

ALBERTO CARLEVARO

14 February 1995 ◊ CRLLRT95B14D969V

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I am a passionate mathematician trained through years of curiosity and hard work, which led me to earn both a bachelor's and a master's degree in this field. I have always been eager to learn something new, and this has allowed me to have unforgettable experiences all over Europe and in the United States, where I spent an entire year in Berkeley, deepening my knowledge of artificial intelligence and machine learning, my fields of expertise thanks to my doctorate in electrical engineering. I have devoted this passion not only to my studies, but also to many other activities that have made me who I am, such as Scoutism and a love of swimming. I am really glad you will read some of my story, I hope you enjoy it as much as I did!

CURRENT EMPLOYMENT

Research project manager at Aitek S.p.A.

July 2024 - present

Freelance researcher in the field of trustworthy artificial intelligence with affiliation to the IEIIT institute of the CNR.

EDUCATION

PhD in Science and Technology for Electronic and Telecommunication Engineering,

Department of Electrical, Electronics and Telecommunications Engineering and Naval Architecture (DITEN) of the University of Genoa, Italy, **funded by** Institute of Electronics, Information Engineering and Telecommunications (IEIIT) of the National Council of Research of Italy (CNR) and Aitek S.p.A.. Nov. 2020 - Nov. 2023

Visiting Research Scholar in the **Department of Electrical Engineering and Computer Sciences (EECS) at University of California Berkeley.** Apr. 2023 - May 2024

Master's degree in mathematics, University of Genoa, Italy Grade: 110/110 cum Laude, Mar. 2020

Thesis Title: Mathematical Methods for Liquid Crystals: the Fréedericksz transition

Main Courses: Mathematical Analysis, Mathematical Physics, Numerical Computation.

Bachelor's degree in mathematics University of Genoa, Italy

Grade: 103/110, Sep. 2017

Thesis Title: Fractal Geometry: from the Topological Dimension to the Hausdorff Dimension.

Main Courses: Analysis and Analytic Geometry, Algebra and Topology.

Classical High School Diploma, Liceo Classico Statale Giuseppe Mazzini, Sampierdarena (Ge), Italy Grade: 100/100, 2014

MAIN PUBLICATIONS

Please check my personal page on [Google Scholar](#).

Journals:

- Carlevaro, A., Alamo, T., Dabbene, F., & Mongelli, M. (2024). **Conformal Predictions for Probabilistically Robust Scalable Machine Learning Classification** . arXiv preprint arXiv:2403.10368.
- Carlevaro, A., Lenatti, M., Paglialonga, A., & Mongelli, M. (2023). **Multi-Class Counterfactual Explanations using Support Vector Data Description**. IEEE Transactions on Artificial Intelligence.
- Carlevaro, A., Alamo, T., Dabbene, F., & Mongelli, M. (2023). **Probabilistic Safety Regions Via Finite Families of Scalable Classifiers**. ArXiv, abs/2309.04627.
- M. Lenatti, A. Carlevaro, A. Guergachi, K. Keshavjee, M. Mongelli, A. Paglialonga **A novel method to derive personalized minimum viable recommendations for type 2 diabetes prevention based on counterfactual explanations**, in Plos One, vol. 17, issue 11, Published: November 17, 2022, doi: 10.1371/journal.pone.0272825.
- I. Vaccari, A. Carlevaro, S. Narteni, E. Cambiaso and M. Mongelli, **eXplainable and Reliable Against Adversarial Machine Learning in Data Analytics**, in IEEE Access, vol. 10, pp. 83949-83970, 2022, doi: 10.1109/ACCESS.2022.3197299.
- A. Carlevaro, M. Lenatti, A. Paglialonga and M. Mongelli, **Counterfactual Building and Evaluation via eXplainable Support Vector Data Description**, in IEEE Access, vol. 10, pp. 60849-60861, 2022, doi: 10.1109/ACCESS.2022.3180026.
- A. Carlevaro and M. Mongelli, **A New SVDD Approach to Reliable and eXplainable AI**, in IEEE Intelligent Systems, doi: 10.1109/MIS.2021.3123669.

Conferences:

- J. Motta, A. Sassu, A. Deidda, L. Ghiani, A. Carlevaro, F. Gambella, G. Garibotto, **A Deep Learning Artichoke Plants Identification Approach for Site-Specific UAV Spraying**, 12th International AIIA Conference: September 19-22, 2022 Palermo - Italy
- I. Vaccari, A. Carlevaro, S. Narteni, E. Cambiaso and M. Mongelli, **On The Detection Of Adversarial Attacks Through Reliable AI**, IEEE INFOCOM 2022 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS), 2022, pp. 1-6, doi: 10.1109/INFOCOMWKSHPS54753.2022.9797955.
- Marta Lenatti, Alberto Carlevaro, Karim Keshavjee, Aziz Guergachi, Alessia Paglialonga, Maurizio Mongelli, **Characterization of Type 2 Diabetes using Counterfactuals and Explainable AI**, 32nd Medical Informatics Europe Conference (MIE2022), May 27th - 30th 2022, Nice.
- Carlevaro A., Mongelli M. (2021) **Reliable AI Through SVDD and Rule Extraction**. In: Holzinger A., Kieseberg P., Tjoa A.M., Weippl E. (eds) Machine Learning and Knowledge Extraction. CD-MAKE 2021. Lecture Notes in Computer Science, vol 12844. Springer, Cham. <https://doi.org/10.1007/978-3-030-84060-0-10>
- Maurizio Mongelli Alberto Carlevaro, Marta Lenatti, Martina Mammarella, Marco Muselli, Sara Narteni, Vanessa Orani, Alessia Paglialonga, Fabrizio Dabbene (2022) **eXplainable and Reliable AI Approaches to Trustworthy AI**, II Convegno Nazionale CINI sull'Intelligenza Artificiale (Ital-IA 2022).
- Mongelli M. Paglialonga A., Lenatti M., Orani V., Carlevaro A., Narteni S., Muselli M., Dabbene F., **AI & Health: Methods and Applications**, II Convegno Nazionale CINI sull'Intelligenza Artificiale (Ital-IA 2022).

GitHub

- MultiClassSVDD, https://github.com/AlbiCarle/MultiClass_SVDD.
- CounterfactualSVDD, <https://github.com/AlbiCarle/CounterfactualSVDD>.
- ZeroFPRSVDD, https://github.com/AlbiCarle/ZeroFPR_SVDD.

Dataset

Adversarial Machine Learning Dataset, <https://www.kaggle.com/datasets/cnrieit/adversarial-machine-learning-dataset>.

Under submission or current works

Sassu, Alberto and Motta, Jacopo and Deidda, Alessandro and Ghiani, Luca and Carlevaro, Alberto and Garibotto, Giovanni and Gambella, Filippo, **Artichoke Deep Learning Detection Network for Site-Specific Agrochemicals Uas Spraying**. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4272684.

Gianluca Brilli, Alberto Carlevaro, Chiara Garibotto, Jacopo Motta, Vittoriano Muttillio, Giacomo Valente, Damiano Vallocchia, Paolo Burgio, **Sentient Spaces in the ECSEL FRACTAL Project: the Intelligent Totem Use Case Demonstrators**, submitted to Microprocessors and Microsystems.

RESEARCH PROJECTS

I have actively participated in the following research projects

- **REXASI-PRO**, Horizon 2020 (October 2022 -).
 - I am currently working on WP2 - Requirements for the development of a reliable and explainable AI framework. In addition, I am working on defining the functional architecture of the project's use cases (which have as their final goal the development of a fully autonomous wheelchair) and related risk analysis.
- **More Than This**, POR Liguria 2019.
 - I worked on the extraction of data from the Genoa subway simulator (implemented by STAM srl) and implemented a classical and original machine learning algorithm for the prediction of train waiting platform crowding. In addition, I created a questionnaire on the goodness of fit of the results obtained from the model that will be used as a statistical benchmark for a future publication on AI techniques for smart cities.
- **Comp4Drones**, Horizon 2020.
 - In this project, I actively worked on both the implementation and exploitation of the results. In particular, I contributed to the definition of an object detector (a feature pyramid network, a special type of convolutional neural network) for detection of artichoke plants from a UAV spraying drone. The results obtained, in collaboration with other researchers, were published in the 12th AIIA International Conference and in the Smart Agriculture technology Journal published by Elsevier.
- **NextPerception**, Horizon 2020 (May 2020 - April 2023).
 - I worked on extracting and labeling data and writing materials for some of the project deliverables.
- **Fractal**, Horizon 2020 (September 2021 - August 2023).
 - I worked on extracting and labeling data and writing materials for some of the project deliverables.
- **CASTORE**, (2020-2021).
 - This was the first project I worked on. I followed it from the data acquisition part, working directly with the use case provider and all the other partners. I managed the data, doing statistical analysis on the relationship between the port of Genoa and the vehicular traffic in its proximity. Then I built an autoregressive model, later made explainable, based on the extracted data (both from the port and city traffic) for predicting bus inter-arrival times at bus stops of interest (30 rule based models) working in the perimeter area of the port.

WORK EXPERIENCE

Aitek S.p.a., Genova (Italy)
PhD student

November 2020 - November 2023

- As a PhD student I work as AI developer in Deep Learning models for video content analysis.

- Participation in KDT, ECSEL and other "Calls for Proposals" events.
- Managing funded research: writing European and MiSe projects, attending project meetings, and writing deliverables.

CNR-IEIIT, Genoa (Italy)

November 2020 - November 2023

PhD student

- From June 2020 to November 2020 as research fellow and then as PhD student.
- ML techniques for safe cooperating cyber-physical systems, trustworthiness AI, eXplainable AI, counterfactual eXplanation, robust ML.
- Project management activities and contribution to the organisation of project proposals.

Teaching Tutor, University of Genoa (Italy)

a.y. 2018, 2019, 2020, 2021, 2022, 2023

- Tutor for the bachelor's degree in Mathematics in the subjects of Mathematical Analysis I, Algebra I and Linear Algebra and Analytical Geometry.

Associazione Festival della Scienza, Genoa (Italy)

Oct. 24 - Nov. 4 2019

- Worked as a scientific animator on the occasion of the seventeenth edition of the science festival in Genoa, that promotes through exhibitions, debates, installations scientific knowledge for all types of audiences.

GSCV, Valbrenna (GE) (Italy)

seasonal work (2014 - 2020)

- Worked as a lifeguard at a municipal outdoor water pool.

PERSONAL SKILLS

Languages

Mother tongue

Italian

other languages

English (C1)

Social skills

- Excellent ability to relate and communicate with people clearly and accurately acquired through participation in project meetings.
- Excellent ability to work in group, acquired both during the school experience (projects and reports) and through participation in European projects drafting.
- Good ability to manage and organize groups of people also derived from experience as a Scout leader.

Mathematical and Engineering skills

- Good theoretical and practical knowledge in:
 1. Uncertainty quantification in machine learning (e.g., conformal prediction).
 2. Black-box Machine Learning algorithms (e.g., neural networks).
 3. Mathematical analysis, convex analysis, statistical methods, learning theory.
 4. Explainable AI methods and algorithms (e.g., counterfactual explanations).
 5. Robust machine learning.
 6. Deep Learning techniques in smart agriculture.
- Good ability to analyse sensitive data.
- Good knowledge of IoT systems.

- Good teaching and learning skills.

Other skills

- Limited knowledge in FPGA boards.
- Very good knowledge of Microsoft Office and the Windows Operating System.
- Car equipped (A and B Italian licenses, California driver license).
- Lifeguard and first-aid responder certification (CPR/AED, American Heart Association)
- Competitive swimmer at Nuotatori Rivarolesi s.s.d. (2005 - 2014) and at Nuotatori Genovesi s.s.d. (2015 - Present)

TECHNICAL STRENGTHS

Languages	Python, R, Matlab, C and C++
Technologies	Rulex, Tensorflow, Keras, Latex, OpenFoam
Tools	Jupyter, Colab, PyCharm, Latex

CERTIFICATIONS

- Cambridge English: C1 Advanced (CAE)
- Cambridge English: B2 First (FCE)
- Cambridge English: B1 Preliminary (PET)
- ECDL

REVIEWS

I have been a reviewer for several scientific journals, such as IEEE Access, IEEE Intelligent Systems and Springer Nature. Please see my profile on Web of Science <https://www.webofscience.com/wos/author/record/2472385>.

AWARDS

- Winner of the 3rd edition of "Certamen Ligusticum" in the Greek test, <https://www.istruzioneeliguria.it/vincitori-del-certamen-ligusticum-2014/>. March 3, 2014

OTHER ACTIVITIES

- Lecturer in the seminar of the series "Thursday Meetings - special session 'Youth of IEIIT'", organized by CNR-IEIIT on the topic "Countermeasures against adversarial machine learning based on eXplainable and Reliable Artificial Intelligence". April 13, 2023
- Lecturer in the 4th edition of the "Cyber-Physical Systems Summer School", http://www.cpsschool.eu/wp-content/uploads/2022/09/poster_Carlevaro.pdf. September 19-23, 2022
- Lecturer of the course "Strategies for Telecommunications" in the Master of Science in Modeling, Engineering and Strategies of Operations and Systems (STRATEGOS), <http://www.simulationteam.com/strategos/program.html>. May 11, 2022
- Member of the CNR-IEIIT Journal Club held by Professor Fabrizio Dabbene of the Politecnico di Torino. The Journal Club is an informal club composed by professors and PhD students where articles regarding novelties in Artificial Intelligence are presented and discussed.

- AGESCI scoutmaster (2018 - Present)