KHANG BUI TRAN DUY

AI ENGINEER / DATA SCIENCE

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I. ABOUT ME

I'm a highly motivated third-year Computer Science student with a strong foundation in **Machine Learning, Data Science, Computer Vision**, and **Natural Language Processing**. I'm passionate about **Artificial Intelligence**, continuously expanding my knowledge and applying it to **real-world problems**. I have hands-on experience with **TensorFlow**, **PyTorch,** and **Scikit-learn**, along with **solid skills** in **Machine Learning and Deep Learning**, and **growing expertise** in **Reinforcement Learning**. Beyond academics, I actively engage in social and community activities, which have strengthened my **teamwork**, **communication**, and **leadership skills**. As an aspiring AI Engineer and Data Scientist, I am eager to collaborate with experts, tackle challenging projects, and further **develop my expertise with the goal of building scalable, intelligent systems** and advancing research on **AI agents**.

II. EDUCATION

University of Technology - Vietnam National University, Ho Chi Minh City   **Sep 2023 - Apr 2027**

Bachelor of Engineering in Computer Science, Minors in Applied Artificial Intelligence
CPA: **3.6/4.0**

III. RESEARCH EXPERIENCE

University of Technology - VNU-HCM - Faculty of Computer Science and Engineering (Optimization AI Lab)

Research Team Member (Team of 2) — Topic: Optimization of Continual Learning Strategy   **May 2025 - Present**
for Reinforcement Learning

- Designed and implemented an **Online Continual Learning, Nested Learning** framework in PyTorch for reinforcement learning agents, integrating **DER++ replay buffer**, **loss-based task boundary detection**, and **regularization-based methods (Online EWC, Synaptic Intelligence)**.
- Developed a robust evaluation pipeline, including **Final Average Accuracy (FAA)**, **Forgetting Measure**, and **Loss Dynamics**, to assess catastrophic forgetting and stability–plasticity trade-offs.
- Conducted experiments on **CIFAR-10** and **CIFAR-100** sequential benchmarks, systematically comparing replay- and regularization-based strategies for memory retention.
- Achieved **higher task retention** and **reduced forgetting**, providing insights into the role of memory buffer size and regularization strength in online continual learning.
- Collaborated with research team to analyze results and prepare for academic publication and conference presentations.

IV. TECHNICAL SKILLS

- **Programming Languages:** Python, Java (Core), C++, JavaScript.
- **ML/DL Frameworks**:
  - Frameworks: PyTorch, TensorFlow, Scikit-learn
  - Learning paradigms: Supervised, Unsupervised
  - Model development: training, validation, evaluation
  - Optimization and tuning: learning rate scheduling, regularization
- **Natural Language Processing:** *Repository*
  - Text preprocessing: tokenization, normalization, stopword removal, stemming, lemmatization, etc.
  - Feature extraction: Bag of Words, TF-IDF, N-gram models.
  - Text representation: Word Embedding, Semantic Vector Embedding.
  - NLP tasks: Text Classification, Sentiment Analysis, Named Entity Recognition (NER).
  - Retrieval-Augmented Generation (RAG) systems combining vector search and generation.
- **Computer Vision:**
  - Tasks: Image classification, Object detection
  - Detection models: YOLO, Faster R-CNN
  - CNN backbones: ResNet, MobileNet, EfficientNet
  - Data augmentation, evaluation and visualization for vision models

- **Reinforcement Learning**
  - Algorithms: **DDPG, Actor–Critic**
  - Continuous control environments
  - Continual learning techniques: Experience Replay, Elastic Weight Consolidation (EWC)
- **Time-Series Analysis**
  - Spatio-temporal data modeling
  - Feature engineering: Sliding Window, Time Encoding
  - Dual Embedding (Entity/Spatial Embeddings) with BiLSTM architectures
- **MLOps / Deployment:** Model serving via FastAPI and Flask, Containerization and deployment using Docker, CI/CD workflows for machine learning systems
- **Databases & Tools:** MongoDB, SQL Server, Git, Conda, Poetry, Postman, Jupyter Notebook, Google Colab, Vercel

V. CORE COMPETENCIES

- Strong analytical thinking with solid foundations in **algorithms**, **data structures**, and **mathematical modeling** for AI.
- Ability to **design and implement end-to-end AI systems**, from data preprocessing and model development to deployment.
- Experience translating **research ideas into working implementations**, attention to reproducibility and evaluation.
- System-level thinking in AI workflows, using **UML** and **architectural diagrams** to structure complex pipelines.
- Comfortable working in **Linux-based environments**, collaborating via **Git**, and adapting quickly to new tools and frameworks.
- Self-motivated learner with hands-on experience across **NLP, Computer Vision, Reinforcement Learning**, and **Time-Series**, able to ramp up fast in new domains.

VI. LEADERSHIP & EXTRACURRICULAR ACTIVITIES SKILLS

Member of the Executive Committee, Ho Chi Minh Communist Youth Union – Faculty of CSE.
- Contributed to faculty-level student initiatives and community development programs.
  - **Leader**, Volunteer Campaign "Xuan Tinh nguyen" (2025) – Faculty of CSE
  - **Vice Leader**, Volunteer Campaign "Mua he xanh" (2024) – Ho Chi Minh City Front, Faculty of CSE
  - **Vice Leader**, CSE Summer School (2024) - Faculty of CSE
- Key skills developed:
  - **Teamwork**: Collaborated effectively with peers and local communities to achieve shared goals.
  - **Team Management**: Directed and motivated groups, delegated tasks, and ensured **smooth** execution of activities.
  - **Time Management**: **Balanced** academic responsibilities with leadership roles, prioritizing tasks to meet deadlines.
  - **Problem-Solving**: **Tackled logistical** and **organizational challenges** during campaigns, developing practical and adaptive solutions.
  - **High Intensity Working:** Maintained **high performance under pressure** and tight schedules, **ensuring successful completion** of demanding projects.

VII. PROJECTS

1. Self-Driving Car Detect Objects Module (Reinforcement Learning, Deep Learning)   *Repository* **Jul 2025 - Present**
Project goal: Built an autonomous driving system that integrates reinforcement learning with real-time object detection for safer and adaptive navigation.
Details:
- Applied Deep Deterministic Policy Gradient (DDPG) with **actor–critic–agent** modules to **optimize continuous control of steering and acceleration**.
- Developed and benchmarked object detection modules for self-driving perception using **YOLOv11** and **fine-tuned Faster R-CNN architectures** with **ResNet** and **MobileNet backbones**.
- Implemented a robust training pipeline with **advanced augmentation (rotation, noise, color jitter), AdamW optimizer, OneCycleLR scheduler**, and **early stopping**, ensuring stable convergence.
- **Findings: YOLOv11 outperformed fine-tuned models in terms of accuracy and inference speed**, making it more effective for real-time scenarios. However, **the fine-tuned Faster R-CNN models showed strong potential for future improvement**, offering flexibility in backbone selection and research extensions.
- Designed a modular PyTorch framework supporting scalable training, reproducibility, and detailed loss dynamics analysis, enabling further research and deployment.

2. Food Image Classification with Large Label Space (CV, Deep Learning)   *Repository* **Jul - Aug 2025**

Project goal: Conducted systematic experiments on a custom **10-class food dataset** and the **Food101 benchmark (101 classes, 100K+ images)** to evaluate CNN performance under varying choices, training setups, regularization strategies.

Details:

- **Implemented** and **compared multiple baseline CNNs (shallow Conv2D models, simplified CNN, refined CNN with dropout/batch norm)** and optimized training using Adam optimizer with learning rate tuning.
- Apply **data augmentation (rotation, shifting, zoom, flipping)** to mitigate overfitting, improve validation accuracy.
- Integrated regularization techniques including **dropout, early stopping**, and **architecture restructuring** to balance model capacity and generalization.
- **Scaled** experiments from small CNNs to larger refined models (>2M parameters), **observing trade-offs** between model complexity, training loss convergence, and validation accuracy.
- Built an evaluation pipeline for loss/accuracy monitoring, comparative analysis across models, and visualization of overfitting dynamics.
- Achieved about **80% validation accuracy on large-scale Food101 dataset** and **high performance on custom 10-class dataset**, demonstrating the effectiveness of refined CNNs with augmentation and regularization for large-label-space image classification.

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3. SkimLit: Sequential Sentence Classification in Scientific Abstracts   *Repository* **Jul - Sep 2025**
(NLP, Deep Learning)

Project goal: Developed deep learning models to classify sentences in scientific abstracts into structured roles (e.g., objective, methods, results, conclusions), enabling researchers to efficiently skim papers and accelerate literature review.

Details:

- Implemented a diverse range of models including baseline statistical approaches, token-level **Conv1D networks, pretrained embeddings, character-level models,** and **hybrid architectures.**
- Applied both **token-level** and **character-level** representations to capture semantic meaning and **handle rare/unknown words effectively**.
- Integrated **positional features** alongside token and character embeddings to model sequential structure of abstracts.
- Designed and trained a **tri-brid embedding model (token + character + positional)** that significantly outperformed all baselines, achieving about **81% accuracy.**
- Developed an evaluation framework with precision/recall/F1 comparisons and error analysis, enabling deeper understanding of model behavior and misclassifications.
- Demonstrated that token-level CNNs provide strong performance but benefit further when enriched with character-level and positional signals. This experience showed that **hybrid and tribrid approaches outperform single-representation models** by combining complementary strengths.
- Highlighted the **potential of deep multi-input architectures for improving scientific text understanding**.

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4. Vietnam AQI Forecasting System: Spatio-Temporal Regression (Deep Learning)   *Repository* **Nov - Dec 2025**

Project Goal: Developed a unified deep learning framework using **Dual Embedding BiLSTM** to forecast multi-station Air Quality Index (AQI) across Vietnam, addressing complex spatio-temporal dependencies.

Details:

- Engineered a robust ETL pipeline using **Pandas**, implementing advanced time-series preprocessing techniques including **Sliding Window, Cyclical Time Encoding** (Sin/Cos), and **Lag/Rolling** features to transform raw environmental data into supervised learning tensors.
- Architected a novel **Dual Embedding BiLSTM with Attention** model: Leveraged **Entity Embeddings** to capture spatial heterogeneity (Station/Region ID) and **Bidirectional LSTM** layers to model long-term temporal dependencies efficiently.
- Implemented advanced training strategies including **Gradient Clipping, Learning Rate Scheduling**, and **Early Stopping**. Designed a custom **Weighted MSE/Huber Loss** function to improve model robustness against extreme outliers and data imbalance.
- Developed a **Recursive Forecasting** strategy to extend prediction horizons to 7 days, successfully integrating the model into a web application using **Flask** and **Leaflet.js** for real-time geo-visualization and interactive analytics.
- Achieved a competitive **RMSE** of ~0.43 on the test set, demonstrating the efficacy of spatial embeddings in multi-station forecasting tasks compared to traditional isolated modeling approaches.

VIII. CERTIFICATES

Machine Learning A-Z: AI, Python & R + ChatGPT Prize [2025]
June 2024 - May 2025

Platform: Udemy | Company: SuperDataScienceTeam | Status: Completed

Professional Certificate - Completed **100%** of 47-hour Machine Learning fundamentals and Python implementation through hands-on projects.

TensorFlow for Deep Learning Bootcamp
Dec 2024 - June 2025

Platform: Udemy | Company: ZTM | Status: Completed

Professional Certificate - Completed **100%** of 62.5-hour comprehensive training in neural networks implementation through hands-on projects.

The Complete Python Bootcamp From Zero to Hero in Python
Dec 2024 - Mar 2025

Platform: Udemy | Status: Completed

Professional Certificate - Advanced core Python programming concepts through coding exercises, projects

LLM Engineering: Master AI, Large Language Models & Agents
Aug 2025 - Present

Platform: Udemy | Company: Ligacy Team | Status: In progress (50%)

Professional Certificate - build and deploy LLM applications while mastering generative AI, RAG, QLoRA, AI agents, etc.

IX. LANGUAGES

- **Vietnamese:** Native.
- **English:**
  - **TOEIC L&R: 855**
  - Excellence (Equivalent to CEFR C1 level)
  - Professional working proficiency.
  - Fluent in technical discussions.
  - Strong presentation and documentation skills.
  - Experienced in cross-cultural collaboration.
- **Chinese (Simplified):** Aspiring to learn in the future.