

# ANDREA CAVALLO

M.Sc. in Computer Engineering and Artificial Intelligence from Politecnico di Torino

## SUMMARY

I hold a M.Sc. Degree in Computer Engineering and I am looking for exciting PhD opportunities in **Machine Learning and Deep Learning**. I gained research experience through several projects during my studies and through my Master Thesis, which focuses on **Graph Neural Networks** and their limitations when applied to heterophilous graphs. I also worked with **Explainable AI** applied to the healthcare world. I enjoy diving into the details of Machine Learning algorithms, understanding their limitations and trying to explain the motivations behind their predictions. I am also fascinated by the impact these algorithms can have on several real-world tasks, and I aim at improving them and solving challenging problems.

## CONTACT

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in Andrea Cavallo

## SKILLS

### Programming

- *Advanced:* Python
- *Intermediate:* C, C++, SQL
- *Basic:* Java, JavaScript

### Software & Tools

- *Advanced:* Pytorch, Numpy
- *Intermediate:* Pandas, MATLAB,  $\LaTeX$
- *Basic:* TensorFlow, Hadoop, Spark, React, Git

### Main ML and CS topics

- *Machine Learning and Deep Learning:* Graph Machine Learning, Explainable AI, Computer Vision, Natural Language Processing
- *Computer Science:* Databases (DBMS and Data Warehouses), Operating Systems (Unix/Linux environment and concurrent programming), Computer Networks, Cybersecurity, Embedded Systems

## LANGUAGES

Italian (native speaker)  
English (IELTS 8.0)

## OTHER INTERESTS

- I like practicing different sports: I enjoy running, I am an average football and tennis player and I often go hiking and skiing.
- I like different kinds of games: I play chess on online platforms and I enjoy playing cards and board games.

## EDUCATION

📅 09/2020 - 10/2022

📍 Politecnico di Torino, Torino

### Master's - Computer Engineering

- Specific track: Artificial Intelligence and Data Analytics
- Final grade: 110/110 cum laude (GPA: 29.6/30)
- Master Thesis: *Graph Neural Networks on heterophilous graphs: performance analysis and new architectures*, supervised by Prof. Luca Vassio, Dr. Claas Grohnfeldt, Michele Russo and Dr. Giulio Lovisotto

📅 02/2021 - 09/2022

📍 Alta Scuola Politecnica, Torino - Milano

### Excellence Program

- Program involving the best 150 students from Politecnico di Torino and Politecnico di Milano
- Participated in conferences and group activities on innovation, management of change, design and complex decision making
- Realized a Clinical Decision Support System (NEAR) based on Explainable AI in collaboration with Dedalus, a leading company in software for healthcare

📅 09/2017 - 09/2020

📍 Politecnico di Torino, Torino

### Bachelor's - Electronic Engineering

- Final grade: 110/110 cum laude (GPA: 29.88/30)
- Member of Percorso Giovani Talenti, a program for the best 200 students in the university

📅 08/2019 - 12/2019

📍 University of Georgia, Athens, GA, USA

### Exchange Program

- Won a scholarship to finance the program

## WORK EXPERIENCE

📅 01/04/2022 - 30/09/2022

📍 Huawei Munich Research Center, Munich

### Research Intern

- Performed research on Node Anomaly Detection and Graph Neural Networks on heterophilous graphs for the Master Thesis

📅 01/10/2021 - 30/06/2022

📍 Team PoliOcean, Torino

### Computer Vision team member

- Implemented computer vision tasks (line detection, object detection) for an ROV to take part in the international Mate ROV Competition

📅 01/04/2020 - 30/06/2021

📍 Team Icarus PoliTo, Torino

### Machine Learning team member

- Applied Machine Learning algorithms to model the behavior and the parameters of an aircraft
- Created Machine Learning models to predict rocket's trajectory

📅 15/01/2020 - 29/02/2020

📍 WeStudents s.r.l., Torino

### Data Analyst

- Applied ML techniques to improve the design and analyze customers' behavior for a mobile app

## SELECTED RESEARCH PROJECTS

### Graph Neural Networks on heterophilous graphs

- Defined 2NCS, a new metric to characterize a graph property that affects GNN performance
- Designed and tested GATH and GCNH, two GNN models that achieve competitive results with SOTA on heterophilous graphs
- Paper currently under review at the AAAI GCLR 2023 workshop

### Graph Machine Learning for Node Anomaly Detection

- Designed and tested GNN-based architecture with generative component to perform node anomaly detection on graphs

### Explainable AI for cardiac event risk prediction 🧠🔗

- Implemented NEAR, an explainable ML-based model to predict the risk of cardiac events
- The explainable model is built based on the explanations provided by SHAP

### Real-time Domain Adaptation in Semantic Segmentation 🧠

- Implemented and trained a semantic segmentation architecture (BiSeNet)
- Implemented domain adaptation (also real-time) to train the network on synthetic data
- Generated pseudo-labels for the target domain with Maximum Probability Threshold

### Low-resource Machine Translation 🧠

- Performed fine-tuning of a transformers-based Machine Translation model on small datasets for low-resource languages