Corrado Coppola

Curriculum Vitae

Summary

I am a PhD student in **Artificial Intelligence** at the **Sapienza University of Rome**. I collaborate with the Mathematical Institute at the **University of Oxford**, where I am currently working as visiting research scientist, and with the Vision Perception and Learning Robotics Laboratory (ALCOR Lab) at Sapienza University. With a mixed background in Applied Mathematics and Engineering, my research interests lie in the field of **Large-scale Optimization for Deep Learning** with main applications in **Computer Vision** and **Reinforcement Learning**.

- LinkedIn: `https://www.linkedin.com/in/corrado-coppola-6a67a7202/`
- Sapienza University: `https://phd.uniroma1.it/web/CORRADO-COPPOLA_nP1698064_EN.aspx`
- GitHub: `https://github.com/corradocoppola97`
- University of Oxford: `https://www.maths.ox.ac.uk/people/corrado.coppola`

Work Experiences

University of Oxford - Mathematical Institute

2024 — **Visiting Research Scientist**.
Under the supervision of Prof. Coralia Cartis, I am a member of the Numerical Analysis group, where I am studying the worst-case complexity of the optimization methods I have developed during my PhD.

Sapienza University of Rome

2023–today — **Research Project Manager**.
I am currently leading a 4 people team for the research project **"Large-scale optimization for Deep Learning"**.
- The joint work with ALCOR Lab within the project has produced as an output two ready-to-use optimizers for the training of large-scale models [GitHub Repo.] [arXiv];
- The project has been ranked by the Italian Ministry of Education and Research (MIUR) amongst the most promising in the IT field for the year 2023 and granted additional state funding [MIUR Ranking];
- I am tutoring two MS thesis students on potential applications of the developed optimizer in Distributed Learning.

2022–today — **Machine Learning Teaching Assistant**.
I have been tutoring MS students in Data Science for the Deep Learning course, covering SVM, the main types of neural networks for supervised learning, and the use of Pytorch.

2022–2023 — **Mathematical Analysis Teaching Assistant**.
I tutored BS students in Computer Science for "Calculus I" and "Calculus II" exams.

2021 –today — **Researcher**.
During my Doctoral studies I have been involved in the departmental research project **Optimization for Enhancing Machine Learning Models**.
- I have carried out a computational study on the scaling capabilities of different optimizers for Image Recognition tasks [GitHub Repo.] [arXiv];
- I have tutored three MS students in the field of Deep Reinforcement Learning (application to the Capacitated Vehicle Routing Problem and to dynamic asset management);
- I have developed a Deep Learning-based heuristic to address large-size mixed-integer optimization problems. [arXiv];

Sintef Digital Research Institute

2021   **MS Thesis Student**.
I have developed my MS thesis project on Deep Reinforcement Learning applied to the Traveling Salesperson Problem in collaboration with the department of applied mathematics of Sintef Digital Research Institute (Oslo, Norway). The solution I proposed achieved promising results and has been further developed with other two MS students I tutored. [Technical Report]

Education

2021–today   **PhD in Artifical Intelligence (ABRO Program)**, *DIAG, Sapienza University of Rome & Mathematical Institute, University of Oxford*.
Research interests:
- Optimization algorithms for Deep Learning;
- Large-scale optimization for Computer Vision,
- Deep Reinforcement Learning applied to logistics and finance;

2019–2021   **MS in Applied Mathematics**, *Sapienza University of Rome*, Italy, Grade: 110/110 *cum laude*, GPA: 30.0/30.
Core courses: Continuous optimization, combinatorial opitimization, deep learning, operations research, automatic control, stochastic control
Thesis: *Solving the Traveling Salesperson Problem with Deep Reinforcement Learing*

2015–2019   **BS in Management Engineering**, *Sapienza University of Rome*, Italy, Grade: 110/110 *cum laude*, GPA: 29.1/30 .
Thesis: *Solving a black-box production scheduling problem with Mixed-Integer Programming*

2010–2015   **High School - Liberal Arts**, *Torquato Tasso, Rome*, Italy, Final Grade: 100/100.

Other experiences and awards

2023   **Innovation Project Grant**, *Sapienza University of Rome*.
I have been granted with additional funds for the project "Large scale optimization for Deep Learning", which has been selected by the Italian MoE among the most promising research projects in the IT field for the year 2023.

2023   **Visiting Researcher Grant**, *Sapienza University of Rome & University of Oxford*.
I have been selected for a fully financed visiting research period at the Mathematical Institute of the University of Oxford, where I am currently working in the Numerical Analysis team, under the supervision of Prof. Coralia Cartis.

2021   **MS Excellence Program**, *Sapienza University of Rome*.
I have been ranked first among the highest achieving students of the Engineering Faculty and attended the excellence program, which involved applications of Operations Research to industry-related cases
- Dynamic portfolio optimization, in collaboration with Enel Global Trading s.p.a.;
- Crew scheduling optimization, in collaboration with Sabre Corporation;
- Sales and bid management, in collaboration with Wabtec Corporation.

2016-2019   **Russian Language Exchange Program**, *Moscow State University*.
I have attended Russian language summer school in Moscow State University every year, gaining a proficiency certificate in Russian (equivalent to European level C1).

Computer skills

Advanced   Python (PyTorch, TensorFlow), Matlab, AMPL, Gurobi, Git, LaTeX
Intermediate   C++, MySQL
Basic   C, Solidity

Languages

Italian	Mother tongue.
English	Full professional knowledge.
Russian	Full professional knowledge.
French	Advanced spoken, intermediate written. I have lived 2 years in France, Lyon.
German	Basic written and spoken knowledge. I have attended A2 courses at Goethe Institut in Rome.

Scientific publications

- **C. Coppola**, G. Grani, M. Monaci, L. Palagi, *Heuristics for the Traveling Salesperson Problem based on Reinforcement Learning*, [Technical Report]

- G. Grani, **C. Coppola**, V. Agasucci, *PUSH: a primal heuristic based on Feasibility PUmp and SHifting*, [arXiv]. Submitted to "COAP".

- S. Foa, **C. Coppola**, G. Grani, L. Palagi, *Solving the vehicle routing problem with deep reinforcement learning*, [Technical Report]

- **C. Coppola**, L. Papa, M. Boresta, I. Amerini, L. Palagi, *Computational issues in Optimization for Deep networks*, [arXiv]. Submitted to "TOP".

- **C. Coppola**, G. Liuzzi, L. Palagi, *CMA Light: a novel Minibatch Algorithm for large-scale non convex finite sum optimization*, [arXiv]. Submitted to "JMLR".

Conferences and Seminars

Feb 2022	**AIRO Young**, *Roma Tre University*, Rome, Italy.
	Invited speaker. Delivered a talk *Heuristics for the Traveling Salesperson Problem based on Deep Reinforcement Learing.*
Jul 2022	**19th Workshop on Advances in Continuous Optimization**, *SST NOVA*, Lisbon, Portugal.
	Invited speaker. Delivered a talk *Solving the vehicle routing problem with deep reinforcement learning.*
Jul 2023	**Optimization2023**, *Aveiro University*, Aveiro, Portugal.
	Invited speaker. Delivered a talk *Block-decomposition methods for the training of large-scale neural models.*
Aug 2023	**20th Workshop on Advances in Continuous Optimization**, *Corvinus University*, Budapest, Hungary.
	Invited speaker. Delivered a talk *CMA Light: an objective function-free method for large-scale optimization.*
Feb 2024	**Numerical Analisys Seminars**, *University of Oxford*, Oxford, UK.
	Invited speaker. Delivered a full seminar *CMA Light: a novel Minibatch Algorithm for large-scale non convex finite sum optimization.*