# Hoang Quoc Viet

## AI Reseacher

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AI Engineer & Researcher with a strong focus on R&D in Machine Learning, Deep Learning, and Database Optimization. Published Scopus-indexed papers on Vietnamese NLP and sentiment analysis. Developed adaptive algorithms for PostgreSQL's AQO framework and built cloud-based AI systems with AWS and LLM integration. Passionate about advancing research while delivering practical, enterprise-ready solutions.

## EDUCATION

**Vietnam - Korea University of Information and Communication Technology**

*Bachelor of Science in Computer Science (Expected 2026)*

Computer Science - 4th years student

Courses:
- *Artificial Intelligence*
- *Machine Learning*
- *Deep Learning*
- Data Structure and Algorithm

## PROJECT

**Project 1: Build Data AI Agent For Branches**

***VPBank Hackathon 2025 - AWS Powered*** ***Role: AI Engineer, Solution Architect***

*Source code available on github*

- **Problem:** The current VPBank system are facing with fragmented customer data and difficult to access , that lead to subtantial time and effort to consolidate this data and gain 360 degrees customer profile
- **Solution:**
  - **Automated Data Aggregation:** A daily ETL pipeline that unifies fragmented customer information from multiple banking systems into a single reliable source of truth.
  - **GenAI-powered Assistant:** A natural language interface that enables branch staff to query customer insights instantly, receive proactive recommendations, and make faster, data-driven decisions without IT dependency
- **Contributions:**
  - **Architected** and **developed** a **multi-agent system** on **AWS** to automate user intent analysis, knowledge base retrieval, and SQL query generation.
  - **Built** a comprehensive **knowledge base** of table schemas using **Semantic Chunking** and **k-NN search** in **OpenSearch** to ensure highly relevant context retrieval.
  - **Engineered** a **self-correcting agent** to execute, validate, and debug SQL queries, significantly improving data retrieval accuracy and system reliability.
  - **Leveraged AWS** services including **Lambda**, **Bedrock**, and **OpenSearch** to build a scalable, high-performance, and event-driven architecture.

**Project 2: Adaptive Query Optimization For PostgreSQL Using Machine Learning**

***Stipend: SRA Japan*** ***Role: Research Team Lead***

*Source code available on github*

- **Problem:** The existing AQO-ML uses a fixed k=3 in k-NN, which often fails to adapt to varying query patterns, leading to suboptimal cardinality estimation
- **Solution:** Designed a dynamic k-adaptive mechanism that adjusts the number of neighbors based on query feature variance, improving accuracy and robustness in PostgreSQL's AQO framework
- **Contributions:**
  - Researched and developed a mathematically **adaptive k-Nearest Neighbors algorithm** to replace the fixed-k version in **PostgreSQL**'s Adaptive Query Optimization framework using **C**.
  - Focused on designing a **dynamic-k selection mechanism** based on query features, improving estimation quality in cardinality prediction.
  - Achieved **0.5~1% reduction in loss** on the TPC-DS benchmark

**Project 3: Pathlight: a Agentic LLM-Powered AI Tutor Platform for Self-Paced Learning**

***Graduation Project*** ***Role: Team Lead, Solution Architect***

Source code available on github

- **Problem:** Creating a full course from raw materials is slow and manual. Subject Matter Experts often have slides/docs, but turning them into a complete curriculum (syllabus, lessons, quizzes, projects) takes weeks and doesn't scale
- **Solution:** Pathlight - an AI course builder: drop in your materials and LLM agents auto-generate the end-to-end course (syllabus, lesson plans, quizzes, drafts). Designed as AWS microservices with CI/CD for fast, reliable updates, supports retrieval over your sources and optional personalization later
- **Contributions:**
  - Designed and implemented the system architecture using **AWS cloud services**, ensuring scalability, security, and reliability.
  - Developed autonomous **AI agents** powered by **LLMs** to generate and personalize course materials for self-paced learning.
  - Engineered the platform based on a **microservices architecture**, enabling modular development, easier maintenance, and better deployment flexibility.
  - Built and maintained a **CI/CD** pipeline using **GitHub Actions**, automating the entire process of building, testing, and deploying directly to **AWS**.

**Project 4: Reinforcement Learning for Early-Exit Decisions in Supervised Text Classification**

***eSTI-Digital Science and Technology Institute*** ***Role: AI Team Lead***

*Source code* available on github

- **Problem:** On small or low-power systems, running full deep learning models is slow and resource-hungry. Traditional methods always process the entire input, even when only part of the text is enough for a reliable prediction.
- **Solution:** Applied Reinforcement Learning to train a model that learns when to stop reading. The system makes predictions once it has seen enough input, instead of processing everything. This reduces computation and speeds up inference while keeping prediction accuracy high.
- **Contributions:**
  - Designed and implemented a **Reinforcement Learning** model based on **Proximal Policy Optimization** algorithm to **enhance a finetuned model's predictive efficiency**, enabling accurate predictions with **partial input data**.
  - Trained and evaluated the model on the AG News dataset, achieving robust performance metrics.
  - **Optimized** the model to **require only 50-60% of sentence input** for reliable predictions, significantly improving computational efficiency.

**Project 5: E2v-PhoBERT - A Fine-tuned PhoBERT Model with Enhanced Accuracy for High-Performance Vietnamese Sentiment Analysis**

***eSTI-Digital Science and Technology Institute*** ***Role: AI Researcher***

*Source code* available on github

- **Problem:** In Vietnamese sentiment analysis, emojis often carry strong emotional cues. However, most preprocessing pipelines remove them, and PhoBERT itself was not trained on emoji data. This leads to loss of valuable sentiment signals and weaker model performance
- **Solution:** Integrated Emoji2Vec embeddings into PhoBERT to transfer emoji knowledge into the model. Fine-tuned the combined representation on benchmark sentiment datasets, boosting accuracy and enabling the model to capture both text and emoji signals for more robust sentiment detection
- **Contributions:**
  - **Researched** and Integrated **Emoji2Vec with PhoBERT** to **enhance emoji-aware Vietnamese sentiment understanding**, using **Transformers** and **Huggingface**.
  - **Fine-tuned** the extended model (E2v-PhoBERT) on three benchmark datasets (AIVIVN 2019, UIT-VSFC, UIT-ViHSD), combining it with various deep learning classifiers (CNN, LSTM, CNN-trans-enc, ...) using **pytorch**.
  - Achieved state-of-the-art accuracy of **88% - 91%** on UIT-VSFC and UIT-ViHSD datasets.
  - **Published results in ACIIDS 2025** - scopus-indexed conference proceedings

## AWARDS & HONORS

All Available Awards & Honors & Certifications Here

- **Consolation Prize -** Euréka Student Scientific Research Award 2025 issued by VNU
- **Third Prize -** Student Scientific Research University-wide level Competition 2025 by University of Danang
- **First Prize -** Scientific Research Competition 2025 of VKU
- **Top Warrior -** VPBank Technology Hackathon 2025
- **Third prize -** Scientific Research Competition 2024 of VKU
- **Second Prize -** AI Challenge, Danang AI for Life 2024
- **Certificate of Achievement** - The 2022 ICPC Vietnam Provincial and National Programming Contest
- **Third prize -** Provincial competitive programming contests in Quang Tri Province

## ACADEMIC PAPER PUBLISHES

- **ICIIT 2026 -** Adaptive Query Optimization with Artificial Intelligence in PostgreSQL (Accepted) **- Ei Compendex**
- **ACIIDS 2025 -** E2V-PhoBERT: Enhanced Vietnamese Sentiment Analysis with Emoji Integration **- Scopus-indexed**
- **CITA 2025 -** VED_PhoBERT: Integrating Emoji Descriptions for Improved Vietnamese Sentiment Detection **- Scopus-indexed**
- **CITA 2024 -** Sentiment Analysis of Airline Customer Reviews in Vietnamese Language Using Deep Learning **- Scopus-indexed**