Thanh Le

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SUMMARY

Mathematics PhD candidate studying transformer expressiveness and random graph theory, with industry experience developing computer vision models. Seeking roles in AI research, such as AI safety and alignment, AI for math & sciences, AI for healthcare.

EDUCATION

University of Nebraska-Lincoln, *PhD in Mathematics*	(GPA = 4.00)	**Expected May 2027**
University of Nebraska-Lincoln, *MS in Mathematics*	(GPA = 4.00)	**2023**
Fairfield University, *BS in Computer Science and Mathematics*	(GPA = 3.90, summa cum laude)	**2022**

RESEARCH & PROFESSIONAL EXPERIENCE

University of Nebraska-Lincoln: Lincoln, NE **2025 – Present**
Graduate Research Assistant

- Conduct research on pure math and theoretical computer science to advance the theory of deep learning and probabilistic combinatorics.
- Work independently and collaborate with 4 researchers to solve conjectures; present results in seminars and conferences.
- Co-organized department's research seminar on discrete math; corresponded with outside speakers.

Ocuvera LLC: Lincoln, NE **Summer 2026**
Computer Vision Research Intern, Haight Intern Fellow

- Developed deep learning models in PyTorch to estimate bed pressure from depth images, with the goal of supporting pressure injury prevention.
- Developed an automated bed detection and cropping pipeline by training and testing on ~10,000 hospital-room frames.
- Trained and evaluated convolutional neural networks and vision transformers (on 200,000 bed frames) for pressure estimation, comparing performance using mean squared error and structural similarity.

University of Nebraska-Lincoln: Lincoln, NE **2022 – 2024**
Graduate Teaching Assistant

- Taught three undergraduate mathematics sections and led five Calculus II recitation sections (semester-based, about 30 students per section) using the active learning approach.
- Collaborated with teaching team to design lessons, strengthen materials, and ensure consistent grading.

VietESoft JSC: Hanoi, Vietnam **2020 – 2021**
Software Engineer Intern

- Designed and implemented server-side pages, APIs, and SQL databases for 3 websites by ASP.NET Core.
- Collaborated with front-end developers to complete and deliver websites to customers.

PUBLICATIONS & MANUSCRIPTS

[1] **Thanh Le**, A. Pavan, and N. V. Vinodchandran. *A Tight Hierarchy for Chain of Thought*. Advances in Neural Information Processing Systems (**NeurIPS 2026**). To appear.

- Proved a hierarchy theorem separating the computational power of transformers with different chain-of-thought length budgets.

[2] **Thanh Le**, A. Pavan, Xavier Pérez-Giménez, and N. V. Vinodchandran. *Cliques, Quasi-Cliques, and Bicliques in Random Graphs: Sampling and Algorithms*. Submitted, 2026.

- Found a sampling-based algorithm with improved running time to find large cliques in Erdős-Renyi random graphs. Extended the algorithm to a related random bipartite graph model.

[3] Derek DeBlieck, **Thanh Le**, and Xavier Pérez-Giménez. *Hamilton cycles with a periodic pattern in random digraphs with minimum total degree at least 2*. In preparation, 2026.

- Established thresholds for the existence of Hamilton cycles with prescribed periodic edge-orientation patterns in a conditioned random digraph model.

SELECTED PROJECTS

Heston Model and Simulation – *Final Project for Erdős Institute's Quant Finance Bootcamp* **2026**

- Implemented European call option pricing under the Heston stochastic-volatility model in Python using numerical integration and Monte Carlo simulation.
- Simulated 100,000 asset-price paths with correlated stochastic variance; obtained agreement within one Monte Carlo standard error of the formula-based price in a benchmark example.
- Wrote an accompanying exposition explaining stochastic calculus, the Heston model, and its numerical discretization. [LINK]

EEG Memory Analysis by Machine Learning methods – *Fairfield University* **2021 – 2022**

- Studied EEG time-series data (~600 files, on 20+ human subjects) to predict human memory (true vs false) and vision.
- Engineered features using frequency/complexity metrics; trained ML classifiers (Random Forest, Naive Bayes…) in scikit-learn.
- Delivered model performance comparisons; presented findings and discussed with team to infer models' outcomes. [LINK]

SKILLS & CERTIFICATIONS

- Languages & Frameworks: Python, MATLAB, C#, Java, Haskell, Mathematica, ASP.NET, LaTeX, React, Lean
- Python Libraries: PyTorch, TensorFlow, Pandas, Scikit-learn, Matplotlib
- Machine Learning: CNN, ResNet-UNet, GAN, Vision Transformer, SAM, YOLO OBB
- Skills: Claude Code, Monte Carlo simulation, data labeling, transfer learning, SQL
- Certifications: Deep Learning (2025), AI Agents (2025), Machine Learning (2023), Trading Basics (2025), Quant Finance (2026)

HONORS & AWARDS

Haight Intern Fellowship ($5,000), UNL Math Department **2026**
Lloyd Jackson Award (awarded annually to one student based on scholarship), UNL Math Department **2024**
Outstanding Qualifying Exam Award, UNL Math Department **2023**
Outstanding Achievement in Mathematics, Fairfield University Math Department **2022**
Rank 193rd of 2,975 participants (top 7%), Putnam Competition **2021**
Research and Travel Grant, Fairfield University (supported study abroad in Florence, Italy) **2019**
Third Prize, Vietnam Mathematical Olympiad **2017**