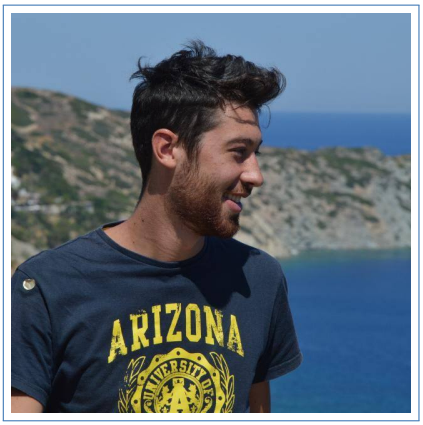
Lorenzo Fiaschi

Ph.D. Student



Personal Data

Hometown	Piombino, LI, 57025 Italy
Date of Birth	16th January 1995
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Education

2019–present **Ph.D. in Information Engineering**, *University of Pisa*, Pisa, Italy.

2017–2019 **Master's Degree in Computer Science and Engineering**, *University of Genoa*, Genoa, Italy.
Thesis Title: Non-Archimedean Game Theory, a Numerical Approach (Supervisor: Marco Cococcioni, Alessandro Verri)
Mark - 110 cum Laude | Average Weighted Mark - 32.09 | Major: Machine Learning | Minors: Game Theory & Non-Standard Analysis

2014–2017 **Bachelor's Degree in Information Engineering**, *University of Pisa*, Pisa, Italy.
Thesis Title: Game Theory with Infinite or Infinitesimal Quantities: New Numerical Results (Supervisor: Marco Cococcioni)
Mark - 110 cum Laude | Average Weighted Mark - 28.73

Experience

Internships

2019 **Public Seminar**, *Machine Learning for non-linear dynamics inference and prediction*, Electronic Engineering Department, Genoa, Italy.

Description:

- sparse non-linear fields inference (potentially constrained)
- interpretable inference of a Koopman operator by means of autoencoders
- CNN and Pseduo-Huber loss for Dynamical Smoothing of non-linear stochastic fields
- Supervisor: Marco Storace

2018 **University Project**, *field: Computational Biology*, DIBRIS, Genoa, Italy.

Description:

- Collaboration with San Martino Hospital (GE)
- Exploitation of machine learning techniques (MKL) for prediction of heart attacks and dementia rising
- Data: genome,retina segmentation and common clinical information of 1000 people

Achievements:

- Design and implementation of the whole framework
- Improved prediction performances w.r.t. the literature

2017 **University Project**, *field: Non-Standard Game Theory*, Information Engineering Department, Pisa, Italy.

Description:

- Extension of Prisoner's Dilemma Tournaments to non-standard quantities
- Exploitation of the Grossone Methodology
- Numerical verification of the theoretical results in Matlab
- The study has been realized with the agreement of the University of Genoa

Achievements:

- Characterization of the solutions of a constrained infinite tournament, when they exist
- Numerical analysis of new and never studied tournament scenarios

Relevant Classes

Machine Learning	Machine Learning, Inverse Problems, Computational Vision, Bioinformatics & Computational Biology, Graph Analytics
NSA	Ultrafilters and Non-Standard Methods
HPC	High Performance Computing
Game Theory	Game Theory

Achievements (Scholarships, Fellowships and Awards)

2020 Winner of 5,000€ grant for "Hardware accelerators for Deep Neural Networks and Machine Learning" workshop organization, funded by University of Pisa within "Progetto Giovani" initiative

2019 Winner of a three-year doctoral fellowship at Dipartimento di Ingegneria dell'Informazione, University of Pisa, granted by the Italian Ministry of Education, University and Research

2019 Winner of the "Springer Young Researcher Prize", for the best talk provided by a young researcher during the 3rd *International Conference on Numerical Computations: Theory and Algorithms* (NUMTA'19)

2009 Winner of the scholarship "Francesca Paola Nicotra", ranking first out of all the first-three-years high school students of Piombino (LI), Italy

Attended Conferences (* if presenting a work)

March 2021* 11th *International Conference on Evolutionary Multi-Criterion Optimization* (EMO2021), Shenzhen, China

October 2020* 14th *International Confonference on Game Theory and Management* (GTM2020), St. Petersburg, SPB, Russia

June 2019* 3rd *International Confonference on Numerical Computations: Theory and Algorithms* (NUMTA'19), Isola di Capo Rizzuto, KR, Italy

Attended Summer Schools and Seminars

September 2019 Summer school on Applied Harmonic Analysis and Machine Learning, Department of Mathematics, Genoa, Italy

December 2018 Seminar on "Weak Interactions", taught by prof. Andreas Maurer, independent researcher, Genoa, Italy

July 2018 2nd International Summer School on Deep Learning 2018, Genoa, Italy

Teaching

2020/2021 Assistant lecturer of Symbolic and Evolutionary AI, Information Engineering Masters's degree, 20h, 6 CFU, 75 students)

2020/2021 Assistant lecturer of Elements of Programming, Information Engineering Bachelor's degree, 20h, 9 CFU, 150 students)

2019/2020 Assistant lecturer of Elements of Programming, Information Engineering Bachelor's degree, 40h, 9 CFU, 300 students)

Service to the Research Community

Fiaschi has been program committee member of the following conferences:

6–9 December 2019	IEEE Symposium on Computational Intelligence for Security and Defense Applications (IEEE CISDA), Xiamen, China

Fiaschi has served as organizer of the following conferences:

30 November 2020	PhD Workshop on Hardware accelerators for AI and HPC applications, Pisa, Italy

Fiaschi has served as peer reviewer for the following journals:

1 paper	Journal of Marine Science and Engineering

Fiaschi has served as peer reviewer for the following books:

1 chapter	Numerical infinities and infinitesimals

Language Skills

Italian	mother tongue
English	fluent: attending PhD program mainly in English (2019-), attending C1/C2-level IELTS proficiency course, C1-level CLI certification for academic English (2020), attended for two years master's classes taught in English (2017-2019), B2-level Cambridge Certification (2012)

Computer Skills

Programming Languages	C and C++11 (advanced), Java (advanced), Julia (advanced), Python (advanced), SQL (fair)
Parallel Paradigms	OpenMP (advanced), MPI(advanced), OpenCL (basic)
Math Packages	Matlab (fair), R (basic)
Typesetting Packages	Latex (advanced), Microsoft Word (advanced), Microsoft PowerPoint (advanced)
Development tools	Visual Studio Code (advanced), Anaconda (advanced)
Database	MySQL (fair)

Publications

[1] Cococcioni M., Fischi L., and Lermusiaux P. Game theory for unmanned vehicles path planning in the marine domain: state of the art and new possibilities. *Journal of Maritime Science and Engineering*, 2021. to appear.

[2] Benci V., Cococcioni M., and Fiaschi L. Non-standard analysis revisited: an easy axiomatic presentation oriented towards numerical applications.

Applied Mathematics and Computer Science, 2021. to appear.

[3] Cococcioni M., Fiaschi L., and Lambertini L. Computing optimal decision strategies using the infinity computer: the case of non-Archimedean zero-sum games. In *Numerical Infinities and Infinitesimals in Optimization*. Springer, 2021. to appear.

[4] Lai L., Fiaschi L., Cococcioni M., and Deb K. On the use of grossone methodology for handling priorities in multi-objective evolutionary optimization. In *Numerical Infinities and Infinitesimals in Optimization*. Springer, 2021. to appear.

[5] Lai L., Fiaschi L., Cococcioni M., and Deb K. Solving mixed Pareto-lexicographic multi-objective optimization problems: The case of priority levels. *IEEE Transaction on Evolutionary Computation*, 25:971–985, 2021, doi:10.1109/TEVC.2021.3068816.

[6] Cococcioni M., Fiaschi L., and Lambertini L. Non-Archimedean zero-sum games. *Journal of Computational and Applied Mathematics*, 393:113483, 2021, doi:10.1016/j.cam.2021.113483.

[7] Lai L., L. Fiaschi, M. Cococcioni, and Deb K. Handling priority levels in mixed pareto-lexicographic many-objective optimization problems. *11th Edition of International Conference Series on Evolutionary Multi-Criterion Optimization (EMO2021)*, pages 362–374, 2021, doi:10.1007/978-3-030-72062-9_29.

[8] M. Cococcioni and L. Fiaschi. The big-M method with the numerical infinite M. *Optimization Letters*, 15(7):2455–2468, 2021, doi:10.1007/s11590-020-01644-6.

[9] L. Lai, L. Fiaschi, and M. Cococcioni. Solving mixed Pareto-lexicographic multi-objective optimization problems: The case of priority chains. *Swarm and Evolutionary Computation*, 55:100687, 2020, doi:10.1016/j.swevo.2020.100687.

[10] L. Fiaschi and M. Cococcioni. Non-Archimedean Game Theory: A numerical approach. *Applied Mathematics and Computation*, 409:125356, 2020, doi:10.1016/j.amc.2020.125356.

[11] L. Fiaschi and M. Cococcioni. Generalizing Pure and Impure Iterated Prisoner's Dilemmas to the Case of Infinite and Infinitesimal Quantities. *In Numerical Computations: Theory and Algorithms*, pages 370–377, Cham, 2020. Springer International Publishing, doi:10.1007/978-3-030-40616-5_32.

[12] L. Fiaschi and M. Cococcioni. Numerical Asymptotic Results in Game Theory Using Sergeyev's Infinity Computing. *International Journal of Unconventional Computing*, 14(1):1–25, 2018.