Tung Anh. Nguyen

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Objective: A data science enthusiast working on applied machine learning for solving real world problems.

Education

Bachelor of Science — ***Electrical Engineering*** Aug 2011 - May 2016
Top 5% over 400 students GPA: 3.45/4.00
Hanoi University of Science and Technology, Hanoi city, Viet Nam

Master of Science — ***Machine Learning and Blockchain*** Aug 2017 - Aug 2019
Computer and Information Department GPA: 4.39/4.50
Korea University, South Korea
Thesis title: Dynamic Data Aggregation in CoAP Based on Markov Chain for IoT Networks

PhD — ***Machine Learning*** Jul 2021 - Dec 2024
School of Computer Science
University of Sydney, NSW, Australia
Thesis title: Resilient and Communication-Efficient Federated Learning for Scalable Heterogeneous IoT Data Modeling on Gassmann Manifolds.

Professional Experience

Teaching Assistant — ***University of Sydney*** Jul 2021 - Present
Teaching, Tutoring, and Designing Course Content for:
- Comp5318: Introduction to Machine Learning.
- Comp5348: Enterprise Scale Software Architecture.
- Comp9121: Design of Networks and Distributed Systems.
- Comp3221: Distributed Systems.

AI Researcher — ***University of Sydney*** Jul 2021 - Present
Research Interests: Federated Learning, Distributed Optimization, Time Series Forecasting, Anomaly Detection, LLM.
Highlighted Research:
- Proposed the world's first unsupervised federated learning algorithm, accepted at the A* conference INFOCOM 2023, titled: *Federated PCA on grassmann manifold for anomaly detection in IoT networks.*
- Conducted large-scale experiments on thousands of IoT devices, applying algorithms to low-computation, privacy-conscious environments. Proved the convergence of the traditional ADMM algorithm under a sub-sampling scheme with rigorous theoretical support. This work has been accepted in a Q1 journal, titled: *Federated PCA on Grassmann Manifold for IoT Anomaly Detection.*

"My PhD has equipped me with advanced critical thinking and problem-solving skills, enabling me to excel in teamwork and effectively build systems from scratch while enhancing existing solutions based on state-of-the-art research."

Data Analysis Intern — ***Wilhelm Intergrated Solutions*** Jun 2023 - Sept 2023
- Provided strategic insights on cost and energy consumption in operating theaters adjacent to high-risk areas, contributing to improved resource allocation and operational efficiency.
- Conducted causal analysis and hypothesis testing to identify key factors influencing patient infection rates, driving actionable changes in hospital protocols.
- Designed and implemented a data collection protocol for operating theaters, including comprehensive tracking of patient outcomes post-surgery, ensuring data accuracy for quality improvement.
- Developed an automated notification system that alerts staff to unusual conditions in operating theaters via Slack, enhancing response times and safety.
- Built an automated data analysis system that generates real-time reports on daily, weekly, and monthly data, streamlining decision-making processes.

AI Engineer — ***IVIRSE(a healthcare start up company)*** Jul 2021 - Jul 2023
- Designed and implemented an end-to-end machine learning pipeline, encompassing data preprocessing, model training, and deployment, significantly improving workflow efficiency.
- Developed and deployed CI/CD pipelines for machine learning model training and production models on AWS, streamlining automation and reducing deployment time.
- Built an LLM-powered chatbot that effectively replaced the customer service team in handling patient inquiries, improving response time and operational efficiency.

- Created an LLM-based doctor assistant for document summarization and information retrieval, enabling faster decision-making and patient care by doctors.
- Constructed a Hadoop-based datalake and utilized Spark to process and query data, reducing pipeline processing time by 1.75x compared to traditional relational databases.

Embedded Software Team Leader — *Viettel R & D* Sept 2019 - Jun 2021
- Developed advanced machine learning algorithms for 5G chip embedded systems for enhancing signal processing capabilities of Digital Predistortion block.
- Development of algorithms optimized for a customized CPU, enabling advanced control and processing of telecommunication signals. Led the world-first integration of Xilinx and ADI 5G systems into a customized CPU architecture.

Software Engineer Intern — *IBM and Linux Foundation* Aug 2016 - Jul 2017
- Designed and implemented a blockchain system for Industrial IoT (IIoT) utilizing Hyperledger Fabric and Docker Compose. Recognized as one of the most successful projects in the internship program. The system enables tracking of construction activities and securely records data on the blockchain. The collected data is analyzed and reported to project administrators, enhancing project oversight and decision-making.

Software Engineer — *HUMAX R&D* Aug 2016 - Jul 2017
- Developed firmware for operating systems in microcontrollers, enhancing system functionality and performance through efficient code optimization and hardware integration.

Machine Learning Intern — *Pohang University* Jan 2016 - Feb 2016
- Developed a Convolutional Neural Network (CNN) on FPGA for image classification, optimizing performance and efficiency, and significantly advancing capabilities in real-time image processing applications.

Skills

- **Programming Language**: Python, Pytorch, SQL, Javascript, Html, Css, C, C++.
- **Software Development**: Proficient in full-stack development with a strong coding background in data structures and algorithms, capable of designing and implementing end-to-end solutions.
- **Machine Learning**: Light weight and efficient Machine Learning for Networking with Federated Learning, Computer Vision, Time Series Prediction, Natural Language Processing, Data Analysis, Hypothesis Testing, Data cleaning and Data preprocessing.
- **Database**: MongoDB, MySQL, Hadoop, Spark.
- **Cloud**: AWS, physical server.
- **Devops**: Docker, Jenkins, SonarQube, Kubernetes, ArgoCD.
- **MLOps**: WandB, MLflow, DVC, CML.

Awards and Recognitions

Faculty of Engineering Scholarship — *University of Sydney* Jul 2021 - Present

Computer and Information Department Scholarship — *Korea University* Jul 2017 - Aug 2019

Best Student Award — *Hanoi University of Science and Technology* 2012 - 2013
Awarded for having the highest academic record among Bachelor's students in the School of Electrical Engineering.

Best Student Award — *Hanoi University of Science and Technology* 2013 - 2014
Awarded for having the highest academic record among Bachelor's students in the School of Electrical Engineering.

SELECTED PUBLICATIONS

1. Nguyen Tung-Anh, Jiayu He, Long Tan Le, Wei Bao, and Nguyen H. Tran. "Federated PCA on Grassmann Manifold for Anomaly Detection in IoT Networks." arXiv preprint arXiv:2212.12121 (2022), INFOCOM2023.
2. Nguyen Tung-Anh, et al. "Federated PCA on Grassmann Manifold for IoT Anomaly Detection." IEEE/ACM Transactions on Networking (2024).
3. Nguyen Tung-Anh, Tuan Dung Nguyen, Long Tan Le, Canh T. Dinh, and Nguyen H. Tran. "On the Generalization of Wasserstein Robust Federated Learning." arXiv preprint arXiv:2206.01432 (2022).
4. He J, Khushi M, Nguyen TA, Tran NH. Fed-mSSA: A Federated Approach for Spatio-Temporal Data Modeling Using Multivariate Singular Spectrum Analysis. In2023 IEEE International Conference on Data Mining (ICDM) 2023 Dec 1 (pp. 1055-1060). IEEE.

REFERENCES

- **Associate Professor Nguyen. H Tran**
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  nguyen.tran@sydney.edu.au