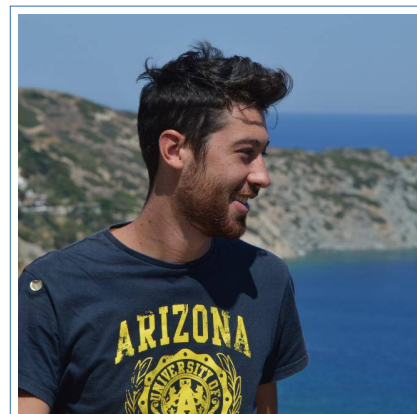


Lorenzo Fiaschi

Research Fellow



Personal Data

Hometown Piombino, LI, 57025 Italy
Date of Birth 16th January 1995
Place of Residence 1 G. Rossini Rd, Pisa, PI, 56122, Italy
Voice 366-4415723
Office 050-2217689
lorenzo.fiaschi@phd.unipi.it
Email lorenzo.fiaschi@gmail.com
Web Site www.lorenzofiaschi.it

Education

2022–present **Postdoctoral researcher**, *University of Pisa*, Pisa, Italy.
2019–2022 **Ph.D. in Information Engineering**, *University of Pisa*, Pisa, Italy.
Thesis Title: Numerical non-Archimedean Calculus: Applications, Software Implementation and Preliminary Hardware Design
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

Achievements (Scholarships, Fellowships and Awards)

2022 Winner of a postdoctoral fellowship at Dipartimento di Ingegneria dell’Informazione, University of Pisa, granted by the European Project EPI SGA2 H2020

2022 Winner of 3,000€ grant for Ph.D. students mobility abroad of at least 3 months, funded by University of Pisa within “Bando per l’assegnazione di contributi di mobilità per periodi di ricerca all’estero di dottorandi - Anno 2022”

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)

September 2022* *International Conference on Applications in Electronics Pervading Industry, Environment and Society*, Genoa, Italy

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

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

June 2019* 3rd *International Conference 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

- 2022/2023 Assistant lecturer of Elements of Programming, Information Engineering Bachelor’s degree, 20h, 9 CFU, 250 students)
- 2021/2022 Assistant lecturer of Symbolic and Evolutionary AI, Information Engineering Masters’s degree, 20h, 6 CFU, 50 students)
- 2021/2022 Assistant lecturer of Elements of Programming, Information Engineering Bachelor’s degree, 20h, 9 CFU, 250 students)
- 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:

- 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:

- 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
- 1 paper Computers and Operations Research

Fiaschi has served as peer reviewer for the following books:

- 1 chapter Numerical infinities and infinitesimals

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

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] Fiaschi L. and Cococcioni M. A non-archimedean interior point method and its application to the lexicographic multi-objective quadratic programming. *Mathematics*, 10(23):4536, 2022, doi:10.3390/math10234536.
- [2] Rossi F., Fiaschi L., Cococcioni C., and Saponara S. Design and fpga synthesis of ban processing unit for non-archimedean number crunching. In *International Conference on Applications in Electronics Pervading Industry, Environment and Society*, 2022. to appear.
- [3] Lai L., Fiaschi L., Cococcioni C., and Kalyanmoy D. Pure and mixed lexicographic-paretian many-objective optimization: state of the art. *Natural Computing*, 1:1–16, 2022, doi:10.1007/s11047-022-09911-4.
- [4] Cococcioni M., Fiaschi L., and Lambertini L. On impure prisoners’ dilemmas, folk theorems, and correlation devices. In *EARIE 2022 (VIENNA)*, 2022. to appear.
- [5] Cococcioni M., Fiaschi 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*, 9:1175, 2021, doi:10.3390/jmse9111175.
- [6] Benci V., Cococcioni M., and Fiaschi L. Non-standard analysis revisited: an easy axiomatic presentation oriented towards numerical applications. *Applied Mathematics and Computer Science*, 32(1):65–80, 2022, doi:10.34768/amcs-2022-0006.
- [7] 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*, pages 271–295. Springer, 2021, doi:10.1007/978-3-030-93642-6_11.
- [8] 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*, pages 183–218. Springer, 2021, doi:10.1007/978-3-030-93642-6_8.
- [9] 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.
- [10] 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.

- [11] 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.
- [12] 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.
- [13] 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.
- [14] 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.
- [15] 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.
- [16] 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.