Hoang-Chau Luong

+84779466239 lhchau20@apcs.fitus.edu.vn ggscholar homepage linkedin github/lhchau

About me

My name is Chau and I am a hard-working and passionate student researcher working on fundamental problems in machine learning. My focus is on understanding why certain methods exhibit their capabilities and how their underlying mechanisms contribute to better generalization and robustness. I aim to bridge theoretical insights with practical advancements to develop more effective learning algorithms. To achieve this, I analyze simplified models to derive theoretical insights and validate them empirically on large-scale deep neural networks. By combining both perspectives, I strive to uncover key principles that improve the efficiency and reliability of deep learning methods.

Education

Bachelor of Science in Computer Science, VNUHCM-University of Science **2020 – 2024**
Advanced Program in Computer Science *Overall GPA: 3.82/4.00*

Research Experience

SELab VNUHCM-University of Science **2023 – 2024**
Research Assistant

- Supervised by Prof. Minh-Triet Tran and M.Sc. Thuc Nguyen-Quang
- Conduct research on improving the robustness of DNNs to label noise datasets through modifying optimization algorithms, focusing on image classification tasks and Sharpness-Aware Minimization (SAM) optimizer.
- Explore that SAM algorithm can explicitly re-weight harmful parameters. We propose a new optimization algorithm SANER which uses SAM to identify harmful parameters in DNNs and down-weight their gradients to mitigate overfitting to label noise, resulting in a significant improvement in performance.

Research Interest

My current research focuses on **fundamental problems in machine learning**. Currently, my work includes (but is not limited to):

1. **Generalization**: enhancing generalization and robustness on realistic datasets such as *out-of-distribution datasets*, *noisy labels*, and *imbalanced class datasets*, which are very common in real-world domains including medical imaging, autonomous driving, and natural language processing. Currently, I am focusing on analyzing the training dynamics of robust methods such as Sharpness-Aware Minimization to explore why and how they achieve robustness and to investigate new ways to enhance their abilities.
2. **Efficient AI**: knowledge distillation and quantization, compresses large DNNs (teacher) into smaller network (student). Currently, I am focusing on enhancing both *teacher quality* and the *distillation process* to obtain a better student model.
3. **LLMs and Diffusion models**: developing both theoretical and practical methods to enhance the performance of real-world applications.

Publications

[1]**(Under review)** Hoang-Chau Luong, Thuc Nguyen-Quang and Minh-Triet Tran. "Improving Resistance to Noisy Label Fitting by Reweighting Gradient in SAM"

- Propose optimization algorithm to help DNNs learn well from label noise datasets and test them on different datasets, including CIFAR-10/100, Tiny-ImageNet, and Mini-WebVision, as well as various architectures, including ResNet, DenseNet, and WideResNet.

[2]**(NeurIPS 2024)** Pham Duy Khanh, Hoang-Chau Luong, Boris S. Mordukhovich, Dat Ba Tran. "Fundamental Convergence Analysis of Sharpness-Aware Minimization"

- Theoretical contributions. Provide convergence results of SAM to the optimal value rather than to a value close to it as in previous works.

[3]**(CVPR 2024 Workshop)** Tuan-An To, Minh-Nam Tran, Trong-Bao Ho, Thien-Loc Ha, Quang-Tan Nguyen, Hoang-Chau Luong, Thanh-Duy Cao, Minh-Triet Tran. "Multi-perspective traffic video description model with fine-grained refinement approach"

- Fine-tune an image-text generation model for video description and add post-processing algorithms to ensure correct output.

[4]**(SOICT 2023)** Hoang-Chau Luong, Minh-Triet Tran. "Applying Adaptive Sharpness-Aware Minimization to Improve Out-of-distribution Generalization"

- Validate the performance of the Sharpness-Aware Minimization (SAM) algorithm against Stochastic Gradient Descent (SGD) on out-of-distribution datasets.

[5]**(RIVF 2022)** Tuan-An To, Hoang-Chau Luong, Nham-Tan Nguyen, Trong-Tin Nguyen, Minh-Triet Tran, Trong-Le Do. "Deepfake Detection using EfficientNet: Working Towards Dense Sampling and Frames Selection"

Reviewer

- ICCV 2025, ICLR 2025

Achievements

AI Competition

Third prize in AI Challenge Ho Chi Minh City, Event Retrieval from Visual Data. 11/2024

Consolation prize in AI Challenge Ho Chi Minh City, Event Retrieval from Visual Data. 10/2023

Consolation prize in AI Challenge Ho Chi Minh City, Event Retrieval from Visual Data. 10/2022

Top 12/69 on private test in FathomNet - FGVC10 workshop at CVPR 2023 4/2023

Competitive Mathematics

1^{st} prize in Ho Chi Minh City Mathematics Olympiad Competition 4/2020

Silver Medal in Southern Vietnam Mathematics Olympiad Competition 4/2019

Bronze Medal in Southern Vietnam Mathematics Olympiad Competition 4/2018

Courses

1. **Advanced in NLP**. Issued by VietAI; focused on learning Attention Mechanism, Transformer-based models and training techniques for large language models (LLMs).
2. **Advanced in CV**. Issued by VietAI; focused on learning CNN-based models to solve object detection, segmentation.

Skills

Programming Languages: Proficient in Python and experienced in writing C++, and Bash.
Technologies/Frameworks: Pytorch, HuggingFace, Linux
English: IELTS 7.0