

# Duc-Anh Nguyen

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## RESEARCH INTEREST

My research aims to uncover the fundamental mathematical principles governing state-of-the-art foundation models, leveraging these theoretical insights to build the next generation of efficient, interpretable, and robust Large Language Models (LLMs) and Vision-Language Models (VLMs).

## EDUCATION

- **Hanoi University of Science and Technology (HUST)** Oct 2020 – Sep 2024  
*B.S. in Mathematics and Informatics (Talented Program)* Hanoi, Vietnam
  - **Valedictorian** (Ranked 1st), CGPA: 3.92/4.00.
  - Scholarships for students with excellent academic achievement (**All semesters**).
  - Thesis: Steepest Descent for Multi-Objective Optimization and Machine Learning Applications (**Best Presentation Award**).

## RESEARCH EXPERIENCE

- **AI Research Resident** Mar 2024 – Present  
*VinAI Research (acquired by Qualcomm)* Hanoi, Vietnam
  - Supervisor: **Dr. Toan Tran**.
  - Research Topic: Efficiency, Interpretability, and Robustness of Foundation Models (Sparse Mixture of Experts, Transformers and State-Space Models).
- **Research Student** Aug 2022 - Aug 2024  
*Modeling, Simulation and Optimization in Data Science (HATLAB), HUST* Hanoi, Vietnam
  - Supervisor: **Dr. Thang Tran Ngoc**.
  - Research Topic: Multi-objective Optimization in Machine Learning.

## PUBLICATIONS & PATENTS (ORCID: 0009-0009-0528-8430)

(\*) denotes equal contribution

1. **Artificial Intelligence in Metal Additive Manufacturing: Current Status, Challenges, and Future Developments**  
**Duc-Anh Nguyen\***; Bui Truong Giang Le\*; Van Anh Nguyen; Minh Tuan Vu; Manh Ha Bui; Minh Thanh Le; Trong Duc Nguyen; Tien Dung Hoang; Xuan Hai Le.  
*Journal of Intelligent Manufacturing (Q1), Impact Factor: 7.4.*
2. **Selective Sinkhorn Routing for Improved Sparse Mixture of Experts**  
**Duc-Anh Nguyen\***, Huu Binh Ta\*, Nhuan Le Duc, Tan Minh Nguyen, Toan Tran
3. **Selected Beautiful Math Problems from International Competitions (Geometry)** [Book]  
Nguyen Duy Khuong, Phan Quang Tri, Tran Quoc Dung, Nguyen Duong Minh, Pham Nguyen Phuc Long, **Duc-Anh Nguyen**  
*Vietnam National University Press, 2025*  
*US Patent filed by Qualcomm, 2025*
4. **Determinants of Credit Risk under the Basel II Accord: A Case Study of the Vietnamese Banking Sector**  
Ngo Thu Giang, **Duc-Anh Nguyen**, Vu Thi Thao Chi, Nguyen Bao Anh, Nguyen Tai Quang Dinh  
*International Conference on Emerging Challenges in Economics and Business (ICECH 2023)*
5. **Adaptive Conflict-Averse Multi-gradient Descent for Multi-objective Learning**  
Dinh Van Tuan, Tran Anh Tuan, **Duc-Anh Nguyen**, Bui Khuong Duy, Tran Ngoc Thang  
*International Conference on Intelligence of Things (ICIT 2023)*

## 6. **Exploration of Plane Geometry** [Book]

Le Xuan Hoang, **Duc-Anh Nguyen**

Vietnam National University Press, 2022

## PREPRINTS

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1. **Selective Sinkhorn Routing for Improved Sparse Mixture of Experts**, *Under review*, 2025  
**Duc-Anh Nguyen\***, Huu Binh Ta\*, Nhuan Le Duc, Tan Minh Nguyen, Toan Tran
2. **Incremental attribute reduction on dynamic decision tables with intuitionistic fuzzy weighted neighborhood rough sets.**, *Under review*, 2025  
Viet Anh Pham, Ngoc Thuy Nguyen, **Duc-Anh Nguyen**, Long Giang Nguyen
3. **Artificial Intelligence for Metal Material Science: Challenges, Solutions, and Future Developments.** , *Under review*, 2025  
Bui Truong Giang Le\*, **Duc-Anh Nguyen\***, Minh Tuan Vu, Phan Anh Tran, Trong Duc Nguyen, Minh Thanh Le, Khue Nguyen Vo Ngoc, Duy Hung Tran, Van Anh Nguyen, Dung Hoang Tien
4. **A Steepest Gradient Method with Nonmonotone Adaptive Step-sizes for the Nonconvex Minimax and Multi-Objective Optimization Problems**, *Under review*, 2025  
**Duc-Anh Nguyen**, Tran Ngoc Thang

## TALKS

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- Workshop on Scientific Computing and Applications (Talk in session with discussion): “*The Minimax Approach for solving non-convex multiobjective optimization and Applications*”, 2024
- VIASM Summer school “Research Experience for Undergraduates” (Talk in session with discussion): “*The Steepest Descent Method for Solving Nonconvex Minimax Problem and Applications to Multi-Task Learning*”, 2023

## HONORS & AWARDS

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- **National Program for the Development of Mathematics Scholarship** Nov 2023 – Apr 2024  
*Vietnam Institute for Advanced Study in Mathematics (VIASM)*
  - Awarded twice for outstanding academic performance in 2023–2024.
- **“Five-Good Student” Award** Jan 2024  
*Hanoi City, Vietnam*
  - Recognized for excellence in academics, ethics, physical fitness, volunteer work, and international integration.
- **Gold Medal - International Youth Math Challenge** Nov 2023
  - Final-round participant; ranked among top 2% of all participants.
- **Exness Scholarship** Aug 2023  
*Hanoi University of Science and Technology & Exness Corporation*
- **Third Prize - VIASM Summer School “Research Experiences for Undergraduates”** Aug 2023  
*Vietnam Institute for Advanced Study in Mathematics (VIASM)*
- **Gold Medal - Iranian Combinatorics Olympiad** Jun 2022

## LANGUAGE & CERTIFICATIONS

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- Vietnamese: Native.
- English: IELTS Academic 7.0 Overall (Listening 7.0, Reading 7.0, Writing 6.5, Speaking 6.5).

## LEADERSHIP & INVOLVEMENT

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- **Member**

Nov 2022 – Dec 2024

*FPT Young Talents*

Hanoi, Vietnam

- Selected for a highly competitive 2-year talent development program within FPT, gaining exposure to leading researchers and expanding professional networks.
- Equipped with a growth mindset through mentorship and participated in multiple FPT hackathons, strengthening coding and mathematical modeling skills.

- **Co-organizer**

Mar 2023 – Aug 2023

*Hanoi Mathematical Modeling*

Hanoi, Vietnam

- Led the organizational development efforts, including preparing and writing academic content, presenting at internal seminars on mathematical modeling.
- Contributed to operational planning and supported participants throughout testing phases.

## REFERENCES

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1. **Dr. Toan Tran**

Senior Staff Engineer, Qualcomm AI Research

toatran@qti.qualcomm.com

*Relationship: Mentor*

2. **Dr. Thang Tran Ngoc**

Lecturer, Faculty of Mathematics and Informatics, Hanoi University of Science and Technology

thang.tranngoc@hust.edu.vn

*Relationship: Undergraduate Thesis Supervisor*