

Le Quoc-Tung

*Ph.D. Candidate, Ecole Normale Supérieure
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Research interests

My research focuses on the training of **sparse deep neural networks**. Currently, I am studying it through the lens of **sparse matrix factorization**, a simpler but already involved question. My primary objectives are:

- **Accelerate** current algorithms to train sparse neural networks.
- Develop a **mathematical framework** to understand the **optimization**, **generalization**, and **limitation** of neural networks.

Education

Sep 2020 – **Ph.D. Student**, *Computer Science Laboratory, ENS de Lyon, Lyon, France*

Dec 2023 Supervisors: [Rémi Gribonval](#) and [Elisa Riccietti](#)

(Expected) Subject: **Sparse matrix factorization and beyond**

- [Algorithmic](#) and [mathematical](#) aspects of the [sparse matrix factorization problem](#).
- Connection between [sparse matrix factorization](#) and [sparse deep neural networks](#).

Sep 2017 – **License 3 - Master 2**, *ENS de Paris, Paris, France*

Aug 2020 ○ **License 3**: [Program L3 Computer Science](#)

ENS de Paris

○ **Master 1**: [Parisian Master of Research in Computer Science](#)

ENS Paris

○ **Master 2**: [Master Mathematics, Vision and Machine Learning](#)

ENS Paris Scalay

Sep 2014 – **Undergraduate**, *Hanoi University of Science and Technology, Hanoi, Vietnam*

Aug 2017 Program: **Talented Engineering of Information and Technology**

Research Internship

Apr 2020 – **Multi-layer sparse matrix factorization**, *Team DANTE, ENS de Lyon, Lyon*

Aug 2020 Supervisor: Rémi Gribonval - You can find my internship report [here](#)

Feb 2019 – **Domain Adaptation and Transfer Learning**, *Team MLIA, LIP6, Paris*

Jun 2019 Supervisor: Mathieu Cord - LIP6, Sorbone University

Jun 2018 – **Quantum computing and optimization**, *Team MC2, ENS de Lyon, Lyon*

Aug 2018 Supervisor: Omar Fawzi - LIP, ENS de Lyon.

Feb 2016 – **Evolutionary Algorithms and applications in Wireless Sensor Network**, *MSO*

May 2017 *Laboratory, School of Information and Communication Technology, Hanoi*

Supervisor: Huynh Thi Thanh Binh - SolCT, Hanoi University of Science and Technology.

Publications

- [1] **Q-T., Le, E., Riccietti, R., Grivonval, Does a sparse ReLU network training problem always admit an optimum?**, *Thirty-seventh Conference on Neural Information Processing Systems, Dec 2023, New Orleans (Louisiane), United States, 2023*
- [2] A., Gonon, L., Zheng, C., Lalanne, **Q-T., Le, G., Lauga, C., Poulinquen, Sparsity can improve privacy of neural networks**, *GRETSI, Grenoble, France, 2023*
- [3] H., Vu, **Q-T., Le, D-H., Ta, and R. Hildebrant, Towards Better Bounds for Finding Quasi-Identifiers**, *ACM SIGMOD/PODS International Conference on Management of Data, Seattle, WA, USA, 2023*
- [4] **Q-T.,Le, E., Riccietti, R., Grivonval, Spurious Valleys, NP-hardness, and Tractability of Sparse Matrix Factorization With Fixed Support**, *SIAM Journal on Matrix Analysis and Applications, 2022*
- [5] **Q-T.,Le, L., Zheng, E., Riccietti, R., Grivonval, Fast learning of fast transforms, with guarantees**, *ICASSP 2022 - IEEE International Conference on Acoustics, Speech and Signal Processing, Singapore, Singapore, May 2022*
- [6] **Q-T., Le and R., Gribonval, Structured Support Exploration for Multi-layer Sparse Matrix Factorization**, *ICASSP 2021 - IEEE International Conference on Acoustics, Speech and Signal Processing, Toronto, Ontario, Canada, June 2021*
- [7] T-H., Nguyen, T-H., Nguyen, T-T-B., Huynh, E., Kurniawan and **Q-T., Le, Connectivity optimization problem in vehicular mobile Wireless Sensor Networks**, *2016 International Conference on Computational Intelligence and Cybernetics, Makassar, Indonesia, Nov 2016*

--- Talks and Presentations

- June 2023 **Existence of optima in sparse matrix factorization and sparse ReLU networks training**, *Research visit at Université de Mons*, Mons, Belgium
- May-June 2023 **Sparse Matrix Factorization from an Optimization Point of View**, *SIAM Conference on Optimization (OP23)*, Seattle, Washington, U.S.
- Sep 2022 **Sparse Matrix Factorization and Beyond**, *Workshop MIA-MIVA*, Sophia-Antipolis, France
- Jun 2022 **From hardness to efficiency in sparse deep network training**, *SNN Workshop*, virtual
- May 2022 **NP-hardness, Tractability and Landscape of Fixed Support Matrix Factorization**, *Journée SMAI-MODE*, Limoges, France
- Apr 2022 **Fixed support matrix factorization**, *Seminar ARIC*, ENS de Lyon, Lyon, France
- June 2021 **Fixed support matrix factorization is NP hard**, *GdR ISIS thematic day: Theory of deep learning*, virtual

--- Honor and awards

- 2012-2013 **Third Prize in Vietnamese Mathematics Olympiads**
- 2013-2014 **First Prize in Vietnamese Mathematics Olympiads**

2014 **Le Van Thiem Award**

This prize is annually given to two or four students and teachers to recognize their achievements in teaching and studying of mathematics by Vietnamese Mathematical Society.

2014-2015 **Special Prize in Vietnamese Mathematics Olympiads for Undergraduate**

Special Prize is only given to students who obtain two First Prizes or achieve the highest score in Algebra and Analytics Section.

Nov 2016 **Consolation Prize in Samsung Software Challenges**

Other skills

Programming **C, C++, Python, Java, Ocaml**

Language **Vietnamese** (Mother tongue), **English** (6.5 IELTS), **French** (B1 - B2 TCF)

Operating **Windows, MacOS, Ubuntu, Debian**
System