Viet Anh Khoa Tran

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I am interested in conceiving novel learning algorithms and architectures beyond backpropagation and feedforward networks, that draw inspiration from - as well as contribute to - computational, cognitive and systems neuroscience.

RESEARCH

Neuromorphic Software Ecosystems (PGI-15), Forschungszentrum Jülich 2023 - now
Doctoral Researcher

- Exploring spatially and temporally local learning algorithms for complex visual reasoning tasks.
- Conceived a cortically-inspired continual representation learning algorithm (TMCL) that continually integrates high-level information from sparse labels into a generalist representation space.

Computation in Neural Circuits (INM-6), Forschungszentrum Jülich 2022 - 2023
Student research assistant

- Demonstrated the efficacy of dendritic modulations in the context of task-incremental continual and layer-local learning by developing a modulation-aware learning rule, contributing to research published in PNAS.

Chair for Human Language Technology (i6), RWTH Aachen 2018 - 2022
Student research assistant

- Demonstrated that joint training does not necessarily improve cascaded speech translation systems beyond domain adaptation effects.
- Analyzed absolute and relative positional encodings in the Transformer architecture, being one of the first works to demonstrate relative encodings generalize better to sequence lengths beyond those seen during training.
- Systematically analyzed and implemented sampling methods for approximating training losses of language models with large vocabularies, deriving correction terms under which these sampling methods perform equivalently.

ACADEMICS

PhD Computer Science, *Forschungszentrum Jülich (RWTH Aachen)* *2023 - now*

- Subject: Biologically Grounded Closed-Loop Visual Reasoning
- Supervisor: *Willem A. M. Wybo*

MSc. Data Science, *RWTH Aachen* *2019 - 2023*

- supported by a *Deutschlandstipendium*
- Thesis: *Towards Biologically Plausible Contextual Adaptation through Task-Modulated Contrastive Learning*
- Final grade: *1.0 (with distinction)*

Exchange Semester, *University of Waterloo* *Fall 2019*

- supported by a *PROMOS Study Abroad Scholarship*

BSc Computer Science, *RWTH Aachen* *2016 - 2019*

- Thesis: *Extensions to the Transformer Architecture for Neural Machine Translation*
- Final grade: *1.2 (with distinction)*

PUBLICATIONS AND PREPRINTS

- **V. A. K. Tran**, E. Neftci, W. A. M. Wybo (2025). *Contrastive Consolidation of Top-Down Modulations Achieves Sparsely Supervised Continual Learning.* NeurIPS 2025
- W. A. M. Wybo, M. Tsai, **V. A. K. Tran**, B. Illing, J. Jordan, W. Senn, A. Morrison (2023). *NMDA-driven dendritic modulation enables multitask representation learning in hierarchical sensory processing pathways.* Proceedings of the National Academy of Sciences, Volume 120, Issue 32.
- **V. A. K. Tran**, D. Thulke, Y. Gao, C. Herold, H. Ney (2022). *Does Joint Training Really Help Cascaded Speech Translation?* EMNLP 2022
- Y. Gao, D. Thulke, A. Gerstenberger, **V. A. K. Tran**, R. Schlüter, H. Ney (2021). *On Sampling-Based Training Criteria for Neural Language Modeling.* Interspeech 2021
- J. Rosendahl, **V. A. K. Tran**, W. Wang, H. Ney (2019). *Analysis of Positional Encodings for Neural Machine Translation.* IWSLT 2019

TEACHING EXPERIENCE

Teaching assistant for the course "Brain-inspired Computing and Engineering" 2025
Forschungszentrum Jülich / RWTH Aachen

- Conceived exercises from scratch, taught a weekly tutorial class, assisted in oral examinations.

Student teaching assistant for the course "Data Structures and Algorithms" 2018
RWTH Aachen

- Assisted in exam and midterm corrections, tutored a weekly exercise class, corrected and graded weekly submissions.

Student teaching assistant for the course "Programming" 2017 - 2018
RWTH Aachen

- Assisted in exam and midterm corrections, tutored a weekly exercise class, corrected and graded weekly submissions.

SKILLS

Natural Languages German (Mother tongue), English (Proficient, CEFR level C2), French (Basic spoken and written knowledge, CEFR level B1), Vietnamese (Basic spoken knowledge)

Programming Languages Python, Java, Rust, C++, JavaScript, PHP

Frameworks and Tools PyTorch, NVIDIA DALI, JAX, NumPy, Pandas, scikit-learn, matplotlib, LaTeX, HTML, CSS, SQL, SLURM, Vim, Git,

SysAdmin Docker, Linux (Networking, System Administration), Bash, MySQL (MariaDB), Nginx, Apache

EXTRA-CURRICULAR

Student dormitory Am Weißenberg, Aachen 2016 - 2023
Core member of the dormitory's network team

- Responsible for the security as well as the reliability of the dormitory's network.
- Implemented measures in order to streamline the dormitory's identity management and access point management.