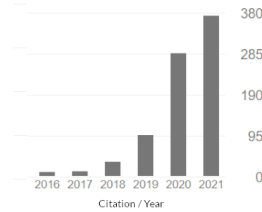# Vincenzo Lomonaco

| | |
|---|---|
| **Personal Information** | Vincenzo Lomonaco<br>*Date of Birth*: 16-08-1991<br>*Residence:* Pisa, Italy |

vincenzo.lomonaco@unipi.it
vincenzolomonaco.com

**Bibliometric indicators**

Citations: 1125
H-Index: 14
i10-Index: 19
by *Google Scholar*.

**Research Interests**

Artificial Intelligence
Machine Learning
Deep Learning
Continual Learning

**Current Position**

**Assistant Professor (Junior)**
*2021 - Present*
Department of Computer Science and Engineering, University of Pisa
Research topics: Artificial Intelligence, Machine Learning, Continual Learning.

**Experiences**

**Postdoctoral Researcher**
*2019 - 2021*
Department of Computer Science and Engineering, University of Bologna
Supervisor: Prof. Davide Maltoni
Research topics: Machine Learning, Continual Learning, Computer Vision.

**Affiliate Researcher**
*2019 - 2020* (6 months)
AI Labs, Bologna, Italy
Supervisor: Prof. Fabio Cuzzolin
Description: Collaboration on the research project *"Continual Learning for Automatic Video Captioning"* with the partners AI Labs, University of Bologna and Oxford Brookes.

**Visiting Researcher**
*2019* (3 months)
Numenta, Redwood City, United States
Supervisor: Jeff Hawkins, Subutai Ahmad
Description: Exploratory research on Neuroscience-Inspired approaches for Continual Learning.

**Visiting Researcher**
*2018* (1 month)
ENSTAParis Tech, Parigi, France
Supervisor: Prof. David Filliat
Description: Vising researcher in the *Autonomous Systems and Robotics Lab* lead by Prof. David Filliat. Working on Continual Learning for Robotics.

**Visiting Researcher**

*2017 - 2018* (6 months)

Purdue University, West Lafayette, United States

Supervisor: Prof. Eugenio Culurciello

Description: Vising researcher in the *e-Lab* laboratory lead by Prof. Eugenio Culurciello. Working on Continual Reinforcement Learning with Deep Architectures.

**Machine Learning Software Engineer**

*2014 - 2015* (6 months)

University of Modena and Reggio-Emilia

Supervisor: Luca Zanni, Riccardo Martoglia

Description: Working on a research project in collaboration with the company *ILD In-line Devices* on the optimization of ML algorithms on embedded devices with *MicroLinux* OS.

**Students Representative**

*2009 - 2019*

Doctoral Students Representative. Department of Computer Science and Engineering, University of Bologna, 2016-2019. Italy.

Students Representative. Department of Physics, Mathematics and Computer Science. University of Modena and Reggio-Emilia, 2012-2013, Italy.

EDUCATION

**Doctoral Degree in Computer Science and Engineering**

*2015 - 2019*

University of Bologna

Supervisor: Prof. Davide Maltoni

Dissertation: *Continual Learning with Deep Architectures*

Specialization: Deep Learning, Continual Learning, Computer Vision.

**Independent Courses**

*2014 - Present*

*Stanford Artificial Intelligence Course* (by Udacity)

*John Hopkins Practical Machine Learning Course* (by Coursera)

*Stanford Machine Learning Course* (by Coursera)

*Deep Learning Course by Google* (by Udacity)

**Master Degree in Computer Science**

*2013 - 2015*

Grade: 110/110 with Honors

University of Bologna

Supervisor: Prof. Davide Maltoni

Dissertation: *Deep Learning for Computer Vision: a Comparison Between Convolutional Neural Networks and Hierarchical Temporal Memories on Object Recognition Tasks*

Specialization: Artificial Intelligence, Deep Learning, Parallel Computing.

**Bachelor in Computer Science**

*2010 - 2013*
Grade: 110/110 with Honors
Università di Modena e Reggio-Emilia
Supervisor: Prof. Riccardo Martoglia
Dissertation: *Progettazione, Realizzazione ed Accessibilità di un Database Biomolecolare sulle Sequenze Ultraconservate del Genoma Umano*
Specialization: Data Analysis, Information Retrieval, Parallel Computing.

**DOCTORAL DISSERTATION**

Vincenzo Lomonaco
*Continual Learning with Deep Architectures*
Doctoral Dissertation, University of Bologna. *Computer Science and Engineering* PhD Program, XXXI Cycle.
doi: 10.6092/unibo/amsdottorato/9073

Awards: The dissertation was awarded by the *Italian Association for Artificial Intelligence* as one of the top-5 best doctoral dissertation of 2019 in Italy.

Abstract: *Humans have the extraordinary ability to learn continually from experience. Not only we can apply previously learned knowledge and skills to new situations, we can also use these as the foundation for later learning. One of the grand goals of Artificial Intelligence (AI) is building an artificial "continual learning" agent that constructs a sophisticated understanding of the world from its own experience through the autonomous incremental development of ever more complex knowledge and skills. However, despite early speculations and few pioneering works, very little research and effort has been devoted to address this vision. Current AI systems greatly suffer from the exposure to new data or environments which even slightly differ from the ones for which they have been trained for. Moreover, the learning process is usually constrained on fixed datasets within narrow and isolated tasks which may hardly lead to the emergence of more complex and autonomous intelligent behaviors. In essence, continual learning and adaptation capabilities, while more than often thought as fundamental pillars of every intelligent agent, have been mostly left out of the main AI research focus. In this dissertation, we study the application of these ideas in light of the more recent advances in machine learning research and in the context of deep architectures for AI. We propose a comprehensive and unifying framework for continual learning, new metrics, benchmarks and algorithms, as well as providing substantial experimental evaluations in different supervised, unsupervised and reinforcement learning tasks.*

**SCIENTIFIC PUBLICATIONS**

## Journal Publications

Andrea Cossu, Gabriele Graffieti, Lorenzo Pellegrini, Davide Maltoni, Davide Bacciu, Antonio Carta, Vincenzo Lomonaco.
*Is Class-Incremental Enough for Continual Learning?*
Frontiers in Computer Science, 2021.
doi: https://doi.org/10.3389/frai.2022.829842
Journal Quality (SJR): Q1

Vincenzo Lomonaco, Lorenzo Pellegrini, Pau Rodriguez, Massimo Caccia, Qi She, Yu

Chen, Quentin Jodelet, Ruiping Wang, Zheda Mai, David Vazquez, German I. Parisi, Nikhil Churamani, Marc Pickett, Issam Laradji, Davide Maltoni.
*CVPR 2020 Continual Learning in Computer Vision Competition: Approaches, Results, Current Challenges and Future Directions.*
Elsevier Journal Artificial Intelligence, 2021.
doi: https://doi.org/10.1016/j.artint.2021.103635
Journal Quality (SJR): Q1


Andrea Cossu, Antonio Carta, Vincenzo Lomonaco, Davide Bacciu
*Continual Learning for Recurrent Neural Networks: an Empirical Evaluation*
Elsevier Neural Networks Journal, 2021
doi: 10.1016/j.neunet.2021.07.021
Journal Quality (SJR): Q1

Heechul Bae, Eoin Brophy, Rosa HM Chan, Baoquan Chen, Fan Feng, Gabriele Graffieti, Vidit Goel, Xinyue Hao, Hyonyoung Han, Sathursan Kanagarajah, Somesh Kumar, Siew-Kei Lam, Tin Lun Lam, Chuanlin Lan, Qi Liu, Vincenzo Lomonaco, Liang Ma, Davide Maltoni, German I Parisi, Lorenzo Pellegrini, Duvindu Piyasena, Shiliang Pu, Qi She, Debdoot Sheet, Soonyong Song, Youngsung Son, Zhengwei Wang, Tomas E Ward, Jianwen Wu, Meiqing Wu, Di Xie, Yangsheng Xu, Lin Yang, Qihan Yang, Qiaoyong Zhong, Liguang Zhou
*IROS 2019 Lifelong Robotic Vision: Object Recognition Challenge*
IEEE Robotics & Automation Magazine, 27(2), pp.11-16, 2020.
doi: 10.1109/MRA.2020.2987186
Journal Quality (SJR): Q1

Timothée Lesort, Vincenzo Lomonaco, Andrei Stoian, Davide Maltoni, David Filliat, Natalia Díaz-Rodríguez
*Continual Learning for Robotics: Definition, Framework, Learning Strategies, Opportunities and Challenges*
Information Fusion, 58, pp.52-68, 2020.
doi: https://doi.org/10.1016/j.inffus.2019.12.004
Journal Quality (SJR): Q1

Jary Pomponi, Simone Scardapane, Vincenzo Lomonaco, Aurelio Uncini
*Efficient Continual Learning in Neural Networks with Embedding Regularization*
Neurocomputing, 2020
doi: https://doi.org/10.1016/j.neucom.2020.01.093
Journal Quality (SJR): Q1

Davide Maltoni, Vincenzo Lomonaco
*Continuous Learning in Single-Incremental-Task Scenarios*
Elsevier Neural Networks Journal, 2019
doi: 10.1016/j.neunet.2019.03.010
Journal Quality (SJR): Q1

Vincenzo Lomonaco, Riccardo Martoglia, Federica Mandreoli, Laura Anderlucci, Warren Emmett, Silvio Bicciato, Cristian Taccioli
*UCbase 2.0: Ultraconserved Sequences Database (2014 update)*
Database: The Journal of Biological Databases and Curation, 2014.

Journal Quality (SJR): Q1

**Conference & Workshop Publications**

Gabriele Merlin, Vincenzo Lomonaco, Andrea Cossu, Antonio Carta, Davide Bacciu
*Practical Recommendations for Replay-based Continual Learning Methods*
Novel Benchmarks and Approaches for Real-World Continual Learning Workshop, ICIAP 2022.

Valerio De Caro, Saira Bano, Achilles Machumilane, Alberto Gotta, Pietro Cassará, Antonio Carta, Christos Sardianos, Christos Chronis, Iraklis Varlamis, Konstantinos Tserpes, Vincenzo Lomonaco, Claudio Gallicchio, Davide Bacciu
*AI-as-a-Service Toolkit for Human-Centered Intelligence in Autonomous Driving*
Demostration at the International Conference on Pervasive Computing and Communications (PerCom), 2022.

Nicolò Lucchesi, Antonio Carta, Vincenzo Lomonaco, Davide Bacciu
*Avalanche RL: a Continual Reinforcement Learning Library*
International Conference on Image Analysis and Processing (ICIAP), 2022.
Conference Quality (GGS): B

Antonio Carta, Andrea Cossu, Vincenzo Lomonaco, Davide Bacciu
*Ex-Model: Continual Learning from a Stream of Trained Models*
Continual Learning in Computer Vision Workshop at CVPR, 2022.

Davide Bacciu, Antonio Carta, Daniele Di Sarli, Claudio Gallicchio, Vincenzo Lomonaco, Salvatore Petroni
*Towards Functional Safety Compliance of Recurrent Neural Networks*
International Conference on AI for People (CAIP), 2021.
Conference Quality (GGS): N.A.

Andrea Cossu, Marta Ziosi, Vincenzo Lomonaco
*Sustainable Artificial Intelligence through Continual Learning*
International Conference on AI for People (CAIP), 2021.
Conference Quality (GGS): N.A.

Ajmal Shahbaz, Salman Khan, Mohammad Asiful Hossain, Vincenzo Lomonaco, Kevin Cannons, Zhan Xu, Fabio Cuzzolin
*International Workshop on Continual Semi-Supervised Learning: Introduction, Benchmarks and Baselines*
IJCAI Workshop on Continual Semi-Supervised Learning, 2021.

preprint: abs/2110.14613
Workshop Paper

Davide Bacciu, Siranush Akarmazyan, Eric Armengaud, Manlio Bacco, George Bravos, Calogero Calandra, Emanuele Carlini, Antonio Carta, Pietro Cassara, Massimo Coppola, Charalampos Davalas, Patrizio Dazzi, Maria Carmela Degennaro, Daniele Di Sarli, Jürgen Dobaj, Claudio Gallicchio, Sylvain Girbal, Alberto Gotta, Riccardo Groppo, Vincenzo Lomonaco, Georg Macher, Daniele Mazzei, Gabriele Mencagli, Dimitrios Michail, Alessio Micheli, Roberta Peroglio, Salvatore Petroni, Rosaria Potenza, Farank Pourdanesh, Christos Sardianos, Konstantinos Tserpes, Fulvio Tagliabò, Jakob Valtl, Iraklis Varlamis, Omar Veledar
*TEACHING: Trustworthy Autonomous Cyber-physical Applications through Human-Centred Intelligence*
IEEE International Conference on Omni-layer Intelligent systems, 2021.
preprint: abs/2107.06543
Conference Quality (GGS): N.A.

Lorenzo Pellegrini, Vincenzo Lomonaco, Gabriele Graffieti, Davide Maltoni
*Distilled Replay: Overcoming Forgetting through Synthetic Samples*
IJCAI Workshop on Continual Semi-Supervised Learning, 2021.
preprint: abs/2103.15851
Workshop Paper

Lorenzo Pellegrini, Vincenzo Lomonaco, Gabriele Graffieti, Davide Maltoni
*Continual Learning at the Edge: Real-Time Training on Smartphone Devices*
European Symposium on Artificial Neural Networks (ESANN), 2021.
doi: 10.14428/esann/2021.ES2021-136
Conference Quality (GGS): B

Andrea Cossu, Davide Bacciu, Antonio Carta, Claudio Gallicchio, Vincenzo Lomonaco
*Continual Learning with Echo State Networks*
European Symposium on Artificial Neural Networks (ESANN), 2021.
doi: 10.14428/esann/2021.ES2021-80
Conference Quality (GGS): B

Vincenzo Lomonaco, Lorenzo Pellegrini, Andrea Cossu, Antonio Carta, Gabriele Graffieti et al
*Avalanche: an End-to-End Library for Continual Learning*
2nd Workshop on Continual Learning in Computer Vision at CVPR 2021.
doi: https://arxiv.org/pdf/2104.00405.pdf
Workshop Paper

Leonardo Ravaglia, Manuele Rusci, Alessandro Capotondi, Francesco Conti, Lorenzo Pellegrini, Vincenzo Lomonaco, Davide Maltoni and Luca Benini
*Memory-Latency-Accuracy Trade-offs for Continual Learning on a RISC-V Extreme-Edge Node*
IEEE International Workshop on Signal Processing Systems (SiPS), 2020.
doi: 10.1109/SiPS50750.2020.9195220
Conference Quality (GGS): B

Lorenzo Pellegrini, Gabrile Graffieti, Vincenzo Lomonaco, Davide Maltoni

*Latent Replay for Real-Time Continual Learning*
International Conference on Intelligent Robots and Systems (IROS), 2020
preprint: abs/1912.01100
Conference Quality (GGS): A+

Qi She, Fan Feng, Xinyue Hao, Qihan Yang, Chuanlin Lan, Vincenzo Lomonaco, Xuesong Shi, Zhengwei Wang, Yao Guo, Yimin Zhang, Fei Qiao, Rosa HM Chan
*OpenLORIS-Object: A Dataset and Benchmark Towards Lifelong Object Recognition*
International Conference on Robotics and Automation (ICRA), 2020
preprint: abs/1911.06487
Conference Quality (GGS): A

Vincenzo Lomonaco, Davide Maltoni, Lorenzo Pellegrini
*Rehearsal-Free Continual Learning over Small Non-I.I.D. Batches*
Continual Learning Workshop at CVPR, 2020
doi: 10.1109/CVPRW50498.2020.00131
Workshop Paper

Vincenzo Lomonaco, Karan Desai, Eugenio Culurciello, Davide Maltoni
*Continual Reinforcement Learning in 3D Non-stationary Environments*
Continual Learning Workshop at CVPR, 2020
doi: 10.1109/CVPRW50498.2020.00132
Workshop Paper

Vincenzo Lomonaco, Lorenzo Pellegrini, Davide Maltoni
*Apprendimento Automatico Continuo per la Robotica e la Visione Artificiale*
Ital-IA, Convegno Nazionale CINI sull'Intelligenza Artificiale, 2019
website: http://www.ital-ia.it/submission/90/paper
Conference Quality (GGS): N.D.

Vincenzo Lomonaco, Angelo Trotta, Marta Ziosi, Juan de Dios Yáñez Ávila, Natalia Díaz-Rodríguez
*Intelligent Drone Swarm for Search and Rescue Operations at Sea*
AI for Social Good Workshop at NeurIPS, 2018
preprint: abs/1811.05291
Workshop Paper

Natalia Díaz-Rodríguez, Vincenzo Lomonaco, David Filliat, Davide Maltoni
*Don't Forget, There is More than Forgetting: new Metrics for Continual Learning*
Continual Learning Workshop at NeurIPS, 2018
preprint: abs/1810.13166
Workshop Paper

Claudia Carpineti, Vincenzo Lomonaco, Luca Bedogni, Marco Di Felice, Luciano Bononi
*Custom Dual Transportation Mode Detection by Smartphone Devices Exploiting Sensor Diversity*
IEEE International Conference on Pervasive Computing and Communications Workshops (PerCom Workshops), 2018
doi: 10.1109/PERCOMW.2018.8480119

Workshop Paper

Vincenzo Lomonaco, Davide Maltoni
*CORe50: a new Dataset and Benchmark for Continuous Object Recognition*
Conference on Robot Learning (CoRL), pp. 17-26, 2017
website: http://proceedings.mlr.press/v78/lomonaco17a.html
Conference Quality (GGS): N.D.

Davide Maltoni, Vincenzo Lomonaco
*Semi-Supervised Tuning from Temporal Coherence*
23rd International Conference on Pattern Recognition (ICPR), 2016
doi: 10.1109/ICPR.2016.7900013
Conference Quality (GGS): A-

Vincenzo Lomonaco, Davide Maltoni
*Comparing Incremental Learning Strategies for Convolutional Neural Networks*
IAPR Workshop on Artificial Neural Networks in Pattern Recognition, 2016
doi: 10.1007/978-3-319-46182-3_15
Workshop Paper

Daniel Russo, Vincenzo Lomonaco, Paolo Ciancarini
*A Machine Learning Approach for Continuous Development*
International Conference in Software Engineering for Defence Applications, 2016
doi: 10.1007/978-3-319-70578-1_11
Conference Quality (GGS): N.D.

**Other Publications**

German I. Parisi, Vincenzo Lomonaco
*Online Continual Learning on Sequences*
Recent Trends in Learning From Data. Springer, Cham. pp.197-221, 2020
doi: 10.1007/978-3-030-43883-8_8
Book Chapter

Vincenzo Lomonaco
*Continual Learning with Deep Architectures*
University of Bologna, PhD Thesis, 2019
doi: 10.6092/unibo/amsdottorato/9073
Doctoral Dissertation

Vincenzo Lomonaco
*Deep Learning for Computer Vision: a Comparison Between Convolutional Neural Networks and Hierarchical Temporal Memories on Object Recognition Tasks*
Master Thesis, University of Bologna, 2015
website: https://amslaurea.unibo.it/9095/1/Vincenzo_Lomonaco_tesi.pdf
Master Degree Dissertation

RESEARCH   Continual Learning for Predictive Maintainence
PROJECTS   Description: *Research contract with the SeaVision Group for the research and development of ariginal continual learning solutions applied to predictive maintainance*

*in the pharmaceutical domain.*
Involvement: Principal Investigator.

TEACHING: A computing Toolkit for building Efficient Autonomous appliCations leveraging Humanistic INtelliGence
Description: *EU-funded project that designs a computing platform and the associated software toolkit supporting the development and deployment of autonomous, adaptive and dependable CPSoS applications, allowing them to exploit a sustainable human feedback to drive, optimize and personalize the provisioning of their services.*
Involvement: Task leader.

Image Manipulation Attack Resolving Solutions
Description: *The iMARS research project, fully funded by the European Union for a total budget of 7+ Million, aims at designing new solutions for the detection of morphing attacks and digital image manipulations in order to provide accurate verification of ID documents.*
Involvement: Participant.

Recycle Symbols Detection on Embedded Cameras
Description: *In collaboration with the Hera Group, one of the biggest multi-services companies in Italy, the project was centered around the prototyping of an object detection API service running directly on the edge on Android mobile phones.*
Involvement: Participant.

<table>
<tr><td>EVENTS<br>ORGANIZATION</td><td>**General Chair**<br>*2020 - Present*</td></tr>
</table>

Co-Organizer of *"Deep Continual Learning"*, Dagstuhl Seminar 23122, March 19 – 24 , 2023 (Participants: 50, invite-only)

General Chair for the 1st edition of the Workshop *"Novel Benchmarks and Approaches for Real-World Continual Learning"* at ICIAP 2021. (Participants: 50-100)

General Chair for the 3rd edition of the Workshop *"Continual Learning for Computer Vision"* at CVPR 2022. (Participants: 250-300)

General Chair for the 1st *"Semi-Supervised Continual Learning Workshop"* at IJCAI 2021. (Participants: 250-300)

General Chair for the 1st *"Theory of Continual Learning Workshop"* at ICML 2021. (Participants: 250-300)

General Chair for the 2nd edition of the Workshop *"Continual Learning for Computer Vision"* at CVPR 2021. (Participants: 250-300)

General Chair for the Workshop *"Continual Learning for Computer Vision"* at CVPR 2021. (Participants: 250-300)

General Chair for the workshop *"Generative Models for Continual Learning"*, organized by ContinualAI, February 2020. (Participants: 30-50)

General Chair for the workshop *"Neuroscience-Inspired Continual Learning"*, organized by ContinualAI, March 2020. (Participants: 30-50)

General Chair for the workshop *"Real-World Applications of Continual Learning"*, organized by ContinualAI, April 2020. (Participants: 30-50)

General Chair for the workshop *"Continual Learning with Sequential Streaming Data"*, organized by ContinualAI, May 2020. (Participants: 30-50)

General Chair for the workshop *"Continual Learning: in the Cloud, at the Edge or Both?"*, organized by ContinualAI, June 2020. (Participants: 30-50)

General Chair for the workshop *"ContinualAI Wiki 1.0"*, organized by ContinualAI, September 2020. (Participants: 30-50)

General Chair for the workshop *"Generalization and Robustness in Continual Learning*, organized by ContinualAI, October 2020. (Participants: 30-50)

**Program Chair**
*2021 - Present*

*Program Chair* for: *AI for People* conference 2021.

**Session Chair**
*2020 - Present*

Special Session Chair *"Continual Learning and Emergence of Intelligent Systems: Theory and Application"* (IJCNN 2022)

Special Session Chair *"Advances in Continual Learning: beyond Catastrophic Forgetting"* for IEEE EAIS 2021 conference.

Special Session Chair *"AI for People"* for the GOODTECHS 2020 conference.

Special Session Chair *"New Trends in Continual Learning with Deep Architectures"* for IEEE EAIS 2020 conference.

EDITORIAL
CONTRIBUTIONS

**Author e Technical Reviewer**
*2016 - Present*

Vincenzo Lomonaco. *Deep Learning with R*. Packt Publishing, 2017 (Author).

Oneto, L., Navarin, N., Sperduti, A., Anguita, D., *Recent Trends in Learning From Data*. Springer, 2019. (Book Chapter Author)

Joshua F. Wiley. *R Deep Learning Essentials*. Packt Publishing, 2016. (Technical Reviewer)

**Special Issue Editor**
*2020 - Present*

Editor of the special issue *"Continual Unsupervised Learning in Computer Vision"*, *Frontiers in Computer Science*, 2022.

Editor of the special issue *"Adaptive Machines: Leveraging Neuroscience for Lifelong Learning Systems"* for the *Frontiers in Artificial Intelligence* Journal, 2021.

Editor of the special issue *"Lifelong Learning Machines"* for the Elsevier Journal *Neural Networks*, 2021.

Editor of the special issue *"AI for People"* for the Springer Journal *AI & Society: Journal of Knowledge, Culture and Communication*, 2020.

**Teaching**
*2020 - Present*

Artificial Intelligence Fundamentals, Master Degree in Computer Science, University of Pisa (2021 - Present, 1 academic year).

Continual Learning: On Machines that can Learn Continually, PhD Course, University of Pisa (2021 - Present, 1 academic year).

Medical Computer Science, Medical Degree, University of Pisa (2021 - 2022, 1 academic years).

Programming Laboratory I, Bachelor Degree in Computer Science, University of Pisa (2020 - 2021, 1 academic years).

**Teaching Assistant**
*2014 - Present*

Computer Architectures, Bachelor Degree in Computer Science, University of Bologna (2016 - Present, 5 academic years).

Foundations of Computer Science, Bachelor Degree Management Engineering, University of Bologna (2014 - 2016, 2 academic years).

Parallel Computing, Bachelor Degree in Computer Science, University of Modena and Reggio-Emilia (2016 - 2016, 1 academic year).

**Course Collaborations**
*2014 - Present*

Machine Learning Introduction Lecturer, *Smart Things Course* for the Bachelor Degree in Computer Science, Samsung Innovation Campus & University of Pisa, 2020 - 2021 (1 academic year).

Continual Learning Day Leader & Content Creator for the Neuromatch Deep Learn-

ing Academy (Summer School), August 2021.

Invited Seminar *"Open-Source Frameworks for Deep Learning: an Overview"*, within the Machine Learning master degree course, University of Bologna, 2018-2020 (for 3 academic years).

Collaborating on the course material preparation and laboratory infrastructure for the master degree course Machine Learning, University of Bologna, 2018-2020 (for 3 academic years).

**Tutorials**
*2019 - Present*

Tutorial *"Continual Learning with Deep Architectures"* for the conference International Conference on Machine Learning (ICML), Virtual Only, 2021.

Tutorial *"Continual Lifelong Learning with Neural Networks"* for the conference 2019 INNS Big Data e Deep Learning, Sestri Levante, Italy, 2019.

**Invited Talks**
*2017 - Present*

Invited Talk *"Continuous Unsupervised Training of Deep Architectures"*, Istituto Italiano di Tecnologia (IIT), Genoa. 6 July 2017.

Invited Talk *"Continuous Learning with Deep Architectures"*, Neurala, Boston. 25 March 2017.

Invited Talk *"Continuous Learning with Deep Architectures"*, Autonomous System and Robotics, ENSTA ParisTech, Paris. 17 May 2018.

Invited Talk *"Continual Learning with Deep Architectures"*, Computer VISIONers Conference, Kyiv, Ukraine. 6 October 2018.

Invited Talk *"Continual/Lifelong Learning with Deep Architectures"*, Data Science Milan, Milano, Italy. 28 January 2019.

Invited Talk *"Open-Source Frameworks for Deep Learning: an Overview"*, Data Science Bologna @ Musixmatch, Italy. 28 February 2019.

Invited Talk *"Continual Reinforcement Learning in 3D Non-stationary Environments"*, Computational Science Lab @ UPF, Barcelona, Spain. 29 March 2019.

Invited Talk *"Apprendimento Automatico Continuo per la Robotica e l'Intelligenza Artificiale"*, Codemotion Meetup @ AlmaCube, Bologna, 4 July 2019.

Invited Talk *"Continual Learning for Robotics"*, Istituto Italiano di Tecnologia (IIT), Genoa. 9 September 2019.

Invited Talk *"Continual Learning: Another Step Towards Truly Intelligent Machines"*, Numenta, Redwood City, California, 16 September 2019.

Invited Talk *"Toward Continual Learning on the Edge"*, Apple, Cupertino, United States, 21 November 2019.

Invited Talk *"Toward Continual Learning on the Edge"*, University of Pisa, Pisa, Italy, 14 February 2020.

Invited Talk *"Towards Continual Learning at the Edge"*, MILA, Montreal, Canada, 27 March 2020.

Invited Talk *"Towards Continual Learning at the Edge"*, HiPeRT Lab @ Unimore, Modena, Italy, 18 May 2020.

Invited Talk *"Continual Learning for Production Systems"*, MILA, PRODUCTION.AI conference, Kiev, Ukraine, 27 May 2020.

Invited Talk *"Continual Learning for AI"*, 1st AIforPople Workshop, Online, 9 Agosto 2020.

Invited Talk *"Continual Learning, Neuroscience and Robotics: an Entwined Destiny"*, Lifelong Learning for Long-term Human-Robot Interaction Workshop, Online, 4 September 2020.

Invited Talk *"Real-Time Continual Learning from Natural Video Streams"*, Human-centered Vision: from Body Analysis to Learning and Language Workshop, Online, 9th September 2020.

Invited Talk *"Rehearsal-Free Continual Learning over Small non-I.I.D Batches"*, ContinualAI Meetup, 27-11-2020.

Invited Talk *"Sustainable AI through Continual Learning"*, Continual Learning: Towards "Broad" AI course, Université de Montréal, 25-01-2021.

Invited Talk *"Sustainable AI through Continual Learning"*, ML & Data Science Meetup, 27-05-2020.

Invited Talk *"Open-Source Frameworks for Deep Learning: an Overview"*, Machine Learning Course, University of Bologna, Italy, 2020.

Invited Talk *"Towards Continual Learning at the Edge"*, Twitter, ML seminar, 03-12-2020.

Invited Talk *"An Overview of Continual Learning Scenarios & Benchmarks"*, ContinualAI Meetup 27-11-2020.

Invited Talk *"Introduction to Continual Learning"*, Enel, 28-10-21.

Invited Talk *"Introduction to Continual Learning"*, Generali Italia, 21-10-21.

Invited Talk *"Distributed Continual Learning: Challenges and Opportunities"*, Invited Talk, Workshop on Continual Learning and Adaptation for Time Evolving Data, 2021.

Invited Talk *"Continual Learning with Deep Architectures"*, MLDM Italia, AIxIA conference, 2021.

Invited Talk *"Sustainable AI through Continual Learning"*, SMART Cloud 3 - AI Machine Learning, 10-19-2021.

Invited Talk *"Avalanche: an End-to-End Library for Continual Learning"*, Intel corporation, 11-05-2021.

Invited Talk *"Introduction to Continual Learning"*, Intelligent Systems & Pattern Recognition course, University of Pisa, 20-03-21.

Invited Talk *"Continual Learning: On Machines that Can Learn Continually"*, H&M, 10-06-21.

Invited Talk *"Avalanche: an End-to-End Library for Continual Learning"*, AI2, 1-06-2021.

Invited Talk *"The Thousand Brains Theory of Intelligence"*, Computational Neuroscience Course, University of Pisa, 26-05-2021.

Invited Talk *"Sustainable AI through Continual Learning"*, Sea Vision srl, Italy, 26-04-2021.

Invited Talk *"CORe: an Android App for Continual Object Recognition at the Edge"*, Workshop on On-Device Machine Learning, 4-04-2021.

Invited Talk *"Sustainable AI through Continual Learning"*, ML Modena Meetup, 30-03-2021.

Invited Talk *"Sustainable AI through Continual Learning"*, Department of Computer Science - University of Pisa 22-03-2021.

Invited Talk *"Introduction to Continual Learning"*, PhD in Data Science, PhD course, UniRoma, 21-04-22.

Invited Talk *"Introduction to Continual Learning"*, Intelligent Systems and Pattern Recognition course, University of Pisa, 20-04-22.

Invited Talk *"Ex-Model Continual Learning: a New Paradigm for Distributed Robotics Intelligence"*, Invited Talk at Workshop on Lifelong Learning and Personalization in Long-Term Human-Robot Interaction 2022.

Invited Talk *"Introduction to Continual Learning, AI Seminars"*, Sapienza University, Rome, Italy, 24-3-22.

Invited Talk *"Avalanche: an End-to-End Library for Continual Learning"*, CLVision Workshop, CVPR, 2022.

Invited Talk *"Introduction to Continual Learning"*, School of AI, University of Modena and Reggio-Emilia, 2022.

Invited Talk *"Introduction to Continual Learning"*, Baker  Hughes, 2022.

**Co-Founder & President**
*2018 - Present*
ContinualAI

**President** of the non-profit research organization *ContinualAI*. ContinualAI is the largest research organization and open community on Continual Learning for Artificial Intelligence. The organization has more than 1000+ members in 19 different timezones, 5000+ annual users of its online services, 30+ supporting partners, 50+ organized or supported events, 5 active collaborative projects, e 3000+ followers on its social platforms.
website: https://www.continualai.org

**Co-Founder & Board Director**
*2019 - Present*
AIforPeople

**Co-Founder & Board Member** of the non-profit organization *AIforPeople*. The social mission of AIforPeople is the one to learn, pose questions and take initiative on how the technology based on Artificial Intelligence can be used for the social good.
website: https://www.aiforpeople.org

**International Doctoral Reviewer**
*2020 - Present*

International Expert for the doctoral evaluation committee for the candidate *Francesco Pelosin* (Ca' Foscari University) and the revision of his doctoral dissertation: "Dissecting Continual Learning: a Structural and Data Analysis", 2022.

International Expert for the doctoral evaluation committee for the candidate *Ângelo Garangau Menezes* (Universidade de São Paulo) and the revision of his doctoral dissertation: "Continual Object Detection with Deep Neural Networks", 2022.

International Expert for the doctoral evaluation committee for the candidate *Kai Wang* (Universitat Autonoma de Barcelona) and the revision of his doctoral dissertation: "Continual learning for hierarchical classification, meta-learning, and multimodal learning", 2022.

International Expert for the doctoral evaluation committee for the candidate *Julio Hurtado* (Pontificia Universidad Católica de Chile) and the revision of his doctoral dissertation: "Augmenting Deep Learning models using Continual and Meta Learning strategies", 2022.

International Expert for the doctoral evaluation committee for the candidate *Tom Veniat* (*Sorbonne Université*) and the revision of his doctoral dissertation: "Neural Architecture Search under Budget Constraints", 2021.

International Expert for the doctoral evaluation committee for the candidate *Marc Masana* (*Universitat Autonoma de Barcelona*) and the revision of his doctoral

dissertation: "Lifelong Learning of Neural Networks: Detecting Novelty and Adapting to New Domains without Forgetting", 2020.

**Program Committee Member & Reviewer**
*2019 - Present*

IJCAI-PRICAI 2020, IEEE EAIS 2020, GOODTECHS 2020, Continual Learning workshop at ICML 2020, ROMAN Workshop on Lifelong Learning for Longterm HRI, CCNC 2021 Workshop RoboCom, AAAiI-2022, EAIS 2022, CCNC 2022 Workshop RoboCom, PeRConAI 2022, IEEE RA-L, ICPR 2020, IROS 2020, ICML 2020 Continual Learning workshop, ICONIP 2020, ICML 2020 Lifelong Machine Learning, ISBA 2016, ISBA 2017, ISBA 2018, PIMRC2018, CoRL 2017, ICANN 2019, AAAI 2020, ECAI 2020, EAIS 2020, CVPR 2022, ICIAP 2022, ECCV 2022, Conference on Lifelong Learning Agents (CoLLAs) 2022 and a reviewer for prestigious journals / institutions such as Elsevier Cognitive Systems Research, Artificial Intelligence in Medicine and IEEE Access, Journal of Information Security and Applications, Artificial Intelligence Journal, IEEE Access, CVPR 2021, Neural Computing and Applications Journal, ICRA 2021, ICCV 2021, IEEE Transactions on Neural Networks and Learning Systems, Neurocomputing, Mobile Information Systems Hindawi, Evolving Systems, Frontiers Robotics and AI, Elsevier Patter Recognition, TPAMI, Leverhulme Trust, Nature Machine Intelligence among others.

**Associations**
*2019 - Present*

Active Member of the following associations: *ELLIS, CLAIR, IEEE, IEEE Computational Intelligence Society, AIXIA, CVPL, IAML, AIforPeople, ContinualAI, CINI AIIS.*

**Podcasting Activity**
*2021 - Present*

Smarter Podcast: Il Podcast Italiano sull' Intelligenza Artificiale, Co-Organizer and Co-Host (2021 - Present).

TEACHING Podcast: Official podcast of the EU Funded Project TEACHING, A computing Toolkit for building Efficient Autonomous appliCations leveraging Humanistic INtelliGence, Lead Organizer and Host (2021 - Present).

Pointer Podcast: Guest Interview on Continual Learning, Avalanche and more, Episode 99th, (4th May, 2022).

**Press Articles**
2021 - Present

AI Weekly: Continual learning offers a path toward more humanlike AI, Interview, VentureBeat, 2021.

L'IA attuale non è sostenibile: cosa cambia con l'apprendimento automatico continuo, Author, Agenda Digitale, 2022.

**Dissemination Videos**
*2016 - Present*

ContinualAI Seminars, YouTube Collection (2020 - Present).

ContinualAI Meetups, Youtube Collection (2020 - Present).

Announcing the Continual Learning Workshop at CVPR 2022!, YouTube Video, 2022.

Continual Learning Course, YouTube Collection, 2021.

CORe: an Android App for Continual Object Recognition at the Edge, YouTube Video, 2020.

ContinualAI: a Non-Profit Research Organization on Continual Learning for AI, YouTube Video, 2019.

**PhD Students Supervisor / Co-Supervisor**
*2019 - Present*

Rudy Semola, Department of Computer Science and Engineering, University of Bologna (2021 - Present).

Hamed Hemati, Institute of Computer Science, University of St. Gallen (2021 - Present).

Andrea Cossu, Department of Computer Science, Scuola Normale Superiore (2020 - Present).

Gabriele Graffieti, Department of Computer Science and Engineering, University of Bologna (2020 - Present).

Lorenzo Pellegrini, Department of Computer Science and Engineering, University of Bologna (2019 - Present).

**Thesis Supervisor / Co-Supervisor**
*2016 - Present*

Gabriele Merlin. *Replay-based Approaches for Continual Learning.* University of Pisa, 2021. (Master Thesis)

Niccolò Lucchesi. *Extending Avalanche for Continual Reinforcement Learning: Design, Implementation, Experiments and Continual-Habitat-Lab.* University of Pisa, 2021. (Master Thesis)

Federico Matteoni. *Continual Learning for Human State Monitoring.* University of Pisa, 2021. (Bachelor Thesis)

Diego Pergolini. *Reinforcement Learning: un caso di Studio nell' Ambito Della Animal-AI Olympics.* University of Bologna, 2019. (Master Thesis)

Martin Cimmino. *RGB-D Object Recognition for Deep Robotic Learning.* University of Bologna, 2018. (Master Thesis)

Lorenzo Gatto. *Apprendimento Continuo per il Riconoscimento di Immagini.* University of Bologna, 2018. (Master Thesis)

Giacomo Bartoli. *Edge AI: Deep Learning techniques for Computer Vision applied to embedded systems.* University of Bologna, 2018. (Master Thesis)

Claudia Carpineti. *Sensors Relevance Analysis for Transportation Mode Recognition,* University of Bologna, 2017. (Master Thesis)

Giulio Zhou. *Machine Learning come Supporto per la Valutazione dei Requisiti Agili.* University of Bologna, 2017. (Bachelor Thesis)

Riccardo Monica. *Deep Incremental Learning for Object Recognition.* University of Bologna, 2016. (Master Thesis)

**Academic Tutor for Industrial Internship**
*2021 - Present*

Emiliano Marrale. *"Sistema di AI per Rilevare Anomalie sui Dati",* University of Pisa, 2022.

Lorenzo Ferri. *"Applying AI Techniques for Data Analysis and Storytelling",* University of Pisa, 2022.

Luca Cataldo. *"White collar Stress monitorin",* University of Pisa, 2021.

Gabriele Masciotti. *"Sviluppo di una telecamera intelligente che aggiusta la qualità del video in base alle espressioni del viso",* University of Pisa, 2021.

**Advisor**
*2021 - Present*

Scientific Advisor for *Intellia ICT* (2021 - Present). website: https://www.intellia.gr

TECHNICAL SKILLS

AI & Continual Learning: Continual Learning, Bio-Inspired Artificial Intelligence, Deep Learning, Computer Vision.

Machine Learning Frameworks: PyTorch, Tensorflow, Caffe, Theano, Keras, H20, MxNetR, Scikit-learn.

Programming Languages: Python, R, C/C++, JAVA, C#, PHP, HTML, CSS, Javascript.

Parallel Computing: C/C++ OpenMP, C/C++ MPI, CUDA, Assembly and *Thread-level Parallelism.*

Tech. & Editorial Tools: PyCharm, Visual Studio, IPython, Sublime Text, Docker,

Sacred, LaTeX, Overleaf, Premiere Pro, Photoshop, Camtastia Studio.

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|---|---|
| **LANGUAGES** | Italian (Mother Tongue) |
| | English (C1) |

**AWARDS & CERTIFICATES**

**W&B Best Library Award:** Avalanche was chosen by Weights & Bias as the best Continual Learning library presented ad CLVision 2021.

**Doctoral Dissertation Distinction:** The dissertation was awarded by the Italian Association for Artificial Intelligence as one of the top-5 AI PhD Thesis of 2019.

**2nd Classified** of the competition *"Lifelong Robotic Vision"* organized at IROS 2019 with the UniBo team supervised by Prof. Davide Maltoni.

**Winner** of the hackathon *HackCortona* (KCL Tech + Cortona Mix Festival). Cortona, Italy, 2016.

**Winner** of the National Short-Film Festival *L'educazione fa crescere i diritti* organized by CISP, Roma, Italy, 2009.

**English Proficiency Certificate** *IELTS – International English Language Testing System.* Grade 7, 2015.