Francesco Caporali

Master's student in Mathematics

francescocaporali@outlook.com | +39 333 9538258 | Via Roma 48, Oriolo Romano (VT), Italy
homepage | caporali | francescocaporali | Last updated: February 19, 2023

Education

Master's degree (M.Sc.) in Stochastics and Data Science

University of Turin

September 2022 – Ongoing | Turin, Italy

- Master's degree in Mathematics with emphasis on probability, statistics and data analysis
- Program entirely taught in English

Allievi Honors Program, track in Economics, Statistics and Applied Mathematics

Collegio Carlo Alberto

September 2022 – Ongoing | Turin, Italy

- Merit-based admission with **full scholarship**
- Extra exams
- Mandatory **GPA** of at least **27/30**

Laurea Triennale (B.Sc.) in Mathematics

University of Pisa

September 2018 – May 2022 | Pisa, Italy

- Final grade: **110/110 cum laude** (a.y. 2020/21)
- Computational curriculum
- Core classes:
  - **Probability**
  - Scientific Computing
  - **Numerical methods for ODEs**
  - Algorithms and Data Structures
  - Operational Research
  - Computational Laboratory

Liceo Scientifico (scienze applicate)

Liceo Scientifico Paolo Ruffini

September 2013 – July 2018 | Viterbo, Italy

- Final grade: **100/100**

Bachelor's Thesis

Reti neurali profonde: capacità di approssimazione e convergenza a processi gaussiani

Deep neural networks: approximation capabilities and gaussian behaviour

Supervisor: Prof. Dario Trevisan

Description: Reviewing some relevant theoretical results, we analysed neural networks (NNs) as a formal model. We presented some versions of the density result of the functions that can be generated by NNs in L^p spaces and in $C(X)$ with X compact in $\mathbb{R}^k$. Then we studied the Gaussian asymptotic behaviour of random NNs. The work includes experiments developed independently using Python's PyTorch module.

Projects

Undergraduate works

University of Pisa

2018 – 2021

- **Scientific Computing:** a *preconditioned conjugate gradient algorithm* for GeneRank (Matlab).
- **Algorithms and Data Structures:** implementation of an *urban route planner* (C++).
- **Computational Laboratory:** implementation and analysis of *simulated annealing* (Python).

Skills

Programming Languages

Proficient:
- Python (PyTorch)
- Matlab
- C, C++

Basic:
- PHP
- JavaScript
- OCaml

Markup Languages

Proficient:
- LaTeX

Basic:
- HTML

Other computer skills

- Microsoft Office
- Operating systems: Linux (all major distributions), Windows, macOS

Languages

- **Italian:** mother tongue
- **English:** B2 level

Certifications

First Certificate in English (FCE)

Cambridge English

October 2017

- Grade: **178/190**

Academic Interests

- Probability theory
- Functional analysis
- Machine learning
- Neural Networks
- Data Structures
- Programming

Extracurriculars

Winter school on Stochastic Processes, Analysis and Semigroups

Universities of Trento and Wuppertal

December 12-16 2022 Trento, Italy

- Four minicourses:
  - An introduction to Malliavin Calculus
  - Entropy inequalities and Wasserstein metric
  - Filtering theory
  - Regularisation by noise

PHC Systems administrator

Department of Mathematics, University of Pisa

December 2018 – May 2022 Pisa, Italy

- Member of a group of technicians that maintains a network of Linux computers and offers various services for mathematics students
- Maintenance of the web server poisson.phc.dm.unipi.it

Other Interests

- Computers
- Running
- Board games and video games