

Giorgia Franchini

Research interests

Machine learning, deep learning, stochastic gradient methods, variance-reduced stochastic gradient methods, automatic hyperparameter selection, NAS Neural Architecture Search, image processing, anomaly detection, binary and multiclass classification, segmentation, autonomous driving, Agriculture 4.0, astronomy, life sciences.

Education

- 2017 – 2020 **University of Modena and Reggio Emilia** – Modena, Italy
PhD in Mathematics
Supervisors: Professors Luca Zanni and Valeria Ruggiero. *Title: Hyperparameters Setting in Stochastic Optimization Methods.*
- 2015 – 2017 **University of Modena and Reggio Emilia** – Modena, Italy
Master's Degree in Mathematics
Supervisor: Professor Luca Zanni. *Title: Stochastic Optimization Methods in Machine Learning.*
- 2015 **University of Modena and Reggio Emilia** – Modena, Italy
Bachelor's Degree in Mathematics
Supervisor: Professor Luca Zanni. *Title: Acceleration of Gradient Methods for Linear Inverse Problems.*

Publications

- 2026 **Accelerating Vision Foundation Models with Drop-in Depthwise Convolution**
C. Scribano, M. Mahdi, N. Prasadnikov, Y. Fu, G. Franchini, D. P. Paudel, M. Bertogna, L. Van Gool.
ICPR 2026.

- 2026 **Towards Faster and More Reliable Image-Based Quality Inspection in the Agri-Food Industry Through Optimized Data Pipelines and Neural Architectures**
E. Giacobazzi, P. Orlandi, G. Franchini, F. Muzzini, M. Neri, M. Roffilli.
AgriEngineering.
- 2026 **Generative Data Augmentation for ArUco-Free RGB-Based 6-DoF Object Pose Estimation**
C. Scribano, I. Ferrari, G. Franchini, E. Govi, Da. Sapienza, T. Poppi, M. Verucchi, M. Bertogna.
Journal of Imaging.
- 2026 **Enterotype-specific microbial biomarkers of immune checkpoint inhibitor response revealed by large-scale integrated metagenomic analysis**
F. Candeliere, E. Busi, S. Cerri, L. Sola, M. Lombardi, S. Greco, S. Pedroni, A. Amaretti, S. Raimondi, C. Chiavelli, M. G. Vitale, F. Bertolini, R. Depenni, G. Franchini, M. Dominici, M. Rossi.
Cancer immunology, immunotherapy.
- 2026 **Can machine learning help in solving the pallet loading optimization problem?**
M. Dell'Amico, G. Franchini, M. Magnani, L. Zanni.
Journal of Heuristics.
- 2026 **Hyperparameter optimization of an augmented autoencoder for 6D object pose estimation via neural architecture search**
M. Lombardi, D. Sapienza, E. Govi, G. Franchini.
Mathematics in Engineering.
- 2025 **A line-search based SGD algorithm with Adaptive Importance Sampling**
F. Camellini, S. Crisci, A. De Magistris, G. Franchini.
Journal of Computational and Applied Mathematics.
- 2025 **Segment Anything for Satellite Imagery: A Strong Baseline and a Regional Dataset for Automatic Field Delineation**
C. Scribano, E. Govi, P. Bertellini, S. Parisi, G. Franchini, M. Bertogna.
International Conference on Image Analysis and Processing.
- 2025 **Unsupervised noisy image segmentation using Deep Image Prior**
A. Benfenati, A. Catozzi, G. Franchini, F. Porta.
Mathematics and Computers in Simulation.

- 2025 **Linesearch-enhanced forward-backward methods for inexact nonconvex scenarios**
S. Bonettini, Gi. Franchini, D. Pezzi, M. Prato.
SIAM Journal on Imaging Sciences.
- 2025 **Computing pth root of a transition matrix with a deep unsupervised learning approach**
F. Camellini, G. Franchini, M. Prato.
International Journal of Computer Mathematics.
- 2025 **Early stopping strategies in Deep Image Prior**
A. Benfenati, A. Catozzi, G. Franchini, F. Porta.
Soft Computing.
- 2025 **A Machine Learning Approach to Speed up the Solution of the Distributor's Pallet Loading Problem**
M. Magnani, G. Franchini, M. Dell'Amico, L. Zanni.
Lecture Notes in Computer Science Volume 14476 LNCS, Pages 108 - 120 NUMTA.
- 2025 **Line Search Stochastic Gradient Algorithm with A-priori Rule for Monitoring the Control of the Variance**
G. Franchini, F. Porta, V. Ruggiero, I. Trombini, L. Zanni.
Lecture Notes in Computer Science Volume 14476 LNCS, Pages 94 - 107 NUMTA.
- 2024 **A stochastic gradient method with variance control and variable learning rate for Deep Learning**
G. Franchini, F. Porta, V. Ruggiero, I. Trombini, L. Zanni.
Journal of Computational and Applied Mathematics.
- 2024 **Addressing challenges in industrial pick and place: A deep learning-based 6 Degrees-of-Freedom pose estimation solution**
E. Govi, D. Sapienza, S. Toscani, I. Cotti, G. Franchini, M. Bertogna.
Computers in Industry.
- 2024 **Automatic Setting of Learning Rate and Mini-batch Size in Momentum and AdaM Stochastic Gradient Methods**
G. Franchini, F. Porta.
AIP Conference Proceedings.
- 2024 **GreenNAS: A Green Approach to the Hyperparameters Tuning in Deep Learning**
G. Franchini.
Mathematics.

- 2024 **Sex differences in schizophrenia-spectrum diagnoses: results from a 30-year health record registry**
M. Ferrara, E. M. A. Curtarello, E. Gentili, I. Domenicano, L. Vecchioni, R. Zese, M. Alberti, G. Franchini, C. Sorio, L. Benini, J. Little, P. Carozza.
Archives of Women's Mental Health.
- 2024 **Machine Learning for mental health: Focus on affective and nonaffective psychosis**
M. Ferrara, G. Franchini, M. Funaro, M. Belvederi Murri, T. Toffanin, L. Zerbinati, B. Valier, D. Ambrosio, F. Marconi, M. Cutroni, M. Basaldella, S. Seno.
Incorporating Ai Technology in the Service Sector: Innovations in Creating Knowledge, Improving Efficiency, and Elevating Quality of Life.
- 2024 **A variable metric proximal stochastic gradient method: An application to classification problems**
P. Cascarano, G. Franchini, E. Kobler, F. Porta, A. Sebastiani.
EURO Journal on Computational Optimization.
- 2024 **Machine learning from real data: A mental health registry case study**
E. Gentili, G. Franchini, R. Zese, M. Alberti, M. Ferrara, I. Domenicano, L. Grassi.
Computer Methods and Programs in Biomedicine Update.
- 2024 **Denoising Diffusion Models on Model-Based Latent Space**
C. Scribano, D. Pezzi, G. Franchini, M. Prato.
Algorithms.
- 2023 **Binary Classification of Agricultural Crops Using Sentinel Satellite Data and Machine Learning Techniques**
p. Bertellini, G. D'Addese, G. Franchini, S. Parisi, C. Scribano, D. Zanirato, M. Bertogna.
Proceedings of the 18th Conference on Computer Science and Intelligence Systems, Fed-CSIS 2023.
- 2023 **Machine Learning Techniques for Understanding and Predicting Memory Interference in CPU-GPU Embedded Systems**
A. Masola, N. Capodiecì, B. Rouxel, G. Franchini, R. Cavicchioli.
Proceedings - 2023 IEEE 29th International Conference on Embedded and Real-Time Computing Systems and Applications, RTCSA 2023.

- 2023 **Establishment of a Public Mental Health Database for Research Purposes in the Ferrara Province: Development and Preliminary Evaluation Study**
M. Ferrara, E. Gentili, M. Belvederi Murri, R. Zese, M. Alberti, G. Franchini, I. Domenicani, F. Folesani, C. Sorio, L. Benini, P. Carozza, J. Little, L. Grassi.
JMIR Medical Informatics.
- 2023 **Diagonal barzilai-borwein rules in stochastic gradient-like methods**
G. Franchini, F. Porta, V. Ruggiero, I. Trombini, L. Zanni.
International Conference on Optimization and Learning.
- 2023 **Piece-wise constant image segmentation with a deep image prior approach**
A. Benfenati, A. Catozzi, G. Franchini, F. Porta.
International Conference on Scale Space and Variational Methods in Computer Vision.
- 2023 **Explainable bilevel optimization: An application to the Helsinki deblur challenge**
S. Bonettini, G. Franchini, D. Pezzi, M. Prato.
Inverse Problems and Imaging.
- 2023 **Learning rate selection in stochastic gradient methods based on line search strategies**
G. Franchini, F. Porta, V. Ruggiero, I. Trombini, L. Zanni.
Journal of Computational and Applied Mathematics.
- 2023 **Constrained and unconstrained deep image prior optimization models with automatic regularization**
P. Cascarano, G. Franchini, E. Kobler, F. Porta, A. Sebastiani.
Computational Optimization and Applications.
- 2023 **DCT-Former: Efficient Self-Attention with Discrete Cosine Transform**
C. Scribano, G. Franchini, M. Prato, M. Bertogna.
Journal of Scientific Computing.
- 2023 **A line search based proximal stochastic gradient algorithm with dynamical variance reduction**
G. Franchini, F. Porta, V. Ruggiero, I. Trombini.
Journal of Scientific Computing.
- 2023 **Neural Architecture Search via classical Machine Learning methods**
G. Franchini, F. Porta, V. Ruggiero, L. Zanni.
Mathematics in Engineering.

- 2022 **On the First-Order Optimization Methods in Deep Image Prior**
P. Cascarano, G. Franchini, F. Porta, A. Sebastiani.
Journal of Verification, Validation and Uncertainty Quantification .
- 2022 **Machine Learning and Non-Affective Psychosis: Identification, Differential Diagnosis, and Treatment**
M. Ferrara, G. Franchini, M. Funaro, M. Cutroni, B. Valier, T. Toffanin, L. Palagini, L. Zerbini, F. Folesani, M. Belvederi Murri, R. Caruso, L. Grassi.
Current Psychiatry Reports, Springer.
- 2022 **Biomedical Image Classification via Dynamically Early Stopped Artificial Neural Network**
G. Franchini, M. Verucchi, A. Catozzi, F. Porta, M. Prato
Algorithms, MDPI.
- 2022 **Deep Image Prior for medical image denoising, a study about parameter initialization**
D. Sapienza, G. Franchini, E. Govi, M. Bertogna, M. Prato.
Frontiers in Applied Mathematics and Statistics.
- 2022 **Learning the Image Prior by Unrolling an Optimization Method**
S. Bonettini, G. Franchini, D. Pezzi, M. Prato.
Proceeding: 2022 30th European Signal Processing Conference (EUSIPCO).
- 2022 **Combining Weighted Total Variation and Deep Image Prior for natural and medical image restoration via ADMM**
P. Cascarano, A. Sebastiani, M. C. Comes, G. Franchini, F. Porta.
Proceedings Book: The 2021 International Conference on Computational Science and Its Applications - ICCSA 2021.
- 2022 **Thresholding Procedure via Barzilai-Borwein Rules for the Steplength Selection in Stochastic Gradient Methods**
G. Franchini, V. Ruggiero, I. Trombini.
Proceedings Book: International Conference on Machine Learning, Optimization, and Data Science, LOD 2021.
- 2022 **Constrained and unconstrained Deep Image Prior optimization models with automatic regularization**
P. Cascarano, E. Kobler, G. Franchini, F. Porta, A. Sebastiani.
Computational Optimization and Applications.

- 2021 **Automatic steplength selection in Stochastic Gradient Methods**
 G. Franchini, V. Ruggiero, I. Trombini.
Proceedings Book: The Seventh International Conference on Machine Learning, Optimization, and Data Science LOD 2021.
- 2021 **All You Can Embed: Natural Language Based Vehicle Retrieval With Spatio-Temporal Transformers**
 C. Scribano, D. Sapienza, G. Franchini, M. Verucchi, M. Bertogna.
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshop.
- 2020 **Steplength and Mini-batch Size Selection in Stochastic Gradient Methods**
 G. Franchini, V. Ruggiero, L. Zanni.
Proceedings book: The Sixth International Conference on Machine Learning, Optimization, and Data Science LOD 2020
- 2020 **Automatic Stochastic Dithering techniques on GPU: image quality and processing time improved**
 G. Franchini, R. Cavicchioli, J. C. Hu.
ASTESJ Advances in Science, Technology and Engineering Systems Journal
 DOI: 10.25046/aj050679.
- 2020 **Ritz-like values in steplength selections for stochastic gradient methods**
 G. Franchini, V. Ruggiero, L. Zanni.
Soft Computing
 DOI: 10.1007/s00500-020-05219-6.
- 2020 **On the Steplength Selection in Stochastic Gradient Methods**
 G. Franchini, V. Ruggiero, L. Zanni.
Sergeyev Y., Kvasov D. (eds) Numerical Computations: Theory and Algorithms. NUMTA 2019. Lecture Notes in Computer Science, vol 11973, Springer, Cham.
 DOI: 10.1007/978-3-030-39081-5_17.
- 2019 **Stochastic Floyd-Steinberg dithering on GPU: image quality and processing time improved**
 G. Franchini, R. Cavicchioli and J. C. Hu.
Fifth International Conference on Image Information Processing (ICIIP), Shimla, India, 2019, pp. 1-6
 DOI: 10.1109/ICIIP47207.2019.8985831.

- 2019 **Mise en abyme with Artificial Intelligence: How to Predict the Accuracy of NN, Applied to Hyper-parameter Tuning**
G. Franchini, M. Galinier, M. Verucchi.
Oneto L., Navarin N., Sperduti A., Anguita D. (eds) Recent Advances in Big Data and Deep Learning. INNSBDDL 2019. Proceedings of the International Neural Networks Society, vol 1. Springer, Cham
DOI: 10.1007/978-3-030-16841-4_30.
- 2018 **Artificial Neural Networks: The Missing Link Between Curiosity and Accuracy**
G. Franchini, P. Burgio, L. Zanni.
Oneto L., Navarin N., Sperduti A., Anguita D. (eds) Recent Advances in Big Data and Deep Learning. INNSBDDL 2019. Proceedings of the International Neural Networks Society, vol 1. Springer, Cham
DOI: 10.1007/978-3-030-16660-1_100.

Research experience

- November 2024 – present **Full-time Fixed-Term Researcher, Type B (RTD-B)**
- January 2022 – October 2024 **Full-time Fixed-Term Researcher, Type A (RTD-A)**
Supervisor: Marco Prato (UNIMORE)
- November 2020 – October 2021 **Research fellowship: Development of Stochastic Optimization Methods for Innovative Machine Learning Applications**
Supervisor: Valeria Ruggiero (UNIFE).
- May 2020 **Research collaboration contract: Edge and CCloud Computation: A Highly Distributed Software Architecture for BigData Analytics’ – ‘CLASS’ (‘action’)**
Supervisor: Marko Bertogna (UNIMORE).
- May 2019 – November 2019 **Research fellowship: Stochastic Optimization Methods for Large-Scale Problems in Machine Learning**
Supervisor: Valeria Ruggiero (UNIFE).
- April 2018 – April 2019 **Research fellowship: Acceleration Techniques for Optimization Methods in Large-Scale Machine Learning Applications. The activity was part of the EU research project CLASS “Edge and Cloud Computation: A Highly Distributed Software Architecture for Big Data Analytics”, Grant Agreement No. 780622.**
Supervisor: Marko Bertogna (UNIMORE).

Teaching experience

2026	10 teaching hours: Inexact and Stochastic Optimization Methods for Big Data Applications PhD School in Mathematics: UNIMORE, UNIFE, UNIPR.
2025/2026	14 teaching hours, course lecturer: Numerical Optimization for Artificial Intelligence Master's Degree in Mathematics, UNIMORE, FIM.
2024/2025/2026	45 teaching hours, course lecturer: Computational and Statistical Learning Master's Degree in Mathematics, Data Science curriculum, UNIMORE, FIM.
2024/2025	24 teaching hours, course lecturer: Fundamentals of Machine Learning Master's Degree in Computer Science, UNIMORE, FIM.
2022/2023	36 teaching hours, course lecturer: Computational and Statistical Learning Master's Degree in Mathematics, Data Science curriculum, UNIMORE, FIM.
2022/2023	28 teaching hours, course lecturer: Fundamentals of Machine Learning Master's Degree in Computer Science, UNIMORE, FIM.
2021/2023	10 teaching hours: Optimization Methods for Machine Learning PhD School in Mathematics: UNIMORE, UNIFE, UNIPR.
2021	30 teaching hours, adjunct lecturer: Numerical Analysis and Statistics Bachelor's Degree in Computer Engineering, UNIMORE, DIF, Mantua.
2021	30 teaching hours, adjunct lecturer: Computational and Statistical Learning Master's Degrees in Mathematics and Computer Science, UNIMORE.
2018/2019/2020/2021	120 tutoring hours, Youth Support Fund: Geometry and OFA Bachelor's Degree in Computer Engineering, UNIMORE.
2019/2020	4 teaching hours: Inverse Problems Master's Degree in Mathematics, UNIMORE.
2018/2019/2020	8 teaching hours: Mathematical Methods for Machine Learning Master's Degrees in Computer Science and Computer Engineering, UNIMORE.

2019/2020	15 days, Mathematics PLS Project: Development of Online OFA Test Questions FIM, UNIMORE.
2018/2019	4 teaching hours, Mathematics Preparatory Course Bachelor's Degree in Mathematics, UNIMORE.
2019	16 teaching hours, Mathematics Preparatory Course Bachelor's Degree in Geology, UNIMORE.
2018	15 tutoring hours: Mathematics I Bachelor's Degree in Geology, UNIMORE.
2018	4 teaching hours, A Week as a Scientist FIM, UNIMORE.
2016/2017/2018	Substitute high-school teacher: Mathematics and Physics A. Zanarini Private High School.
2017	Substitute secondary-school teacher: Mathematics and Science Andreoli State Secondary School.

Supervised theses

September 2026	The mathematics behind Artificial Intelligence. Laboratory activity on binary classification. Supervisor, Bachelor's Thesis in Mathematics.
April 2026	Thesis title: Comparative Analysis of Geometric and Neural Methods for Dust Detection in LiDAR Data (host company: HiPeRT SRL). Supervisor, Master's thesis in Mathematics.
April 2026	Thesis title: Segmentation of Cell Nuclei in Tumour Histological Tissues Using Deep Learning Models. Supervisor, Master's thesis in Mathematics.

April 2026	Thesis title: Comparative Analysis of Explainable AI Methods for Identifying Biological Variables Relevant to Immunotherapy Response. Supervisor, Master's thesis in Mathematics.
April 2026	Thesis title: LISA-AIS: Dynamic Batch-Size Control and Adaptive Importance Sampling in Deep Learning. Supervisor, Master's thesis in Mathematics.
February 2026	Thesis title: Scalable Gradient-Based Optimization Methods with Application to Supervised Learning. Co-supervisor, PhD thesis in Mathematics.
December 2025	Thesis title: Exploring Transducer-Based Architectures for Automatic Speech Recognition. Supervisor, Master's thesis in Mathematics.
December 2025	Thesis title: Integrating Artificial Intelligence into Business Processes: A Case Study at System Logistics (host company: System Logistics SPA). Supervisor, Master's thesis in Mathematics.
December 2025	Thesis title: Study of Unsupervised Machine Learning Techniques Applied to Metagenomic Data. Supervisor, Bachelor's thesis in Computer Science.
October 2025	Thesis title: Optimization of the ROS2 Pipeline for Robotic Grasping with YOLOv4: From Dataset Extraction to Picking-Point Estimation. Supervisor, Bachelor's thesis in Computer Science.
October 2025	Thesis title: Neural-Network Application for Surface-Defect Identification in the Textile Industry Using Machine Vision (host company: BonsAI SRL). Supervisor, Master's thesis in Mathematics.
October 2025	Thesis title: Explainability Methods for Constrained Optimization with Large Language Models (host company: Ammagamma). Supervisor, Master's thesis in Mathematics.
October 2025	Thesis title: From Machine Learning to Foundation Models: A Comparison of Models for Time-Series Forecasting (host company: Ammagamma). Supervisor, Master's thesis in Mathematics.
October 2025	Thesis title: Deep Reinforcement Learning for Cost Optimization in a Manufacturing Company (host company: AI-ML SRL). Supervisor, Master's thesis in Mathematics.

September 2025	Thesis title: Binary Classification of Treatment Response Using Machine Learning Techniques Applied to Metagenomic Data. Supervisor, Bachelor's thesis in Computer Science.
September 2025	Thesis title: Machine Learning Applied to Compositional Data from the Human Gut Microbiota for Predicting Response to Cancer Therapies. Supervisor, Bachelor's thesis in Computer Science.
September 2025	Thesis title: Hybrid Path-Planning Methodologies: Experiments with RRT and Hybrid A* (host company: HiPeRT SRL). Supervisor, Master's thesis in Mathematics.
July 2025	Thesis title: Automated Crystalline-Lens Segmentation in AS-OCT Images for Ophthalmic Applications (host company: Reggio Emilia Hospital). Supervisor, Master's thesis in Mathematics.
April 2025	Thesis title: Classification of Lesions in Patients with Non-Small Cell Lung Cancer (NSCLC) Using Deep Learning Techniques (host company: Reggio Emilia Hospital). Supervisor, Master's thesis in Mathematics.
April 2025	Thesis title: Object Detection in Thermal Images. Supervisor, Master's thesis in Mathematics.
December 2024	Thesis title: Digitization of Agricultural Rows Using Geometric and Machine Learning Techniques (host company: ABACO SPA). Supervisor, Master's thesis in Computer Science.
December 2024	Thesis title: Development of a Convolutional-Neural-Network-Based Anomaly-Detection System for Inspecting Surface Defects in Lithium-Ion Battery Separators (host company: BonsAI SRL). Supervisor, Master's thesis in Computer Science.
December 2024	Thesis title: Workforce Optimization in a Call Centre through Reinforcement Learning: A Deep-Q-Network-Based Approach (host company: Alkemy SpA). Supervisor, Master's thesis in Mathematics.
December 2024	Hyperparameter Optimization of an Augmented Autoencoder for 6D Object-Pose Estimation. Supervisor, Master's thesis in Mathematics.
October 2024	Thesis title: Machine Learning and Sport: Techniques for Predicting Modena Volley Attacks (host company: Volley Vision AI SRL). Supervisor, Master's thesis in Mathematics.

October 2024	Thesis title: Comparative Analysis of Codebook Interleaving Schemes in Meta's MusicGen Model. Supervisor, Master's thesis in Mathematics.
September 2024	Thesis title: Electricity Prices: Time-Series Analysis and Forecasting Models. Supervisor, Master's thesis in Mathematics.
September 2024	Thesis title: From Sensor-Volatile-Compound Interaction to Classification: An Experimental Analysis Using Time Series and Data-Driven Models (host company: Nano Sensor Systems SpA). Supervisor, Master's thesis in Mathematics.
July 2024	Thesis title: Machine Learning Models Based on Image Statistics for Visual-Quality Quantification. Supervisor, Bachelor's thesis in Mathematics.
April 2024	Thesis title: Time-Series Analysis and Exploration of Deep Learning Techniques for Business Demand Forecasting (host company: Ammagamma). Supervisor, Master's thesis in Mathematics.
April 2024	Thesis title: Store-Assortment Planning through Clustering Techniques: The Game7Athletics Case Study (host company: Game7Athletics). Supervisor, Master's thesis in Mathematics.
April 2024	Thesis title: Data-Driven Evolution: Redefining Business through Innovative Technologies and Analytics (host company: Reggio Emilia Hospital). Supervisor, Master's thesis in Mathematics.
April 2024	Thesis title: Motion Forecasting for Autonomous-Driving Competitions: A Deep Learning Approach (host company: HiPeRT SRL). Supervisor, Master's thesis in Mathematics.
December 2023	Thesis title: Cost Reduction and Efficiency Improvement: A Transition from Cloud Analytics to Headlight (host company: Doxee SpA). Supervisor, Master's thesis in Mathematics.
October 2023	Thesis title: No-Reference Indices in Machine Learning: A Case Study on Natural Images (host company: TimeLapseLab SRL). Supervisor, Master's thesis in Mathematics.
September 2023	Thesis title: Stochastic Gradient Methods in Machine Learning and Imbalanced-Dataset Management. Supervisor, Bachelor's thesis in Mathematics.

June 2023	Thesis title: Efficient Data Augmentation for Training Convolutional Neural Networks: An Industrial Application (host company: Bioretics SRL). Supervisor, Master's thesis in Computer Science.
January 2023	Thesis title: A comprehensive analysis of vision deep learning methods for object detection and 6D pose estimation: Real-time applications. Co-supervisor, PhD thesis in Mathematics.
December 2022	Thesis title: Deep Reinforcement Learning in an Industry 4.0 Setting: Completion of a Traffic Manager Task (host company: E80 SpA). Supervisor, Master's thesis in Computer Science.
October 2022	Thesis title: The SVM Machine Learning Methodology for Regression: Application to the Blurred-Text Problem. Supervisor, Bachelor's thesis in Mathematics.
October 2022	Thesis title: Use of a Neural Network and a Depth-Based Algorithm for 6D Pose Estimation. Co-supervisor, Bachelor's thesis in Computer Engineering.
October 2022	Thesis title: Use of Deep Learning Methods for Deploying 6D Pose Estimation in an Industrial Pick-and-Place Application and Its Industry 4.0 Integration. Co-supervisor, Bachelor's thesis in Computer Engineering.
July 2022	Thesis title: From the Monte Carlo Method to Artificial Intelligence. Supervisor, Bachelor's thesis in Mathematics.
June 2022	Thesis title: Deep Learning Models for the Analysis and Generation of Musical Sequences. Supervisor, Master's thesis in Mathematics.
June 2022	Thesis title: Application of the YOLO Model to Recognize Alternaria Spores in Microscope-Slide Images. Supervisor, Bachelor's thesis in Computer Science.
October 2021	Thesis title: Machine Learning Techniques for Crop Classification through the Analysis of Sentinel-2 NDVI Time Series (host company: ABACO SpA). Second Supervisor, Bachelor's thesis in Computer Engineering.
October 2021	From Satellite Images to Crop Classification through Machine Learning Techniques (host company: ABACO SpA). Second Supervisor, Bachelor's thesis in Computer Engineering.

- July 2021 **Analysis, Evaluation and Comparison of Artificial Neural Networks for Event Prediction (host company: MEEO SRL).**
Co-supervisor, Master's thesis in Mathematics.
- July 2021 **Adaptive Step-Length Selection Techniques in Stochastic Gradient Methods.**
Co-supervisor, Master's thesis in Mathematics.
- October 2020 **On Step-Length Selection in the Stochastic Gradient Algorithm for Large-Scale Optimization Problems.**
Second Supervisor, Master's thesis in Mathematics.
- July 2020 **Feature Engineering of Convolutional Neural Networks in Biological Imaging (host company: Bioretics SRL).**
Second Supervisor, Master's thesis in Mathematics.

Industry experience

- 2025–2026 **ASTRA SPA (Industrial project in collaboration with HiPeRT Lab, UNIMORE)**
RO.C.C.I.A. – Artificial-Intelligence-Based Automation of Quarry Trucks.
- 2023–2024 **Esautomotion Srl (Industrial project in collaboration with HiPeRT Lab, UNIMORE)** – Carpi, Italy
Optimal Sheet-Metal Bending in 2D and 3D Industrial Processes.
- 2022–2023 **Bioretics Srl (Project associated with the PON Type-A Researcher Position)** – Cesena, Italy
Hyperparameter Setting in CNNs for Segmentation.
- 2023 **Bonfiglioli Consulting (Data Science course lecturer)** – Bologna, Italy
Machine Learning and Deep Learning.
- 2023 **ABACO SpA (Industrial project in collaboration with HiPeRT Lab, UNIMORE)** – Mantua, Italy
Design of algorithms for data analysis and crop classification.
- 2022 **TII, Technology Innovation Institute (Industrial project in collaboration with HiPeRT Lab, UNIMORE)** – Abu Dhabi, United Arab Emirates
Model-Based Underwater 6D Pose Estimation from RGB.
- 2022 **Cifarelli SpA, (Industrial project in collaboration with HiPeRT Lab, UNIMORE)** – Mantua, Italy
Pick and place via 6D pose estimation.

- 2021 **ABACO SpA (Industrial project in collaboration with HiPeRT Lab, UNI-MORE)** – Mantua, Italy
Design of algorithms for data analysis and decision support systems.
- 2021 **Bonfiglioli Consulting (Data Science course lecturer)** – Bologna, Italy
Machine Learning and Deep Learning.
- 2020 **Tetra Pak SpA (Industrial project in collaboration with HiPeRT Lab, UNI-MORE)** – Modena, Italy
Anomaly detection.
- 2019 **Energy Way srl (Data Science course lecturer)** – Modena, Italy
Gradient Methods and Classical Machine Learning.
- 2018 **NEOS srl** – Fiorano Modenese, Italy
Analysis and implementation of parallel algorithms for dithering-half toning in the digital printing domain.

Organization of conferences, workshops and minisymposia

- September 2026 Numerical Optimization: Theory, Algorithms, Applications - A workshop in memory of Valeria Ruggiero,
UNIMORE, workshop organization, Modena, Italy.
- June 2026 MAtheMatical and Computational imaging acROss modalities,
INdAM, workshop organization, Rome, Italy.
- September 2025 From Classical to Data-Driven: Modern Trends in Optimization and Regularization, University of Trieste
SIMAI 2025, workshop organization, Trieste, Italy.
- July 2025 Recent trends and advances in Imaging: Models, Methods, and Applications
AIP-2025, minisymposium organization, Rio de Janeiro, Brazil.
- September 2024 Optimization Techniques for Inverse Problems
OIP-2024, conference organization, Modena, Italy.
- February 2024 Handling Uncertainties in Industry
SIAM UQ24, workshop organization, Trieste, Italy.
- May 2023 Machine learning and optimization for industry and society
M2P-2023, minisymposium organization, Taormina, Italy.

- March 2022 Novel Perspectives in Optimization and Machine Learning for Imaging
SIAM IS22, minisymposium organization, Berlin (online), Germany.
- December 2020 Advances in optimization techniques for machine learning
BOS/SOR 2020, minisymposium organization, Warsaw (online), Poland.

Conference contributions: talks and posters

- June 2026 A Momentum-Enhanced Stochastic Gradient Method with Line Search and Adaptive Mini-Batch Size
SIAM OP26, Invited session New Challenges in Optimization for Machine Learning, University of Edinburgh, GB
- September 2025 A stochastic gradient method with variance control and variable learning rate for Deep Learning
SIMAI 2025, invited session "From Classical to Data-Driven: Modern Trends in Optimization and Regularization", University of Trieste, Italy.
- June 2025 GreenNAS: A Green Approach To the Hyperparameters Tuning in Deep Learning
SIMAI 2025, invited session "Challenges and Innovative Solutions in Optimization and Data-Driven Approaches for Industrial and Real-World Problems", Valencia, Spain.
- July 2024 A Momentum-Enhanced Stochastic Gradient Method with Line Search and Adaptive Mini-Batch Size
ISMP 2024, Invited session A stochastic gradient method with variance control and variable learning rate for Deep Learning, Montreal, Canada
- June 2024 Automated image selection for weather and climate assessment in smart cities
ICIPE 2024, International Conference on Inverse Problems in Engineering: Theory and Practice, Rio de Janeiro, Brazil.
- March 2024 Bilevel optimization with a no-reference image statistics based score-predictor loss
Algoritmy 2024, Invited session Model and data-driven algorithms in imaging, High Tatra Mountains, Slovakia
- August 2023 Quality measure score predictor for imaging via SVR
SIMAI23, invited session "Data-Driven Methods for Inverse Problems in Imaging", University of Basilicata.
- November 2022 A line search based proximal stochastic gradient algorithm with dynamical variance reduction
Mathematics for Artificial Intelligence and Machine Learning: Young Researchers, Politecnico di Torino.

September 2022	Neural Architecture Search via standard Machine Learning methodologies <i>GMC SIMAI Young, University of Pavia.</i>
September 2022	On the learning rate selection rules for stochastic gradient methods <i>Second PRIMO workshop, Trieste</i>
September 2022	Automatic setting of learning rate and mini-batch size in momentum and AdaM stochastic gradient methods <i>ICNAAM 2022, Crete.</i>
August 2022	A line search based proximal stochastic gradient algorithm with dynamical variance reduction <i>ODS 2022, NODAI invited session, University of Florence.</i>
July 2022	A line search based proximal stochastic gradient algorithm with dynamical variance reduction <i>EURO 2022, Invited Session Optimization methods with inexact evaluations, Aalto University, Finland</i>
June 2022	On the learning rate selection rules for stochastic gradient methods <i>ATOMI INdAM workshop, Rome.</i>
June 2022	Optimization for Machine Learning and Machine Learning for Optimization <i>GNCS Conference, Montecatini.</i>
May 2022	On the learning rate selection rules for stochastic gradient methods <i>ICIPE 2022, Francavilla al Mare (Chieti)</i>
May 2022	Neural Architecture Search via standard Machine Learning methodologies <i>First UMI Meeting of PhD Students, University of Padua.</i>
March 2022	Neural Architecture Search via standard Machine Learning methodologies <i>SIAM, IS22</i>
October 2021	AYCE: All you can embed <i>PRIMO workshop, University of Bologna</i>
October 2021	Automatic steplength selection in Stochastic Gradient Methods <i>LOD 2021 The Seventh International Conference on Machine Learning, Optimization, and Data Science</i>
October 2021	Machine learning methods for supervised industrial production <i>LOD 2021 The Seventh International Conference on Machine Learning, Optimization, and Data Science</i>

August 2021	Barzilai-Borwein and Ritz-like values in steplength selections strategies for stochastic gradient methods <i>SIMAI 2020+2021</i> Invited by the organizers of the special session “Large-Scale Optimization and Applications – Part I”.
August 2021	Applied machine learning methods: predicting anomalies in a packaging line <i>SIMAI 2020+2021</i> Invited by the organizers of the special session “Mathematical Methods for Data Science: Business Case Studies”.
March 2021	Dynamic Early Stopping by Mini-Batch Size Increasing <i>SIAM, Conference on Computer Science and Engineering 2021</i> Invited by the organizers of the special session “Beyond the Classical Variational Regularization in Imaging: When Bayesian and Learning Methods Come to the Rescue – Part I”.
December 2020	Steplength and mini-batch size selection in Convolutional Neural Networks <i>BOS/SOR2020 Conference, Polish Operational and Systems Research Society, Systems Research Institute of the Polish Academy of Sciences and Warsaw School of information Technology</i> Invited speaker, organizer and chair of “Advances in Optimization Techniques for Machine Learning”.
July 2020	Adaptive rule for the steplength selection in Stochastic Gradient Methods <i>LOD 2020 The Sixth International Conference on Machine Learning, Optimization, and Data Science</i>
November 2019	Stochastic Floyd-Steinberg dithering on GPU: image quality and processing time improved <i>ICIIP 2019, Image Information Processing</i>
October 2019	On the steplength selection in Stochastic Gradient Methods <i>Mathematical and Computational Aspects of Machine Learning</i>
September 2019	Poster: Adaptive selection of the learning rate in Stochastic Gradient Methods <i>Summer School on Applied Harmonic Analysis and Machine Learning</i>
June 2019	On the steplength selection in Stochastic Gradient Methods <i>The 3rd International Conference and Summer School Numerical Computations: Theory and Algorithms NUMTA 2019</i>

April 2019	Mise en abyme with artificial intelligence: how to predict the accuracy of NN, applied to hyper-parameter tuning <i>INNS BIG DATA AND DEEP LEARNING 2019</i>
January 2019	Poster: On the steplength selection in Stochastic Gradient Methods <i>The mathematics of imaging: the CIRM winter school</i>
December 2018	Artificial Neural Networks: the missing link between curiosity and accuracy <i>NaBIC Nature and Biologically Inspired Computing</i>
July 2018	A meta-learning approach to tune hyperparameters in Neural Networks <i>ACDL Advanced Course on Data Science and Machine Learning</i>
June 2018	Barzilai-Borwein for Stochastic Gradient Methods <i>IndAM Intensive Period</i>

Participation in research projects

2023	Data-Driven Optimization Methods: New Theoretical and Practical Perspectives <i>Coordinator of the GNCS 2023 Research Project, INdAM.</i>
2022	Hyperparameter Search Techniques for Large-Scale Problems <i>Young Researchers Project, INdAM.</i>
2021	First-Episode Psychosis in the Province of Ferrara: Assessment of Access to Care and Outcomes within an International Learning Health Network <i>FIR 2020, UNIFE</i>
2021	Optimization for Machine Learning and Machine Learning for Optimization <i>National Scientific Computing Group (GNCS) INdAM, National Institute for Advanced Mathematics "Francesco Severi"</i>
2020	ASGM Adaptive selection of the learning rate in Stochastic Gradient Methods <i>CINECA ISCRA C</i>
2020	DSS Darknet for Semantic Segmentation <i>CINECA ISCRA B</i>
2019	AUTOCNA AUTomatic Optimization of a Constrained artificial neural Network Architecture <i>CINECA ISCRA C</i>

- 2019 Adaptive Techniques for Optimization Methods in Machine Learning
National Scientific Computing Group (GNCS) INdAM, National Institute for Advanced Mathematics "Francesco Severi"
- 2018 Optimizing Performance of Training and Inference of Convolutional Neural Networks
CINECA ISCRA C
- 2017 European Union funded project CLASS Edge and CCloud Computation: A Highly Distributed Software Architecture for Big Data Analytics (H2020-ICT-2017-1)
High-Performance Real-Time Lab(HiPeRT Lab)
- 2017 PRYSTINE - Programmable Systems for Intelligence in Automobiles -H2020 ECSELJU
2017 Grant agreement n°783190
High-Performance Real-Time Lab(HiPeRT Lab)

Technical skills

Programming languages

MATLAB, Python (Tensorflow, Keras, Pytorch, Optuna), C++ (OpenMP, MPI and CUDA)

Software

L^AT_EX, Git, Office

Foreign languages

English (B2), French (A2)

Awards

- 2022 Meta-learning From Learning Curves Challenge @ WCCI 2022
Third place.

I authorize the processing of the personal data contained in this curriculum vitae pursuant to Article 13 of Italian Legislative Decree No. 196/2003.

CV updated on 4 September 2026.