

VU-ANH LE

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RESEARCH INTERESTS & SKILLS

Research Interests: Mathematics of Data, Numerical Methods, Foundations of Machine Learning

Programming Languages and Software: Python, C++, Java, MATLAB, R, L^AT_EX, QGIS, PostGIS, ArcGIS

EDUCATION

Beloit College

Bachelor of Science, Mathematics, GPA: 3.74/4.00

Relevant Coursework: Mathematical Statistics, Differential Equations, Complex Analysis, Topology, Algorithm Design and Analysis, Data Mining

Beloit, Wisconsin

Aug 2021 - May 2025

ARTICLES AND PREPRINTS

1. **Le, Vu-Anh** and Dik, Mehmet, “The Stability of Persistence Diagrams Under Non-Uniform Scaling,” in *arXiv*, Nov 2024
2. **Le, Vu Anh**, and Dik, Mehmet, “How Analysis Can Teach Us the Optimal Way to Design Neural Operators,” in *Proceedings of International Mathematical Sciences*, Nov 2024 (Accepted for publication, the full paper version is available on *arXiv*)
3. **Le, Vu Anh**, and Dik, Mehmet, “A Mathematical Analysis of Neural Operator Behaviors,” in *arXiv*, Oct 2024. (Accepted as a chapter to the book issue *Advances in Quantum Calculus and Functional Analysis*, CRC Press, Taylor & Francis Group)
4. **Le, Vu Anh**, Wainwright, Haruko, Gonzalez-Raymat, Hansell, and Eddy-Dilek, Carroll, “Machine Learning Algorithms to Assess Site Closure Time Frames for Soil and Groundwater Contamination,” in *arXiv*, Nov 2024
5. Vu, Thi Phuong Thao, and **Le, Vu Anh**, “Computational Modelling of Climate Change Impacts on Flood Inflows Using Remote Sensing and SAWT,” in *EarthArXiv*, Oct 2024
6. 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,” in *International Journal of Environmental Studies*, March 2024
7. 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,” in *Journal of Science on Natural Resources and Environment*, March 2020

RESEARCH EXPERIENCE

Google Research

Student Researcher, B.S.

Remote

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. That framework provided theoretical guarantees on stability, exponential convergence, and generalization. Detailed results in: [1](#) and [2](#).
- Applied the proposed framework in designing a case study model for solving complex partial differential equations. Compared with the state-of-the-art works e.g. DeepONet, it requires **15% fewer epochs**.

Massachusetts Institute of Technology

Research Assistant, Department of Nuclear Science and Engineering

Intern, MIT Summer Research Program - General

Cambridge, Massachusetts

Aug 2023 - Present

June 2024 - Aug 2024

- **Research Advisor:** [Prof. Haruko Murakami Wainwright](#).
- Integrated two machine learning models, namely Random Forest and Bidirectional LSTM, into the Python-based computational chemistry library PyLEnM to monitor the behavior of toxic analytes.
- Achieved **97.7% accuracy** in predicting the time taken for analyte concentration to drop to safety levels. Detailed results in: [3](#).

Vietnam's Ministry of Natural Resources and Environment
Research Assistant and Compliance Reporter, Remote Sensing Department

Hanoi, Vietnam
April 2020 - Present

- **Research Advisor: Dr. Le Quoc Hung.**
- Adopted SAR data and developed standardized software tools integrating computational models for monitoring human-induced land deformation. The most recent project achieved a **1-millimeter resolution** in generated maps. Detailed results in: [4](#), [5](#), and [6](#).
- Presented the results to the government and National Assembly on the effects of the deformation processes, hydroelectric power, and mining operations.

University of Tokyo
Summer Intern, Graduate School of Frontier Sciences

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

SELECTED PRESENTATIONS

1. "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. "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

ADDITIONAL EXPERIENCE

Legal Initiatives for Vietnam
Paralegal Assistant

Remote
Dec 2023 - Present

- Conducted legal research on the current political strategies and policies implemented by Vietnamese authorities.
- Published opinions on critical political issues via the affiliated newspaper "Luat Khoa Tap Chi."

Beloit Math and Computer Science Club
Co-founder and President

Beloit, Wisconsin
Aug 2021 - May 2023

- Updated students on field-related opportunities such as research projects, internships, and employment.
- Set preparatory sessions for academic competitions like the Mathematical Contest in Modeling and Putnam.