VU ANH LE

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EDUCATION

Beloit College Beloit, WI
Bachelor of Science, Mathematics. Grade: 4.0/4.0
Relevant Coursework: Introduction to Proofs, Calculus I/II, Discrete Mathematics, Linear Algebra, Mathematical Statistics, Differential Equations, Complex Analysis, Mathematics Colloquium, Object-oriented Programming, Data Structures and Algorithms, University Physics I/II, General Chemistry, Human Biology

PUBLICATIONS

1. 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. **[Manuscript URL]**

2. Vu, Thi Phuong Thao, Le, Vu Anh, and Kalibbala, Martin. "Estimating the impact of climate change on flood-flow patterns into the Ban Chat Reservoir, Northern Vietnam." *Under peer-review.* **[Manuscript URL]**

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 *June 2024*
Semi Finalist, 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, The University of Tokyo, Awards 4,000 USD *Jun 2022*
Third Prize (Bronze Medal), Vietnam Mathematical Olympiad *Dec 2019*

RESEARCH EXPERIENCE

Massachusetts Institute of Technology Cambridge, MA
Research Assistant, Department of Nuclear Science and Engineering *Aug 2023 – Present*
Incoming Intern, Summer Research Program - General *June 2024 - Aug 2024*

- **PI**: Prof. Haruko Murakami Wainwright.
- **Project:** Modeled groundwater flow and contaminant transport dynamics in local watersheds near the Savannah River Site, a Department of Energy-owned nuclear materials Superfund site. Analyzed the impact of factors such as aquifer characteristics and well depth on contaminant migration.
- **Methods:** Employed the PyLEnM package for numerical simulations, utilizing partial differential equations (PDEs) like the advection-dispersion equation to model groundwater flow patterns. Incorporated factors such as hydraulic conductivity, porosity, dilution, and absorption. Used Principal Component Analysis (PCA) to identify key trends in environmental data for improved monitoring.
- **Techniques:** Implemented random forest regression to identify key factors affecting contaminant concentration variations. Currently exploring a combined convolutional neural network (CNN) and long short-term memory (LSTM) model with attention mechanisms for time-series forecasting of contaminant levels, aiming to improve prediction accuracy and reduce frequency of field sampling.

Vietnam's Ministry of Natural Resources and Environment Hanoi, Vietnam
Research Assistant and Compliance Reporter, Remote Sensing Department *April 2020 - Present*

- **PI**: Dr. Le Quoc Hung.
- **Project:** Monitoring land deformation processes in Vietnam territories.
- **Techniques:** Established image networks using Synthetic Aperture Radar (SAR) data to monitor ground movements. Performed interferometric processing to analyze phase shifts, revealing land deformation patterns. Formulated models for primary and secondary displacement. Employed kriging, a geostatistical technique, to validate displacement maps. Utilized finite element methods (FEM) to simulate deformation processes caused by groundwater extraction, hydraulic fracturing, and mining activities.

Massachusetts Institute of Technology Remote
Summer Fellow, Station1 Frontiers Fellowship *June 2023 - Aug 2023*

- **PI**: Prof. Christine Ortiz.
- **Project:** Quantifying Carbon Footprint Reduction Potential of Biodegradable Materials using Life Cycle Assessment (LCA).
- **Focus:** Applied LCA methodology to quantify the environmental benefits of biodegradable materials compared to traditional alternatives, specifically investigating polylactic acid (PLA).
- **Methods:** Employed the ReciPe model for LCA, which utilizes impact assessment methods and normalization factors to translate various environmental impacts into a single score or set of sub-scores, allowing for comparative analysis between materials.

University of Tokyo Kashiwa, Chiba, Japan
Summer Intern, Graduate School of Frontier Sciences *April 2022 - Aug 2022*

- **PI**: Prof. Frith Martin.
- **Project:** Development of a sorting algorithm for orthologous region identification in genomic datasets.
- **Focus:** The algorithm focused on identifying orthologous regions in human genomes. Orthologous regions are genes with similar sequences and functions across different species.
- **Methods:** Developed a sorting algorithm utilizing dynamic programming and hidden Markov models (HMM) to enhance accuracy and efficiency of ortholog identification. Implemented maximum likelihood estimation (MLE) for parameter tuning in HMM, optimizing its performance.

Beloit College Beloit, WI
Research Assistant, Department of Biology *Aug 2021 - May 2023*

- **PI**: Rachel Bergstrom.
- **Project:** Optimizing machine learning algorithms for seizure detection using EEG datasets.
- **Focus:** Improved the accuracy of seizure detection in scalp EEG datasets through a research partnership with the University of Wisconsin-Madison.
- **Techniques:** Developed improved seizure prediction models using logistic regression and recurrent neural networks (RNNs), specifically focusing on long short-term memory (LSTM) networks. Implemented cross-validation techniques to ensure model robustness and generalizability across different datasets.

VOLUNTEER AND OUTREACH

Legal Initiatives of Vietnam Remote
Paralegal Assistant *Dec 2021 - Present*

- Conduct legal research on the current political strategies and policies implemented by Vietnamese authorities.

Beloit Math and CS Club Beloit, WI
Co-founder and President *Aug 2021 - Present*

- 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, WI
Division III Athlete, Cross Country Team *Aug 2021 - Present*

PRESENTATIONS

1. 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

2. Le, Vu Anh. "Life Cycle Assessment of Biodegradable Plastic Packaging Subject to Comprehensive Organic Sorting.

- Midstates Biological Sciences and Psychology Undergraduate Research Symposium, *Washington University at St. Louis*, Nov 2023
- American Physician Scientist Association - Midwest Regional Meeting, *Saint Louis University School of Medicine*, Oct 2023
- Station1 Frontier Fellowship Capstone Poster Event, *Station1*, Aug 2023
- Beloit College STEM Poster Session, *Beloit College*, Sep 2023

SKILLS & INTERESTS

Research Interests: Partial Differential Equations, Numerical Linear Algebra, Autonomous Scientific Discovery
Programming and Software: Python, MATLAB, R, LaTeX, QGIS, PostgreSQL, PostGIS, ArcGIS
Libraries and Frameworks:

- ***Python:*** NumPy, SciPy, Matplotlib, TensorFlow/PyTorch, Pandas, SimPy, geopandas, shapely, Fiona, SEABORN, rasterio, Brigthway2, PyLEnM, sscikit-learn, folium
- ***MATLAB:*** Simulink
- ***R:*** ggplot2, dplyr, tidyr

REFERENCES

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