Lorenzo Pellegrini

l.pellegrini@unibo.it
lrzpellegrini
0000-0002-7680-8116
X3jGASoAAAAJ

Research themes

My research activity is focused on Artificial Intelligence and Computer Vision. In particular, my main research field is Continual Learning and concerns the experimentation and formulation of new methodologies to mitigate the phenomenon known as Catastrophic Forgetting. Another area to which I direct my research efforts is embedded and robotic systems, in the perspective of creating autonomous systems capable of showing Lifelong Learning characteristics in the presence of strong constraints on energy consumption and computational capabilities. My latest research efforts covered privacy-sensitive approaches to continual learning with Biometric data.

Academic experience

Current Placement

2024–now **Researcher, fixed time (RTDa)**, *University of Bologna*, Cesena, Italy
- Since: 07/03/2024
- Position covered by FSE+ 2021-2027 funding from the Emilia-Romagna Region, aimed at the improvement and innovation of professionalizing university courses.

Previous

2022–2024 **Assegnista di Ricerca (Research Fellow)**, *University of Bologna*, Cesena, Italy
- Supervisor: Prof. Davide Maltoni
- Tema: Biometria e Machine Learning
- 01/02/2022 – 06/03/2024

2018–2024 **Teaching assistant, Machine Learning**, *University of Bologna*, Cesena, Italy
- Machine Learning course, Master's Degree in Computer Science and Engineering.
- 5 years.

2021 **Research Intern**, *Facebook AI Research*
- Supervisor: Dr. Abhijit Ogale
- Perception and Action Group
- 4 months

Education

2018–2022 **Ph.D. in Computer Science and Engineering**, *Università di Bologna*, Cesena, Italy
- Thesis: Continual learning for computer vision applications
- Supervisor: Prof. Davide Maltoni
- Defense date: 23/06/2022

2015–2018 **M.S. in Computer Science and Engineering**, *Università di Bologna*, Cesena, Italy, *110L/110 - Magna cum Laude*
- Thesis: Integrazione Architetturale di Personal Assistant Agent basati su modello BDI con Servizi Cognitivi: Un Caso di Studio in Ambito Ospedaliero
- Supervisor: Prof. Alessandro Ricci

2012–2015 **B.S. in Computer Science and Engineering**, *Università di Bologna*, Cesena, Italy, *110L/110 - Magna cum Laude*
- Thesis: Implementazione di una infrastruttura basata su Kafka e Storm per il Mobile Cloud computing
- Supervisor: Prof. Mirko Viroli

2007–2012 **Diploma**, *Liceo Scientifico Alessandro Serpieri*, Rimini, Italy, *86/100*
- PNI - Matematica, Fisica, Scienze naturali

Teaching

2024–now **Professor, Numerical methods for Artificial Intelligence**, *University of Bologna*, Cesena, Italy
- Degree in Computer Science and Engineering
- 1 year.

2024–now **Professor, Elements of Computer Architectures and Operating Systems**, *University of Bologna*, Cesena and Imola, Italy
- Degree in Information systems technologies
- 1 year.

2023–now **Professor, Laboratory of Embedded Systems and IoT**, *University of Bologna*, Imola, Italy
- Degree in Information systems technologies
- 2 years.

Contract Professor

2023–2024 **Contract Professor, Programming**, *University of Bologna*, Cesena, Italy
- Programming course, laboratory module, Degree in Information systems technologies
- 1 year.

Tutoring

2018–2024 **Teaching assistant, Machine Learning**, *University of Bologna*, Cesena, Italy
- Machine Learning course, Master's Degree in Computer Science and Engineering.
- 5 years.

2018/19 **Teaching assistant, Algoritmi e Strutture Dati**, *University of Bologna*, Cesena, Italy
- Algoritmi e Strutture Dati course, Bachelor's Degree in Computer Science and Engineering.
- 1 year.

Awards

2024 **4th place, Face Recognition Challenge in the Era of Synthetic Data**, *WACV 2024*

2021 **Best Library award**, *Workshop on Continual Learning in Computer Vision (CVPR 2021)*

2019 **2nd place, Lifelong robotic vision: object recognition challenge**, *IROS 2019*

Chairing

Tech Chair — 1st ContinualAI Un-Conference — *2023*

Challenge Chair — 4th Workshop on Continual Learning in Computer Vision @ CVPR — *2023*

Challenge Chair — 3rd Workshop on Continual Learning in Computer Vision @ CVPR — *2022*

Organization of competitions

2023 **4th CLVision Challenge**, *4th Workshop on Continual Learning in Computer Vision at CVPR 2023*
Competition on Continual Lifelong Learning in the novel Class-incremental with Repetition (CIR) setup.
Competition website: https://sites.google.com/view/clvision2023/challenge

2022 **3rd CLVision Challenge**, *3rd Workshop on Continual Learning in Computer Vision at CVPR 2022*
Competition on Continual Lifelong Learning for Object Detection in egocentric videos, based on an ad-hoc dataset (EgoObjects) provided by Meta.
Competition website: https://sites.google.com/view/clvision2022/challenge.
Report: https://arxiv.org/abs/2212.06833

Talks, presentations, tutorials

2024 **Invited speech**, *European Association for Biometrics and iMARS Project*
Transatlantic Dialogue on Presentation Attack Detection
iMARS Testing Platform - An Overview of the Bologna Online Evaluation Platform (BOEP)
Event website: https://www.eventbrite.com/e/transatlantic-dialogue-on-presentation-attack-detection-tickets-1056461758559

2024 **Invited talk**, *European Association for Biometrics*
Evaluating Morphing Attack Detectors: An Overview of the Bologna Online Evaluation Platform
Event website: https://eab.org/events/program/334?ts=1706626738138

2023 **Oral presentation**, *IEEE International Joint Conference on Biometrics (IJCB)*
Detecting Morphing Attacks via Continual Distributed Training
Conference website: https://ijcb2023.ieee-biometrics.org/

2023 **Tutorial**, *IEEE International Joint Conference on Biometrics (IJCB)*
Face Recognition and Verification: recent trends and threats. An analysis of the state-of-the-art solutions and the development of methods to contrast the recently emerged Morphing Attack
Conference website: https://ijcb2023.ieee-biometrics.org/

2021 **Poster presentation**, *European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN)*
Continual learning at the edge: Real-time training on smartphone devices
Conference website: https://www.esann.org/proceedings/2021/

2020 **Oral presentation**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
Latent replay for real-time continual learning
Conference website: https://www.iros2020.org/

Involvement in Evaluation Commissions

2023 **Member, PhD Thesis Defense Committee**, *Ph.D. Defense of Angelo Garangau Menezes*, University of São Paulo at São Carlos, Brazil, Supervisor: Professor André Carlos Ponce de Leon Ferreira de Carvalho
Continual Object Detection with Deep Neural Networks

Reviewing for International Journals

2025 **IEEE Transactions on Biomedical Circuits and Systems**, *https://ieee-cas.org/publication/TBioCAS*, Online ISSN: 1940-9990

2024 **Neural Processing Letters**, *https://link.springer.com/journal/11063*, Online ISSN: 1573-773X

2024 **Neural Networks**, *https://www.sciencedirect.com/journal/neural-networks*, Online ISSN: 1879-2782

2023 **Neural Networks**, *https://www.sciencedirect.com/journal/neural-networks*, Online ISSN: 1879-2782

2023 **IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems**, *https://ieee-ceda.org/publication/ieee-transactions-computer-aided-design-integrated-circuits-systems-tcad*, Online ISSN: 1937-4151

2023 **Machine Learning**, *https://www.springer.com/journal/10994*, Online ISSN: 1573-0565

2022 **Neural Networks**, *https://www.sciencedirect.com/journal/neural-networks*, Online ISSN: 1879-2782

2020 **IEEE Transactions on Neural Networks and Learning Systems**, *https://cis.ieee.org/publications/t-neural-networks-and-learning-systems*, Online ISSN: 2162-2388

Program Committee member

2024 **4th Workshop Towards a Complete Analysis of People: From Face and Body to Clothes at ECCV 2024 (T-CAP)**, *https://sites.google.com/view/t-cap-2024/organization*

2023 **2nd EAI Conference on AI for People (CAIP)**, *https://aiforpeople.org/conference/*

2022 **2nd Workshop Towards a Complete Analysis of People: From Face and Body to Clothes at ICPR 2022 (T-CAP)**, *https://sites.google.com/view/t-cap2022/committee*

2022 **1st International Workshop and Challenge on People Analysis: From Face, Body and Fashion to 3D Virtual Avatars at ECCV (WCPA)**, *https://sites.google.com/view/wcpa2022/commitee*

2021 **1st EAI Conference on AI for People: Towards Sustainable AI**, *https://aiforpeople.org/conference/2021/organisation.php*

2021 **1st Workshop Towards a Complete Analysis of People: From Face and Body to Clothes at ICIAP 2021 (T-CAP)**, *https://sites.google.com/view/t-cap2021/committee*

2020 **4th Lifelong Learning Workshop at ICML 2020 (LifelongML)**, *https://lifelongml.github.io/fourth-workshop/organizers/*

Reviewing for Conferences and Workshops

2024 **4th Workshop Towards a Complete Analysis of People: From Face and Body to Clothes at ECCV 2024 (T-CAP)**

2024 **IEEE International Conference on Robotics and Automation (ICRA)**

2024 **5th Workshop on Continual Learning in Computer Vision at CVPR 2024 (CLVISION)**

2023 **41st IEEE Conference on Robotics and Automation (ICRA)**

2023 **2nd EAI Conference on AI for People (CAIP)**

2023 **4th Workshop on Continual Learning in Computer Vision at CVPR 2023 (CLVISION)**

2022 **3rd Workshop on Continual Learning in Computer Vision at CVPR 2022 (CLVISION)**

2022 **2nd Workshop Towards a Complete Analysis of People: From Face and Body to Clothes at ICPR 2022 (T-CAP)**

2022 **1st International Workshop and Challenge on People Analysis: From Face, Body and Fashion to 3D Virtual Avatars at ECCV (WCPA)**

2021 **1st EAI Conference on AI for People (CAIP)**

2021 **2nd Workshop on Continual Learning in Computer Vision at CVPR 2021 (CLVISION)**

2021 **1st Workshop Towards a Complete Analysis of People: From Face and Body to Clothes at ICIAP 2021 (T-CAP)**

2020 **1st Workshop on Continual Learning in Computer Vision at CVPR 2020 (CLVISION)**

2020 **2020 IEEE International Conference on Evolving and Adaptive Intelligent Systems (EAIS)**

2020 **24th European Conference on Artificial Intelligence (ECAI)**

2020 **29th International Joint Conferences on Artificial Intelligence (IJCAI)**

2020 **4th Lifelong Learning Workshop at ICML 2020 (LifelongML)**

Software

April 2020 - now **Lead Maintainer**, *Avalanche: an End-to-End Library for Continual Learning*, ContinualAI, https://avalanche.continualai.org/

Avalanche is an end-to-end Continual Learning library based on Pytorch, born within ContinualAI with the unique goal of providing a shared and collaborative open-source (MIT licensed) codebase for fast prototyping, training and reproducible evaluation of continual learning algorithms.
The project currently has 1400 stars and 240 forks on GitHub: https://github.com/ContinualAI/avalanche.
I was the main designer and implementer of the first versions of Avalanche and I'm currently the Lead Maintainer of the Benchmarks module.

April 2020 - now **Designer and Implementer**, *Continual Object Recognition App*, SmartCity-BioLab, University of Bologna, hhttps://github.com/lrzpellegrini/CL-CORe-App/

The CORe (Continual Object Recognition) App is an Artificial Vision application for Android devices that can classify objects from the CORe50 dataset and also learn how to classify objects of new categories by using the AR1* Continual Learning Algorithm with Latent Replay (more info in the Papers sections). All the inference and training tasks are performed on-device, offline and without accelerators.
Short video demo: https://youtu.be/Bs3tSjwbHa4.

Metrics

At 03/03/2025 (Google Scholar profile):

- Citations: 835
- H-Index: 13
- i10-index: 14

Publications

Thesis

L. Pellegrini, "Continual learning for computer vision applications," Ph.D. dissertation, Università di Bologna, 2022.

Book Chapters

V. Lomonaco, L. Pellegrini, G. Graffieti, and D. Maltoni, "Architect, Regularize and Replay (ARR): a Flexible Hybrid Approach for Continual Learning," in *Towards Human Brain Inspired Lifelong Learning*, X. Li, R. Savitha, A. Ambikapathi, S. Sundaram, and H. M. Fayek, Eds., Singapore: World Scientific Publishing, 2024, ch. 6. DOI: 10.1142/13689.

Journal

H. Hemati et al., "Continual learning in the presence of repetition," *Neural Networks*, vol. 183, p. 106 920, 2025, ISSN: 0893-6080. DOI: https://doi.org/10.1016/j.neunet.2024.106920.

P. Melzi et al., "Frcsyn-ongoing: Benchmarking and comprehensive evaluation of real and synthetic data to improve face recognition systems," *Information Fusion*, vol. 107, p. 102 322, 2024, ISSN: 1566-2535. DOI: https://doi.org/10.1016/j.inffus.2024.102322.

A. Carta, L. Pellegrini, A. Cossu, H. Hemati, and V. Lomonaco, "Avalanche: A pytorch library for deep continual learning," *Journal of Machine Learning Research*, vol. 24, no. 363, pp. 1–6, 2023.

G. Graffieti, D. Maltoni, L. Pellegrini, and V. Lomonaco, "Generative negative replay for continual learning," *Neural Networks*, vol. 162, pp. 369–383, 2023, ISSN: 0893-6080. DOI: 10.1016/j.neunet.2023.03.006, [ScimagoJR: Q1 (Artificial Intelligence)].

L. Pellegrini et al., "A weakly supervised approach for recycling code recognition," *Expert Systems with Applications*, vol. 215, p. 119 282, 2023, ISSN: 0957-4174. DOI: 10.1016/j.eswa.2022.119282, [ScimagoJR: Q1 (Artificial Intelligence)].

A. Cossu et al., "Is class-incremental enough for continual learning?" *Frontiers in Artificial Intelligence*, vol. 5, 2022, ISSN: 2624-8212. DOI: 10.3389/frai.2022.829842, [ScimagoJR: Q2 (Artificial Intelligence)].

V. Lomonaco et al., "Cvpr 2020 continual learning in computer vision competition: Approaches, results, current challenges and future directions," *Artificial Intelligence*, vol. 303, p. 103 635, 2022, ISSN: 0004-3702. DOI: 10.1016/j.artint.2021.103635, [ScimagoJR: Q1 (Artificial Intelligence)].

H. Bae et al., "Iros 2019 lifelong robotic vision: Object recognition challenge [competitions]," *IEEE Robotics and Automation Magazine*, vol. 27, no. 2, pp. 11–16, 2020. DOI: 10.1109/MRA.2020.2987186, [ScimagoJR: Q1 (Computer Science Applications)].

Conference and Workshops

H. Hemati et al., "Class-incremental learning with repetition," in *Proceedings of The 2nd Conference on Lifelong Learning Agents*, S. Chandar, R. Pascanu, H. Sedghi, and D. Precup, Eds., ser. Proceedings of Machine Learning Research, vol. 232, PMLR, pp. 437–455.

P. Melzi et al., "FRCSyn Challenge at WACV 2024: Face Recognition Challenge in the Era of Synthetic Data," in *2024 IEEE/CVF Winter Conference on Applications of Computer Vision Workshops (WACVW)*, Los Alamitos, CA, USA: IEEE Computer Society, Jan. 2024, pp. 892–901. DOI: 10.1109/WACVW60836.2024.00100.

L. Pellegrini, G. Borghi, A. Franco, and D. Maltoni, "Detecting morphing attacks via continual incremental training," in *2023 IEEE International Joint Conference on Biometrics (IJCB)*, Sep. 2023, pp. 1–10. DOI: 10.1109/IJCB57857.2023.10449306.

V. Lomonaco et al., "Avalanche: An end-to-end library for continual learning," in *2021 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, 2021, pp. 3595–3605. DOI: 10.1109/CVPRW53098.2021.00399.

L. Pellegrini, L. Vincenzo, G. Graffieti, D. Maltoni, et al., "Continual learning at the edge: Real-time training on smartphone devices," in *2021 European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN)*, 2021, pp. 23–28. DOI: 10.14428/esann/2021.ES2021-136.

V. Lomonaco, D. Maltoni, and L. Pellegrini, "Rehearsal-free continual learning over small non-i.i.d. batches," in *2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, 2020, pp. 989–998. DOI: 10.1109/CVPRW50498.2020.00131.

L. Pellegrini, G. Graffieti, V. Lomonaco, and D. Maltoni, "Latent replay for real-time continual learning," in *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2020, pp. 10 203–10 209. DOI: 10.1109/IROS45743.2020.9341460.

L. Ravaglia et al., "Memory-latency-accuracy trade-offs for continual learning on a risc-v extreme-edge node," in *2020 IEEE Workshop on Signal Processing Systems (SiPS)*, 2020, pp. 1–6. DOI: 10.1109/SiPS50750.2020.9195220.