Khai-Nguyen Nguyen

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Education

College of William and Mary — Virginia, USA
Ph.D. Student in Computer Science — 2023 - current

- **GPA:** 3.96/4.00
- **Advisor:** Dr. Antonio Mastropaolo
- **Relevant courses:** Deep Learning (A), Systems for Neural Networks (A-), Deep Transfer Learning (A), Data Mining & Decision Making (A), AI for S/W Eng (A)

Bucknell University — Pennsylvania, USA
B.Sc. in Computer Science and Engineering, minor in Statistics — 2019 - 2023

- **GPA:** 3.94/4.00 *(Summa Cum Laude)*
- **Relevant courses:** Calculus II (A), Calculus III (A), Statistics and Engineering (A), Research Methods (A-), Discrete Structures (A), Image Processing & Analysis (A), Linear Algebra (A), Probability (A), Statistical Inference Theory (A)

Research Interests

Natural Language Processing, Trustworthy and Explainable AI, Multimodal AI, AI for Healthcare

Selected Publications

♣: *equal contribution*

1. **Vision Language Models are Biased** [pdf]
   An Vo♣, **Khai-Nguyen Nguyen♣**, Mohammad Reza Taesiri, Vy Tuong Dang, Anh Totti Nguyen, Daeyoung Kim
   AI4Math Workshop @ ICML 2025
   Submitted to ICLR 2026

2. **Sentiment Reasoning for Healthcare** [pdf]
   Khai-Nguyen Nguyen♣, Khai Le-Duc♣, Bach Phan Tat, Duy Le, Truong-Son Hy
   ACL 2025, Industry Track (Oral)

3. **Medical Spoken Named Entity Recognition** [pdf]
   Khai Le-Duc, David Thulke, Hung-Phong Tran, Long Vo-Dang, **Khai-Nguyen Nguyen**, Truong-Son Hy, Ralf Schluter
   NAACL 2025, Industry Track

4. **Resource-Efficient & Effective Code Summarization** [pdf]
   Saima Afrin, Joseph Call, **Khai-Nguyen Nguyen**, Oscar Chaparro, Antonio Mastropaolo
   ACM International Conference on AI Foundation Models and Software Engineering (FORGE 2025)

5. **Real-time Speech Summarization for Medical Conversations** [pdf]
   Khai Le-Duc♣, **Khai-Nguyen Nguyen♣**, Long Vo-Dang, Truong-Son Hy
   Interspeech 2024 (Oral)

6. **Getting away with network pruning: From sparsity to geometry and linear regions** [pdf]
   Jeffrey Cai♣, **Khai-Nguyen Nguyen♣**, Nishant Shrestha, Aidan Good, Ruisen Tu, Xin Yu, Shandian Zhe, Thiago Serra
   Conference on the Integration of Constraint Programming, Artificial Intelligence and Operations Research (CPAIOR 2023)
   Sparsity in Neural Networks Workshop @ICLR 2023

Preprints

♣: *equal contribution*

1. **Toward Explaining Large Language Models in Software Engineering Tasks**

   Antonio Vitale♣, **Khai-Nguyen Nguyen♣**, Denys Poshyvanyk, Rocco Oliveto, Simone Scalabrino, Antonio Mastropaolo

   Submitting to TOSEM 2025

2. **S-Chain: Structured Visual Chain-of-Thought for Medicine** [pdf]

   Khai Le-Duc, Phuong T.H. Trinh, Duy Minh Ho Nguyen, Tien-Phat Nguyen, Nghiem Tuong Diep, An Ngo, Tung Vu, Trinh Vuong, Anh-Tien Nguyen, Nguyen Dinh Mau, Van Trung Hoang, **Khai-Nguyen Nguyen**, Hy Nguyen, Chris Ngo, Anji Liu, Nhat Ho, Anne-Christin Hauschild, Khanh Xuan Nguyen, Thanh Nguyen-Tang, Pengtao Xie, Daniel Sonntag, James Zou, Mathias Niepert, Anh Totti Nguyen

   arXiv 2025

Research Experiences

AURA Lab, College of William and Mary, Virginia, USA

Research Assistant. Advisor: Prof. Antonio Mastropaolo 2024.10 - current

Paper: *Toward Explaining Large Language Models in Software Engineering Tasks*

- Implemented a model-agnostic SHAP-based framework to quantify the effect of each input features of software engineering prompts on the model output
- Proposed and conducted quantitative experiments to understand the attribution capabilities of our framework compared to random and LLM baselines

Paper: *Resource-Efficient & Effective Code Summarization*

- Built an PEFT training pipeline for code language models (e.g., `DeepSeek-Coder`, `CodeLlama`) to quantify the impact of QLoRA on for code summarization

Nguyen Lab, Auburn University, Alabama, USA

Remote Collaborator. Advisor: Prof. Anh Totti Nguyen 2025.01 - current

Paper: *Vision-Language Models are Biased*

- Conduct ablation and activation patching experiments on open-sourced VLMs using the `nnsight` package to locate the source of bias in the model (on-going)
- Built an AI-assisted image generation pipeline for realistic-looking counterfactual images (e.g., animals, logos and flags) using `Gemini-2.0-Flash`
- Conducted ablation experiments (e.g., linear probing, attention visualization, image background removal with `LangSAM`) to locate contributing factors to knowledge bias

FPT Software AI Center, Vietnam

Remote Research Intern. Supervisor: Prof. Truong-Son Hy 2024.05 - 2024.09

Paper: *Sentiment Reasoning for Healthcare*

- Proposed the *sentiment reasoning* task and implemented a chain-of-thought finetuning pipeline for LLMs in medical sentiment analysis
- Co-led the construction of the `Sentiment Reasoning` dataset consisting of 30,000 samples across 5 different languages

Paper: *Real-time Speech Summarization for Medical Conversations*

- Co-led the construction of the `VietMed-Sum` dataset for medical speech summarization consisting of 24,000 samples and built its training pipeline
- Proposed and conducted ablation study on the effect of mixing human-curated and synthetic data for medical summarization in budget-constrained scenario

Analytics Lab, Bucknell University, Pennsylvania, USA

Undergraduate Research Assistant. Advisor: Prof. Thiago Serra 2022.05 - 2023.01

Paper: *Getting away with network pruning: From sparsity to geometry and linear regions*

- Co-developed a theorem establishing an upper bound on the expressiveness, quantified by linear regions, of ReLU-based deep neural networks.
- Implemented `GurobiPy`-based functions that identify stably active and inactive neurons, and count the linear regions in deep neural networks

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Industry Experiences

Machine Learning Intern, *CodaMetrix* | Boston, USA 2025.05 - 2025.08
- Developed a Gemini-based judge to evaluate and refine medical entity annotations, improving performance by 2–4% F1 over human baseline
- Designed and deployed entity extraction LLMs with DSPy prompt optimization on Databricks, achieving an overall F1 of 70% on `Llama-3.1-70B`

Machine Learning Intern, *CodaMetrix* | Boston, USA 2024.05 - 2024.08
- Trained a BERT-based LLM for ICD-10 multilabel classification, outperforming the deployed system by 4% accuracy
- Accelerate training by 4 times on Databricks using distributed and parallel training

Presentations

Sentiment Reasoning for Healthcare
Oral presentation at ACL 2025 Industry Track

Medical Spoken Named Entity Recognition
Poster presentation at NAACL 2025 Industry Track

Real-time Speech Summarization for Medical Conversations
Oral presentation at Interspeech 2024 & Poster presentation at MASC-SLL 2024

Awards and Honors

- **Recipient** Computer Science Fellowship, College of William and Mary 2023
  Awarded $500 by the CSCI admissions committee
- **Recipient** Bucknell University Grant 2019 - 2023
  Awarded approximately $60,000 annually
- **Dean's List** Bucknell University 2019 - 2023
  Achieved a GPA of 3.6 or higher every semester
- **Recipient**, Program for Undergraduate Research Grant, Bucknell University 2021
  Awarded $4000 for summer research
- **Honorable Mention**, Mathematical Contest in Modeling 2020
  Ranked top 25% (3000/13753) among the participants

Teaching Experiences

William and Mary: CSCI 140: Intro to Data Science
CSCI 304: Computer Organization
CSCI 435/535: Software Engineering

Bucknell University: CSCI 204: Data Structures and Algorithms
MATH 201, 202: Calculus I, II

Mentorship

- **An Ngo**: Bucknell University 2025.01 - 2025.09
- **Linh Nguyen**: Bucknell University → SDE@Amazon 2024.09 - 2025.01
- **Duy Le**: Bucknell University 2024.05 - 2024.08
- **Hung Ngo**: Bucknell University → R&D Engineer@Medivis 2023.05 - 2023.09

Services

Bucknell's Machine Learning Association | Co-founder and Secretary 2022 - 2023
- Connected machine learning enthusiasts at Bucknell by inviting guest speakers from both industry and academia and organizing a machine learning-themed hackathon

Vietnamese Student Association at Bucknell | Vice-president of Finance 2021 – 2022
- Organized traditional Vietnamese events such as Mid-Autumn Festival and Lunar New Year Festival, managed the club budget for said events

Selected Skills

Programming Languages: Python, Java, C/C++, R, SQL

Libraries and Frameworks: PyTorch, TensorFlow, Pandas, HuggingFace, vLLM, nnsight, TransformerLens, SentenceTransformers, DSPy, Matplotlib, Seaborn, GurobiPy