing framework to evaluate recommendation fairness across demographic groups and vulnerability to adversarial behavior.
- Created a statistics and network visualization framework to facilitate analysis of language and semantic relationships between departments and courses to validate embedding space and recommendation logic.

Michigan Tech Research Institute **May. 2024 – Aug. 2024**

Research Intern *Ann Arbor, MI*

- Conducted an extensive literature review on Machine Learning applications for super resolution and image registration in inverse problems, contributing to a **Ford** project for real-time image reconstruction in automotive cameras.
- 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.
- Developed a framework to convert complex loss functions with incompatible gradients for use with MATLAB auto-differentiation, enabling effective training of models using pixel-based loss between warped and true images.

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 paper in preparation for submission to ACM Transactions on Recommender Systems.
- Presented poster at the 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).

UNIVERSITY OUTREACH

Physics Department Peer Advisor: Helping fellow students navigate the Physics Department and University.
Athletics Department Tutor, Wolverine Tutors: Provided STEM tutoring for athletes and K-12 students.
Esports Team Captain: Played and provided coaching for Overwatch Team. Individually reached **rank 2** in the Americas. Led team to multiple **first place** finishes in local tournaments.

TECHNICAL SKILLS

Languages: Python, C++, Matlab, SQL, LaTeX
Frameworks/Libraries: PyTorch, TensorFlow, Scikit-learn, XGBoost, NetworkX, Pandas, NumPy, einops, Matplotlib, Seaborn, Plotly, Node.js, React, FastAPI, Gurobipy
Developer/Cloud Tools: Git, MLflow, Docker; AWS, Google Cloud, Azure ML