Sofiane Ennadir

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Summary

I am an AI/ML researcher at Microsoft/King (ABK), where I work on Temporal Graph Neural Networks and their application to real-world problems. My research interests also include the foundations of large-scale models, with a particular focus on theoretically understanding the internal mechanisms of Transformer-based architectures and Large Language Models (LLMs). I am currently completing a PhD at KTH Royal Institute of Technology under the supervision of Michalis Vazirgiannis, where my work has focused on the robustness of Graph Neural Networks (GNNs), including the study of adversarial attacks and the development of theoretically grounded defense strategies.

Experience

AI/ML Researcher *Stockholm, Sweden*
Microsoft (ABK - King AI Labs) *August 2024 – Present*

- Internship (From August 2024 to February 2025), then full-time researcher.
- Working on Self-supervised representation learning on Continuous-Time Dynamic Graphs (CTDG) and theoretically investigating Transformer-Based models.

Research Intern *New York, USA*
Flatiron Institute - Simons Foundation *May 2024 – Aug 2024*

- Affiliated to the Polymathic AI initiative, I worked on extending the usage of the Joint-Embedding Predictive Architectures (JEPA) for time series pre-training.

Research Intern *Paris, France*
BNP Paribas *June 2020 – Dec 2020*

- Worked within the RISK Artificial Intelligence Research center (Risk AIR) on the Interpretability of ML/DL Models, mainly using counterfactual explanations in a black-box model approach.

Research Scholar *Louisville, KY*
University of Louisville *June 2019 – Sep 2018*

- Worked with Professor Hichem Frigui on a ML-based approach to detect Lung Cancer from CT Images. The output was a Computer Aided Diagnosis System with a 94% (± 0.6) accuracy on the Luna Challenge.

Education

KTH Royal Institute Of Technology *2021 – 2025*
PhD candidate in Deep Learning for graphs

- Thesis: On the Adversarial Robustness and Applications of Graph Neural Networks (GNNs).
- Supervisor: Professor Michalis Vazirgiannis (Ecole Polytechnique/KTH).
- Expected Graduation Date: September 2025.

Ecole Polytechnique - IPP Paris *2019 – 2021*
MSc in Applied Mathematics - Data Sciences

- Thesis: Interpretability and Explicability of Machine Learning Models.
- Supervisors: Professor Eric Moulines and Professor Erwan Le Pennec.

EMINES School Of Industrial Management - UM6P *2014 – 2019*
Master Of Engineering

- A Co-Directed Program by Ecole Polytechnique and supervised by Professor Eric Moulines including 2 years preparatory classes and 3 years General, Industrial Management Engineering Courses.

Publications

[1] Expressivity of Representation Learning on Continuous-Time Dynamic Graphs: An Information-Flow Centric Review.

S. Ennadir*, G. Zarzar*, F. Cornell*, L. Cao, O. Smirnov, T. Wang, L. Zólyomi, B. Brinne, S. Asadi.
Published at the Transactions on Machine Learning Research (**TMLR**) [link].

[2] If You Want to Be Robust, Be Wary of Initialization.

S. Ennadir, J. Lutzeyer, M. Vazirgiannis, E. Bergou.
Accepted at the 38th Annual Conference on Neural Information Processing Systems (**Neurips 2024**) [link].

[3] Joint Embeddings Go Temporal.

S. Ennadir, S. Golkar, L. Sarra.
Accepted at the TSALM Workshop, **Neurips 2024** [link].

[4] Bounding the Expected Robustness of Graph Neural Networks Subject to Node Feature Attacks.

Y. Abbahaddou*, **S. Ennadir***, J. Lutzeryer, M. Vazirgiannis, H. Boström.
Accepted at the 13th International Conference on Learning Representations (**ICLR 2024**) [link].

[5] A Simple and Yet Fairly Effective Defense for Graph Neural Networks.

S. Ennadir, Y. Abbahaddou, J. Lutzeryer, M. Vazirgiannis, H. Boström.
Accepted at the 38th AAAI Conference on Artificial Intelligence (**AAAI 2024**) [link].

[6] UnboundAttack : Generating Unbounded Adversarial Attacks to Graph Neural Networks

S. Ennadir, A. Alkhatib, G. Nikolentzos, M. Vazirgiannis, H. Boström.
Accepted at the International Conference on Complex Networks and their Applications (**CNA 2023**) [link].

Academic Service and Outreach

Talks

- From Bounds to Defenses: A Comprehensive Look at GNN Robustness - Metis Spring School.
- Theoretically Upper-Bounding the Expected Adversarial Robustness of GNNs - Collective ML.
- Adversarial Robustness of GNNs - MoroccoAI.

Awards

- WASP Doctoral Scholarship funded by the Knut and Alice Wallenberg Foundation 2021
- OCP Full Excellence merit scholarship for outstanding results in entrance examination. 2014

Teaching

- Introduction to LLMs & Deep Learning on Graphs - Ecole Polytechnique.
- Deep Learning for time series, NLP and Graphs - Ecole Polytechnique Executive Education.

Academic Reviewing

- Neurips (2025, 2024), ICLR (2025), KDD (2025), Learning On Graphs (2024), TMLR.

Skills

Languages	*Fluent:* English (Toef Score 102). *Native:* Arabic, French
Programming	*Proficient:* Python. - *Prior experience:* MATLAB, C++, SQL, HTML.
Software Tools	PyTorch, PyTorch Geometric, Deep Graph Library, TensorFlow.