VU ANH LE

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EDUCATION

Beloit College   Beloit, Wisconsin
Bachelor of Science, Mathematics   *Aug 2021 - May 2025*
Relevant Coursework: Discrete Mathematics, Linear Algebra, Mathematical Statistics, Differential Equations, Complex Analysis, Object-oriented Programming, Data Structures and Algorithms, Mathematics Colloquium

RESEARCH INTERESTS

Numerical Analysis, Mathematics of Data, Scientific Computing

ARTICLES AND PREPRINTS

1. Le, Vu Anh, and Dik, Mehmet. "A Mathematical Analysis of Neural Operator Behaviors." *arXiv,* (Oct 29, 2024). **[Preprint]**

2. Le, Vu Anh, Wainwright, Haruko, Gonzalez-Raymat, Hansell, and Eddy-Dilek, Caroll. "Machine Learning Algorithms to Access Site Closure Time Frames for Soil and Groundwater Contamination." **[Preprint]**

3. Vu, Thi Phuong Thao, and **Le, Vu Anh**. "Computational Modelling of Climate Change Impacts on Flood Inflows Using Remote Sensing and SAWT: A Case Study Of Ban Chat Reservoir, Northern Vietnam." *EarthArXiv,* (Oct 21, 2024). **[Preprint]**

4. Vu, Thi Phuong Thao, Dang, Truong Giang, and **Le, Vu Anh**. "Reliability Assessment of Land Subsidence Monitoring Results Using PSI Technique in Ho Chi Minh City, Vietnam." *International Journal of Environmental Studies 81,* no. 2 (March 3, 2024): 881–95. **[Article]**

5. Le, Quoc Hung, Vu, Thi Tuyet, Vuong, Trong Kha, and **Le, Vu Anh**. "Applying Technical Regulations of IPCC for Landcover Data used to Estimate Carbon Emission in Vietnam." *Journal of Science on Natural Resources and Environment,* no. 29 (March 22, 2020): 36–41. **[Article]**

RESEARCH EXPERIENCE

Google Research   Remote
Student Researcher, B.S.   *Aug 2024 - Present*
- **Research Advisors:** [Jake Garrison (Google Research)] and [Prof. Mehmet Dik (Beloit College)].
- Developed a mathematical framework for analyzing the behaviors of neural operators. This framework provides theoretical guarantees on stability, exponential convergence, and generalization.
- Applied the proposed framework in designing a case study model for solving complex partial differential equations. Compared with the state-of-the-art works, it achieves 93% accuracy with 15% fewer training epochs.

Massachusetts Institute of Technology   Cambridge, Massachusetts
Research Assistant, Department of Nuclear Science and Engineering   *Aug 2023 – Present*
Intern, MIT Summer Research Program - General   *June 2024 - Aug 2024*
- **Research Advisor:** [Prof. Haruko Murakami Wainwright].
- Integrated two machine learning models (i.e., Random Forest and Bidirectional LSTM models) in the contaminant monitoring software for nuclear material safety supervision.
- Achieved 97.7% accuracy in predicting the time taken for nuclear analyte concentration to drop to safety levels.

Vietnam's Ministry of Natural Resources and Environment — Hanoi, Vietnam
Research Assistant and Compliance Reporter, Remote Sensing Department — *April 2020 - Present*
- **Research Advisor:** [Dr. Le Quoc Hung].
- Adopted SAR data and interferometric processing to monitor human-induced land deformation, achieving a 1-meter resolution accuracy in generated maps.
- Presented the results to the government and National Assembly on the effects of the deformation processes, hydroelectric power, and mining operations.

Massachusetts Institute of Technology — Remote
Summer Fellow, Station1 Frontiers Fellowship — *June 2023 - Aug 2023*
- **Research Advisor:** [Prof. Christine Ortiz].
- Conducted the comparative analysis of carbon emissions between biodegradable materials (BM) and traditional plastics, finding that BM reduced 4.57 kg of carbon emissions per packaging unit.

University of Tokyo — Kashiwa, Chiba, Japan
Summer Intern, Graduate School of Frontier Sciences — *April 2022 - Aug 2022*
- **Research Advisor:** [Prof. Frith Martin].
- Developed a sorting algorithm using dynamic programming and hidden Markov models (HMMs) to identify regions responsible for certain disease mechanisms.
- Implemented maximum likelihood estimation for parameter tuning in HMMs for efficient disease mechanism detection.

SELECTED AWARDS AND HONORS

Presidential Scholarship, Beloit College, Awards 48,000 USD annually — *Aug 2021 - May 2025*
Board of Trustees Grant, Beloit College, Awards 10,000 USD annually — *Aug 2021 - May 2025*
Dean's list, Beloit College — *Every semester*
MIT Summer Research Program, Massachusetts Institute of Technology, Fully funded — *June 2024*
Weissberg Human Rights Grant, Weissberg Foundation, Awards 1,000 USD — *March 2024*
Semifinalist, InSPiR2eS Global Pitching Research Competition 2023 (IGPRC 2023) — *Jan 2024*
Station1 Frontiers Fellowship, Massachusetts Institute of Technology, Awards 13,500 USD — *June 2023*
National Research Grant, Vietnam's Ministry of Finance, Awards 10,000 USD — *Jan 2023*
Friends of UTokyo Scholarship, University of Tokyo, Awards 4,000 USD — *April 2022*

PRESENTATIONS

1. Le, Vu Anh."Mathematical Foundations of Neural Operators."
- National Conference on Undergraduate Research 2025, *Pittsburgh*, April 2025
- 38th Annual Pi Mu Epsilon Undergraduate Regional Conference, *St. Norbert College*, Nov 2024
- Beloit and Beyond Conference, *Beloit College*, Nov 2024

2. Le, Vu Anh. "Machine Learning Algorithms to Assess the Site Closure Time Frame for Soil and Groundwater Contaminated Sites."
- AGU Annual Meeting 2024 at Washington D.C., *American Geophysical Union*, Dec 2024
- Midstates Physical Sciences, Mathematics and Computer Science Undergraduate Research Symposium, *University of Chicago*, Nov 2024
- Beloit and Beyond Conference, *Beloit College*, Nov 2024
- MIT Summer Research Program Conference, *Massachusetts Institute of Technology*, Aug 2024

3. Le, Vu Anh. "Reliability Assessment of Land Subsidence Monitoring Results Using PSI Technique in Ho Chi Minh City, Vietnam."
- Midstates Physical Sciences, Mathematics and Computer Science Undergraduate Research Symposium, *University of Chicago*, Nov 2023
- Beloit College STEM Poster Session, *Beloit College*, Sep 2023

SKILLS

Programming and Software: Python, Java, MATLAB, R, LaTeX, QGIS, PostgreSQL, PostGIS, ArcGIS

Libraries and Frameworks:
- **_Python:_** NumPy, SciPy, TensorFlow/PyTorch, Keras, scikit-learn, SymPy, Theano, JAX, Dask, Cvxpy, PySPH, Pyomo, pymc3, xarray, Numba, mpi4py, Matplotlib, SciencePlots, Pandas, SimPy, geopandas, shapely, Fiona, SEABORN, rasterio, Brigthway2, PyLEnM, folium
- **_MATLAB:_** Simulink, Optimization Toolbox, Global Optimization Toolbox, Parallel Computing Toolbox, Partial Differential Equation Toolbox, Symbolic Math Toolbox, Statistics and Machine Learning Toolbox, Deep Learning Toolbox, Image Processing Toolbox, Curve Fitting Toolbox
- **_R:_** Matrix, pracma, deSolve, nloptr, minipack.lm, rootSolve, caret, foreach, xgboost, ggplot2, dplyr, tidyr

ADDITIONAL EXPERIENCE

Legal Initiatives for Vietnam   Remote
Paralegal Assistant   *Dec 2023 - Present*
- Conduct legal research on the current political strategies and policies implemented by Vietnamese authorities.
- Publish opinions on critical political issues via the affiliated newspaper "Luat Khoa Tap Chi".

Beloit Math and Computer Science Club   Beloit, Wisconsin
Co-founder and President   *Aug 2021 - May 2023*
- Updated students on field-related opportunities such as research projects, internships, and employment.
- Set preparatory sessions for undergraduate competitions like the Mathematical Contest in Modeling and Putnam

Beloit College   Beloit, Wisconsin
Division III Athlete, Cross Country Team   *Aug 2021 - May 2023*

REFERENCES

Haruko Murakami Wainwright
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