Truong Buu Phan

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Google Scholar - LinkedIn

RESEARCH INTERESTS

My research interests lie within information theory, probabilistic inference and representation learning, with a particular focus on developing efficient machine learning algorithms and understanding their fundamental limits. Before starting my PhD, I worked on adversarial attacks, approximate inference, out-of-distribution detection, and uncertainty quantification for neural networks.

Ressearch Topics: information theory, compression, sampling, machine learning, LLMs.

ACADEMIC BACKGROUND

Ph.D. Electrical and Computer Engineering 2022 - Present
University of Toronto, Canada
- Advisor: Prof. Ashish Khisti.
- Research topic: sampling, compression and representation learning.

MASc. Electrical and Computer Engineering 2017-2019
University of Waterloo, Canada
- Advisor: Prof. Krzysztof Czarnecki.
- Research in Bayesian deep learning and out-of-distribution detection.

BEng. Electrical Engineering 2012-2016
Vietnam National University, Vietnam.
- Advisor: Prof. Huu Tue Huynh.
- Research in adaptive and nonlinear control.

RESEARCH EXPERIENCE (INDUSTRY)

Meta AI (FAIR), USA Mar 2024 - Oct 2024
AI Research Intern (Language Model and Probabilistic Reasoning).
Host: Dr. Karen Ullrich.
Project: Probabitistic reasoning, tokenization, LLM collaboration.

LG Electronics AI Lab, Canada May 2021 - May 2022
Research Engineer
Project: Automated check-out and neural symbolic AI.

Algolux (acquired by Torc Robotics in 2023), Canada Oct 2019 - May 2021
Research Scientist
Collaborators: Prof. Felix Heide and Dr. Fahim Mannan.
Projects: Adversarial attack and robust vision for autonomous driving.

SELECTED PUBLICATIONS

For full publications, see my Google Scholar.

Buu Phan, Brandon Amos, Itai Gat, Marton Havasi, Matthew Muckley and Karen Ullrich. "Exact Byte-Level Probabilities from Tokenized Language Models for FIM-Tasks and Model Ensembles" (Preprint). https://arxiv.org/abs/2410.09303.
- Prelimary version presented at **ICML 2024 Workshop on Theoretical Foundations of Foundation Models**. https://arxiv.org/abs/2406.16829

Buu Phan*, Ashish Khisti*, and Christos Louizos. "Importance matching lemma for lossy compression with side information." In International Conference on Artificial Intelligence and Statistics **(AISTATS)**, 2024. https://arxiv.org/abs/2401.02609

Buu Phan*, Salehkalaibar Sadaf*, Jun Chen, Wei Yu, and Ashish Khisti: *On the Choice of Perception Loss Function for Learned Video Compression.* Thirty-seventh Conference on Neural Information Processing Systems (**NeurIPS**) 2023.
Spotlight in Neural Compression Workshop, ICML 2023.
https://arxiv.org/abs/2305.19301

Buu Phan, Fahim Mannan, and Felix Heide: *Adversarial imaging pipelines.* In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, **(CVPR)** 2021. https://arxiv.org/abs/2102.03728

Buu Phan, Samin Khan, Rick Salay, and Krzysztof Czarnecki: *Bayesian uncertainty quantification with synthetic data.* In Computer Safety, Reliability, and Security: **(WAISE-SAFECOMP)** 2019 Workshops **(Best paper award).**
https://link.springer.com/chapter/10.1007/978-3-030-26250-1_31.

OTHER PUBLICATIONS

Sadaf Salehkalaibar, **Buu Phan**, João Atz Dick, Ashish J Khisti, Jun Chen, Wei Yu "Perception Loss Function Adaptive to Rate for Learned Video Compression". In Machine Learning Compression Workshop, **NeurIPS Workshop** 2024.

Sadaf Salehkalaibar, **Buu Phan**, Ashish Khisti, and Wei Yu. "Rate-Distortion-Perception Tradeoff Based on the Conditional Perception Measure." In 2023 **Biennial Symposium on Communications (BSC)**, IEEE, 2023.
https://ieeexplore.ieee.org/document/10201822

Nicolas Scheiner, Florian Kraus, Fangyin Wei, **Buu Phan**, Fahim Mannan, et al. "Seeing Around Street Corners: Non-Line-of-Sight Detection and Tracking In-the-Wild Using Doppler Radar." In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. **(CVPR)** 2020. https://arxiv.org/abs/1912.06613

Samin Khan, **Buu Phan**, Rick Salay, and Krzysztof Czarnecki. "ProcSy: Procedural Synthetic Dataset Generation Towards Influence Factor Studies Of Semantic Segmentation Networks." **CVPR Workshops** 2019.

Sachin Vernekar, Ashish Gaurav, Taylor Denouden, **Buu Phan**, Vahdat Abdelzad, Rick Salay, and Krzysztof Czarnecki. "Analysis of confident-classifiers for out-of-distribution detection." **ICLR SafeML Workshop** 2019. https://arxiv.org/abs/1904.12220

Buu Phan, Rick Salay, Krzysztof Czarnecki, Vahdat Abdelzad, Taylor Denouden, Sachin Vernekar, "Calibrating Uncertainties in Object Localization Task", **NeurIPS Bayesian Deep Learning Workshop**, 2018. https://arxiv.org/abs/1811.11210

Ian Colwell, **Buu Phan**, Shahwar Saleem, Rick Salay, and Krzysztof Czarnecki. "An automated vehicle safety concept based on runtime restriction of the operational design domain." In **2018 IEEE Intelligent Vehicles Symposium (IV)**.

Abdelzad, Vahdat, Krzysztof Czarnecki, Rick Salay, Taylor Denounden, Sachin Vernekar, and **Buu Phan**. "Detecting Out-of-Distribution Inputs in Deep Neural Networks Using an Early-Layer Output." arXiv preprint arXiv:1910.10307 (2019).
https://arxiv.org/abs/1910.10307

Denouden Taylor, Rick Salay, Krzysztof Czarnecki, Vahdat Abdelzad, **Buu Phan**, and Sachin Vernekar. "Improving reconstruction autoencoder out-of-distribution detection with mahalanobis distance", preprint 2018. https://arxiv.org/abs/1812.02765

AWARDS

Ontario Graduate Scholarship 2023
Award for top students in Ontario, Canada.

Best paper award 2019
Received at the Workshop on Artificial Intelligence Safety Engineering for the paper "Bayesian uncertainty quantification with synthetic data."

Toyota Canada Graduate Scholarship 2018
Scholarship for graduate students working in AI Safety.

Faculty of Engineering Awards, University of Waterloo 2018, 2019
Scholarship for top-performing graduate students.

International Master's Student Awards, University of Waterloo 2017-2019
Scholarship for international graduate students.

Undergraduate Valedictorian, Vietnam National University (IU Campus) 2016

ACADEMIC SERVICES

- Reviewer - TMLR/AISTATS 2024/CVPR 2022/ ICML 2023.

SOFTWARE SKILLS

Programming: PyTorch, HuggingFace, Tensorflow, Matlab, PyThon, C/C++.
System: Unix, MacOS .
Tools: Git, Slurm, Docker, WandB.