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. My recent work builds on information-theoretic principles to develop probabilistic methods for large language models, with a focus on tokenization and efficiency. Before starting my PhD, I worked on adversarial attacks, approximate inference, out-of-distribution detection, and uncertainty quantification for neural networks.

Ressearch Topics: probabilistic modelling, LLMs, tokenization, information theory.

ACADEMIC BACKGROUND

Ph.D. Electrical and Computer Engineering 2022 - Oct 2026 (Expected)
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

Qualcomm AI Research, Canada May 2025 - Aug 2025
AI Research Intern.
Host: Dr. Roland Memisevic.
Project: Length Generalization in Hybrid Recurrent-Transformer.

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

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, Ashish Khisti and Karen Ullrich. "Cross-Tokenizer Likelihood Scoring Algorithms for Language Model Distillation" (**Under Review**).

Buu Phan, Ashish Khisti. "Channel Simulation and Distributed Compression with Ensemble Rejection Sampling" (**NeurIPS 2025**). https://www.arxiv.org/abs/2510.05552

Joseph Rowan, **Buu Phan**, Ashish Khisti. "List-Level Distribution Coupling with Applications to Speculative Decoding and Lossy Compression" (**NeurIPS 2025**). https://arxiv.org/abs/2506.05632.

Buu Phan, Reza Ebrahimi, Sanjay Haresh, Roland Memisevic. "Delayed Attention Training Improves Length Generalization in Transformer–RNN Hybrids" (**What Can('t) Transformers Do? Workshop @ NeurIPS 2025**). https://arxiv.org/abs/2510.00258

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" (**ICLR 2025**). https://arxiv.org/abs/2410.09303.

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

Salehkalaibar Sadaf*, **Buu Phan***, 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

Buu Phan, Ashish J Khisti "On List Decoding with Importance Sampling". In Learn to Compress & Compress to Learn Workshop, **ISIT Workshop** 2025.

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/CVPR/ICML/ICLR/NeurIPS.

SOFTWARE SKILLS

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