Le Quoc-Tung

Ph.D. Candidate, Ecole Normale Supérieure (ENS) de Lyon, France

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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 – Sep 2023 (Expected)
Ph.D. Student, *Computer Science Laboratory, ENS de Lyon*, Lyon, France
Supervisors: **Rémi Gribonval** and **Elisa Riccietti**
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 – Aug 2020
License 3 - Master 2, *ENS de Paris*, Paris, France
- **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 – Aug 2017
Undergraduate, *Hanoi University of Science and Technology*, Hanoi, Vietnam
Program: **Talented Engineering of Information and Technology**

Research Internship

Apr 2020 – Aug 2020
Multi-layer sparse matrix factorization, *Team DANTE, ENS de Lyon*, Lyon
Supervisor: Rémi Gribonval - You can find my internship report here

Feb 2019 – Jun 2019
Domain Adaptation and Transfer Learning, *Team MLIA, LIP6*, Paris
Supervisor: Mathieu Cord - LIP6, Sorbone University

Jun 2018 – Aug 2018
Quantum computing and optimization, *Team MC2, ENS de Lyon*, Lyon
Supervisor: Omar Fawzi - LIP, ENS de Lyon.

Feb 2016 – May 2017
Evolutionary Algorithms and applications in Wireless Sensor Network, *MSO Laboratory, School of Information and Communication Technology*, Hanoi
Supervisor: Huynh Thi Thanh Binh - SoICT, Hanoi University of Science and Technology.

Publications

[1] **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*

[2] **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*

[3] **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*

[4] 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

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