

# FRANCESCO CAPORALI

## GRADUATE STUDENT IN COMPUTATIONAL MATHEMATICS

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📍 Via Roma 48, Oriolo Romano (VT), Italy  
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## EDUCATION

### 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 analyzed 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 behavior of random NNs. The work includes experiments developed independently using Python's PyTorch module.

## EXTRACURRICULARS

### 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](http://poisson.phc.dm.unipi.it)

### Early experiences

📅 2017–2018

- Participation in several editions of the *Olimpiadi della Matematica*, both individually and in teams
- Participation in a Mathematics and Physics summer campus in Bardonecchia (TO)

## PROJECTS

### Undergraduate works

#### University of Pisa

📅 2018 – 2021

- 🔗 **Scientific Computing:** a *preconditioned conjugate gradient algorithm* for GeneRank (Matlab).
- 🔗 **Algorithms and Data Structures:** implementation of a *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
- Real Analysis
- Neural Networks
- Data Structures
- Programming

## OTHER INTERESTS

- Computers
- Running
- Board games and Videogames