Tam Minh Nguyen

CONTACT INFORMATION

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EDUCATION

Rice University, Houston, Texas, USA — 2023–present

Ph.D. student in Electrical and Computer Engineering

- Advisor: Professor Richard G. Baraniuk

University of Business and Economics - VNU, Ha Noi, Vietnam — 2013–2018

B.S. in International Business and Economics

RESEARCH INTERESTS

My research aims at understanding and advancing self-attention mechanisms in transformers. Adopting a mathematical approach, I prove that self-attention has connections with various established and well-developed techniques, from probabilistic clustering and non-parametric regression to primal-dual optimization and image denoising. These connections reveal the inherent properties and limitations of self-attention while providing principled frameworks to further develop transformers for real-world applications.

CONFERENCE PUBLICATIONS

Tam Nguyen, Tan M. Nguyen, Richard G. Baraniuk. "Mitigating Over-smoothing in Transformers via Regularized Nonlocal Functionals". *Conference on Neural Information Processing Systems (NeurIPS), 2023.*

Tan M. Nguyen*, **Tam Nguyen***, Nhat Ho, Andrea Bertozzi, Richard G. Baraniuk, Stanley J. Osher. "A Primal-Dual Framework for Transformers and Neural Networks". *International Conference on Learning Representations (ICLR), 2023 (notable-top-25%).*

Tan M. Nguyen*, **Tam Nguyen***, Long Bui*, Hai Do, Dung Le, Hung Tran-The, Khuong Nguyen, Richard G. Baraniuk, Nhat Ho, Stanley J. Osher. "A Probabilistic Framework for Pruning Transformers via a Finite Admixture of Keys". *International Conference on Acoustics, Speech, and Signal Processing (ICASSP, notable-top-3%), 2023.*

Tan M. Nguyen*, Minh Pham*, **Tam Nguyen**, Khai Nguyen, Stanley J. Osher, Nhat Ho. "FourierFormer: Transformer Meets Generalized Fourier Integral Theorem". *Conference on Neural Information Processing Systems (NeurIPS), 2022..*

Tan M. Nguyen*, **Tam Nguyen***, Hai Do, Khai Nguyen, Vishwanath Saragadam, Minh Pham, Khuong Nguyen, Nhat Ho, Stanley J. Osher. "Improving Transformer with an Admixture of Attention Heads". *Conference on Neural Information Processing Systems (NeurIPS), 2022..*

Tam Nguyen*, Tan M. Nguyen*, Dung Le, Khuong Nguyen, Anh Tran, Richard G. Baraniuk, Nhat Ho, Stanley J. Osher. "Improving Transformers with Probabilistic Attention Keys". *International Conference on Machine Learning (ICML), 2022..*

WORKSHOP PAPERS

Tam Minh Nguyen, Quang Huu Pham, Linh Bao Doan, Hoang Viet Trinh, Viet-Anh Nguyen, Viet-Hoang Phan. "Contrastive Learning for Natural Language-Based Vehicle Retrieval". *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 2021.*

*: co-first author

Viet Anh Nguyen*, **Tam Nguyen***, Huy Quang Dao*, and Quang Huu Pham*. "S-NLP at SemEval-2021 Task 5: An Analysis of Dual Networks for Sequence Tagging". *International Workshop on Semantic Evaluation (SemEval), 2021.*

Invited Seminar Presentations

A Primal-Dual Framework for Transformers and Neural Networks. *MURI meeting, Office of Naval Research, 2023.*

Industrial Experience

FPT Software, Ha Noi, Vietnam 2021–2023

AI Resident. My research in transformers started here, where we adopted probabilistic perspectives to explain and improve transformer models.

Sun Asterisk Inc., Ha Noi, Vietnam 2020–2021

AI Engineer. I gained experience working with machine learning models on various topics, including self-supervised learning for toxic span detection, multi-task learning for relation extraction, and multimodal learning for vehicle retrieval. I also participated in several AI competitions:

- CVPR AI city challenge track 5: Natural Language-Based Vehicle Retrieval. Ranked 2^{nd} on the public test dataset and 4^{th} on the private test dataset.
- SemEval 2021 Task 5: Toxic Span Detection. Ranked 2^{nd}.
- VLSP 2020 Relation Extraction. Ranked 3^{rd}.

References

Professor Richard G. Baraniuk
C. Sidney Burris Professor of Electrical and Computer Engineering
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Rice University, Houston, Texas
Email: richb@rice.edu

Professor Tan Minh Nguyen
Professor of Mathematics
National University of Singapore
Email: tanmn@nus.edu.sg

Professor Nhat Ho
Professor of Statistics and Data Sciences
The University of Texas at Austin, Texas
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