

Thai Vu Nguyen

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Education

INRS-EMT, University of Quebec, Canada

Jan 2023 – present

- MSc in Telecommunications - GPA: 4.2/4.3
- Thesis: Intrusion Detection Using Transformer-Based Deep Neural Networks - Excellent thesis graduation.
- Advisor: Prof. Long Le

University of Science, Vietnam National University, Ho Chi Minh City

July 2017 – July 2021

- BS in Computer Science
- Thesis: Deep Convolution Semi-supervised Adversarial Discriminative Domain Adaptation - Thesis grade: 10/10
- Advisor: Prof. Bac Le

Research Experience

Research Assistant | NECPHY-Lab, INRS-EMT, Canada

Jan 2023 - present

- Developed a novel deep learning architecture for cyber-security by utilizing the Transformer architecture.
- Analyzed model size and inference time, applying quantization techniques to create a lightweight model.
- Advisor: Prof. Long Le

Student Research | Kansas State University

2022 and Jan 2024 - present

- Applied computer vision techniques using the U-Net architecture to solve inverse scattering problems.
- Preprocessed input data by normalizing and scaling, which converts the incident wave into a 2D format for analysis.
- Advisor: Prof. Dinh-Liem Nguyen

Student Research | INRS-EMT, Canada

Jan 2024 - Sept 2024

- Developed structured-pruning algorithm to reduce model size and communication overhead in Federated Learning system.
- Analyzed performance of pruning algorithms on multiple architectures (ConvNet, ResNet, InceptionNet) across various Android devices.
- Advisor: Prof. Anderson Avila

Student Research | University of Science, VNU-HCM

Dec 2019 - June 2021

- Conducted research on Domain Adaptation and proposed a novel method called *Semi-supervised Adversarial Discriminative Domain Adaptation*.
- Advisor: Prof. Bac Le

Publications

Thai Vu Nguyen, Duc N. M. Hoang, Long Bao Le, "Multi-Head Attention Based Malware Detection with Byte-Level Representation" *IEEE Wireless Communications and Networking Conference (WCNC)*, 2024.

Thai Vu Nguyen, Long Bao Le, "Attention-Based Interpretable Semi-Supervised Federated Learning for Intrusion Detection in IoT Wireless Networks" *IEEE Global Communications Conference (GLOBECOM)*, 2023.

Vu Tuan Truong, **Thai Vu Nguyen**, Long Bao Le, "MetaCIDS: Metaverse Collaborative Intrusion Detection Based on Blockchain and Federated Learning" *IEEE Global Communications Workshop*, 2023. **Best Workshop Paper Award**.

Thai-Vu Nguyen, Anh Nguyen, Nghia Le, Bac Le, "Semi-supervised Adversarial Discriminative Domain Adaptation" *Applied Intelligence*, 2023.

Thu Le, Dinh-Liem Nguyen, **Vu Nguyen**, Trung Truong (authors listed in alphabetical order) "Sampling type method combined with deep learning for inverse scattering with one incident wave" *Contemporary Mathematics*, 2023.

Under Review

Thai Vu Nguyen, Long Bao Le, "Multi-Modal Cross-Attention Transformer-Based Framework for Network Intrusion Detection" *submitted to IEEE Transactions on Information Forensics and Security*.

Thai Vu Nguyen, Long Bao Le, Anderson Avila "Automatic Structured Pruning for Efficient Architecture in Federated Learning.

Employment

- Teaching Assistant** | University of Science, Vietnam National University Sept 2021 – Dec 2022
- Served as a teaching assistant and lab instructor Computer Science Department, including Programming, Data structure and Algorithm, Introduction to Machine Learning, Programming for Data Science
- AI Engineer Intern** | Emage Development Company June 2021 - Aug 2021
- Built YOLOv4 models for product defect detection in glass manufacturing.
 - Developed a data pipeline incorporating data cleaning, pre-processing, and augmentation techniques.
- Software Engineer Intern** | Intratech Corp Aug 2020 - Oct 2020
- Designed and developed a 3D visualization platform for factory operations.
 - Utilized C# and WPF to create user-friendly software interface.
- Robotics & IoT Club HCMUS** | VNU-HCM Oct 2019 - Oct 2020
- Created a mobile application to control IoT devices and developed a line detection system using Lego robots.

Projects

Quantization Neural Machine Translation [link]

- Developed English-Vietnamese translation model using Transformer architecture from "*Attention is All You Need*".
- Trained on the PhoMT dataset with 3 million sentence pairs, achieving a BLEU score of 0.26 on the test set.
- Applied asymmetric post-training quantization to multi-head attention layers, converting *float32* parameters to *int8*, resulting in a 20MB reduction in model size.

GPU Computation [link]

- Accelerated Convolutional Neural Network inference (2D convolution, pooling, fully connected layers) using CUDA C++ for fast prediction.
- Implemented parallel matrix operations, including LU decomposition and image processing (edge detection, sharpening, and blurring) on GPU.
- Applied Seam Carving for intelligent resizing and Histogram Equalization for image enhancement.

Emoji Search Engine [link]

- Developed a search engine that enables users to quickly find emojis by entering descriptive text
- Improved data quality by processing and augmenting an emoji dataset. Utilized GloVe embeddings with XGBoost for emotion prediction.
- Deployed web application on DigitalOcean using Flask backend and Streamlit frontend.

Technical Skills

Languages: Python, C/C++, C#.

Framework: Tensorflow, Pytorch, CUDA.

ML Engineering: Google Cloud, Docker, Comet, Digital Ocean.

Software: Flask, Streamlit, HTML/CSS, Git/Github, SSH.

Awards

INRS Scholarship (2023-2024): Funded research assistantship and tuition fees scholarship.

VietAI (2023): Full Funded T3 Scholarship. Statement of Accomplishment from VietNam Ministry of Planning and Investment.

HCMUS Scholarship (2022): From University of Science, VNU-HCM for Excellent Graduation Student.

Long Vu Company Scholarship (2017-2020): Awarded for excellent academic achievements.

Giong Trom Scholarship (2018): Local Scholarship for Excellent Student.

References

Dr. Long Le (long.le[at]inrs.ca), Professor, INRS-EMT, University of Quebec, Canada.

Dr. Dinh-Liem Nguyen (dlnghuyen[at]ksu.edu), Associate Professor, Kansas State University, USA.

Dr. Anderson Avila (anderson.avila[at]inrs.ca), Assistant Professor, INRS-EMT, University of Quebec, Canada.

Dr. Bac Le (lhbac[at]fit.hcmus.edu.vn), Professor, Vietnam National University, Ho Chi Minh City, Vietnam.