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[Personal Website](#) • [ORCID](#) • [LinkedIn](#)

RESEARCH INTERESTS & SKILLS

Research Interests: Computational Learning Theory, Geometric Methods, Numerical Methods

Programming Languages and Software: Python, C++, Java, MATLAB, Haskell, Lisp, Coq, Isabelle, Lean, Git

EDUCATION

Beloit College

Beloit, Wisconsin

Bachelor of Science, Mathematics, GPA: 3.74/4.00

Aug 2021 - May 2025

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

ARTICLES AND PREPRINTS

1. **Le, Vu Anh** and Dik, Mehmet, “Topology-Preserving Scaling in Data Augmentation,” in [arXiv](#), Nov 2024
2. **Le, Vu Anh** and Dik, Mehmet, “The Stability of Persistence Diagrams Under Non-Uniform Scaling,” in [arXiv](#), Nov 2024
3. **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](#))
4. **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)
5. **Le, Vu Anh**, Wainwright, Haruko, Gonzalez-Raymat, Hansell, and Eddy-Dilek, Caroll, “Machine Learning Algorithms to Assess Site Closure Time Frames for Soil and Groundwater Contamination,” in [arXiv](#), Nov 2024
6. 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
7. 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
8. 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

Remote

Student Researcher, B.S.

Aug 2024 - Present

- **Research Advisors:** [Jake Garrison \(Google Research\)](#) and [Prof. Mehmet Dik \(Beloit College\)](#).
- Developed a mathematical framework to analyze the behaviors of neural operators, focusing on these aspects:
 - **Stability:** Established bounds for neural operators using **Lipschitz continuity conditions**.
 - **Convergence:** Proved exponential convergence via the **Banach Fixed Point Theorem**.
 - **Clustering Behavior:** Analyzed long-term solution dynamics through **gradient flow interpretation**.
 - **Universality:** Extended the **Universal Approximation Theorem** and **Stone-Weierstrass Theorem** to demonstrate the approximation capabilities of neural operators.
- Provided **theoretical guarantees** on **stability, exponential convergence, and generalization**. Detailed results published in the following papers [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

Cambridge, Massachusetts

Intern, MIT Summer Research Program - General

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. Outperformed baseline models e.g. linear regression and univariate LSTMs with accuracies between 70–85%.

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 developed standardized software tools integrating computational models for monitoring human-induced land deformation. This year's project achieved a **1-millimeter resolution** in generated maps.

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 targeted disease mechanisms.

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

SELECTED PRESENTATIONS

1. "Mathematical Foundations of Neural Operators."

- Infinite Possibilities Conference, *Institute for Mathematical and Statistical Innovation (University of Chicago)*, April 2025
- National Conference on Undergraduate Research 2025, *Pittsburgh*, April 2025
- 38th Annual Pi Mu Epsilon Undergraduate Regional Conference, *St. Norbert College*, Nov 2024

2. "Machine Learning Algorithms to Assess the Site Closure Time Frame for Toxic Analytes."

- AGU Annual Meeting 2024 at Washington D.C., *American Geophysical Union*, Dec 2024
- Midstates Physical Sciences, Mathematics and Computer Science Undergraduate Research Symposium, *Washington University in St. Louis*, Nov 2024
- MIT Summer Research Program Conference, *Massachusetts Institute of Technology*, Aug 2024

ADDITIONAL EXPERIENCE

Legal Initiatives for Vietnam

Remote

Paralegal Assistant

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

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 academic competitions like the Mathematical Contest in Modeling and Putnam.