Niccolò Biondi

Multimedia & Human Understanding, University of Trento (MHUG lab)
Via Sommarive, 9, 38123 Povo Trento, Italy
+39-342 8393246
niccolo.biondi@unitn.it, niccolobiondi5@gmail.com
https://github.com/NiccoBiondi
Google Scholar profile

PROFILE SUMMARY

Assistant Professor at the University of Trento (MHUG lab), working on machine learning and computer vision. Research focused on representation learning — specifically backward-compatible and stationary representations that enable large-scale models to be updated without re-indexing existing data — with further work on multimodal learning and applied computer vision in biomedical, biometric, and human-centered settings. Published at top-tier venues including NeurIPS, AAAI, CVPR (highlight), and IEEE TPAMI.

EDUCATION

Assistant Professor (RTD@A) 2025 - Present
Multimedia & Human Understanding lab, University of Trento, Trento, IT

Ph.D. Information Engineering (cum laude) 2021 - 2025
University of Florence, Florence, IT

- Ph.D. thesis in information engineering under the supervision of Prof. Alberto Del Bimbo and Federico Pernici:*Learning Backward-Compatible Representations via Stationarity*. Thesis defense: 11 June 2025.

M.Sc. Information Engineering (cum laude) 2021
University of Florence, Florence, IT

- Focus areas: machine learning and computer vision (thesis: Incremental Learning of Compatible Representations) and statistics and optimization theory.

B.Sc. Information Engineering 2018
University of Florence, Florence, IT

- Focus areas: computer science and machine learning (thesis: Financial Document Recognition with Neural Network) and basis of physics and mathematics.

RESEARCH & PROFESSIONAL EXPERIENCE

Project Transfer — PIA Project (RECO 3.26 s.r.l.) year

- Developed deep-learning computer vision systems for biometric verification and retail security: face anti-spoofing, appearance-based person re-identification, and pose/behavior-based shoplifting detection.

Project Transfer (University of Florence) 2025 - 2026

- AI-powered multimodal system combining conversational agents and body tracking for engaging with digital art; human-centered HCI for cultural-heritage and educational use (published at HCII 2025).

Project Transfer: Leonardo SPA 2022

- Face Recognition on Masked Face with the use of advanced deep learning methods and transfer learning techniques

Research Fellow 2021
European Commission under European Horizon 2020 Programme, grant number 951911 - AI4Media at MICC, University of Florence.

PUBLICATIONS **Journal Articles.**

5. **Biondi, N.**, Ricci, S., Arati, N., Nocetti, M., Aminti, G., Pala, P., and Brunetti, M. (2026). *Parameter-efficient Vision Transformer adaptation for stem quality classification from smartphone forest images.* Smart Agricultural Technology.
4. Ricci, S., **Biondi, N.**, Pernici, F., and Del Bimbo, A. "Hyperspherical Simplex Representations from Softmax Outputs and Logits are Inherently Backward-Compatible.". (Submitted to TMLR, under review)
3. **Biondi, N.**, Pernici, F., Ricci, S. and Del Bimbo, A. "A Stationary (and Therefore Compatible) Representation is All You Need.". IEEE Transactions on Pattern Analysis and Machine Intelligence (*TPAMI*), https://www.computer.org/csdl/journal/tp/5555/01/11515089/2gpcsTtMN3i.
2. **Biondi, N.**, Mugnai D., Pernici, F., Bruni, M., and Del Bimbo, A. (2021). *CL^2R: Compatible Lifelong Learning Representations.* ACM Transactions on Multimedia Computing, Communications, and Applications, https://dl.acm.org/doi/full/10.1145/3564786.
1. **Biondi, N.**, Pernici, F., Bruni, M., and Del Bimbo, A. (2021). *CoReS: Compatible Representations via Stationarity.* IEEE Transactions on Pattern Analysis and Machine Intelligence (*TPAMI*), https://doi.org/10.1109/TPAMI.2023.3259542.

Conference Contributions.

9. Ricci, S., **Biondi, N.**, Pernici, F., Del Bimbo, A. (2026, March). Mitigating Negative Flips via Margin Preserving Training. In Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 40, No. 11, pp. 8721-8730).
8. Magrini, G., Becattini, F., **Biondi, N.**, Pala, P. (2026). "PEPR: Privileged Event-based Predictive Regularization for Domain Generalization." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2026) - Findings.*
7. Ricci, S., **Biondi, N.**, Pernici, F., Patras, I., Del Bimbo, A. (2025). "λ-Orthogonality Regularization for Compatible Representation Learning." In *The Thirty-Ninth Annual Conference on Neural Information Processing Systems (NeurIPS2025).*
6. Magrini, G., Marini, N., Becattini, F., Berlincioni, L., **Biondi, N.**, Pala, P., Del Bimbo, A. "FRED: The Florence RGB-Event Drone Dataset.". In *The 33rd ACM International Conference on Multimedia (ACMMM2025).*
5. Vivoli, E., **Biondi, N.**, Bertini, M. and Karatzas, D., 2024. "ComiCap: A VLMs pipeline for dense captioning of Comic Panels." In *Proc. of the IEEE/CVF Conference on European Conference on Computer Vision (ECCV2024)*, Milan, IT. (Published in AI4WA workshop).
4. Vivoli, E., Campaioli, I., Nardoni, M., **Biondi, N.**, Bertini, M. and Karatzas, D. "Comics Datasets Framework: Mix of Comics datasets for detection benchmarking." In *International Conference on Document Analysis and Recognition (ICDAR2024)*, 2024, August, (pp. 154-167). Cham: Springer Nature Switzerland.

3. Ricci, S., **Biondi, N.**, Pernici, F. and Del Bimbo, A. "Backward-Compatible Aligned Representations via an Orthogonal Transformation Layer.", in *Proc. of the IEEE/CVF Conference on European Conference on Computer Vision (ECCV2024)*, (pp. 28793-28804), Milan, IT, 2024. (Published in the Beyond Euclidean: Hyperbolic and Hyperspherical Learning for Computer Vision workshop).
2. **Biondi, N.**, Pernici, F., Ricci, S., and Del Bimbo, A. *Stationary Representations: Optimally Approximating Compatibility and Implications for Improved Model Replacements.* In 2024 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2024) (Highlight paper, notable top 2.8%). https://dx.doi.org/10.48550/arXiv.2405.02581
1. Barletti T., **Biondi, N.**, Pernici, F., Bruni, M., and Del Bimbo, A. (2022). *Contrastive Supervised Distillation for Continual Representation Learning.* 21st International Conference on Image Analysis and Processing *(Oral - Awarded as Best Paper)*, https://dl.acm.org/doi/10.1007/978-3-031-06427-2_50.

See also my Google Scholar page and my GitHub profile.

HONORS & AWARDS

- *Best Student Paper Award* for "Contrastive Supervised Distillation for Continual Representation Learning." 21st International Conference on Image Analysis and Processing, May 2022.
- *Petrosino Prize* for "CoReS: Compatible Representation via Stationary." October 2022, Best M.Sc. Thesis of the CVPL Association.

RESEARCH FUNDING

(2026), CINECA award under the ISCRA initiative (ISCRA-C - "MGRES", ID: HP10CKYJ61) to pursue further research on Compatible Representations with the role of External Supervisor, PI.

- Availability of high performance computing resources.

(2022-2023), CINECA award under the ISCRA initiative (ISCRA-C - "CoReS", ID: HP10C4TIIM) to pursue further research on Compatible Representations with the role of External Supervisor, PI.

- Availability of high performance computing resources.

(2021-2022), CINECA award under the ISCRA initiative (ISCRA-C - "ILCoRe", ID: HP10CRMI87) to pursue further research on Compatible Representations

- Availability of high performance computing resources.

INVITED TALKS & TUTORIALS

3. **Biondi N.**, Generative AI, Medea Academy 2025, Florence, IT.
2. **Biondi, N.**, Ricci, S., Pernici, F., Del Bimbo, A. "Model Updates without Reindexing: A Tutorial on Backward-Compatible Representations". In *23rd International Conference on Image Analysis and Processing (ICIAP2025).* Rome, IT.
1. **Biondi, N.**, Ricci, S., Pernici, F., Del Bimbo, A. "Learning Backward Compatible Representations". In *ACM Multimedia 2024 (ACMMM2024)*, Melbourne, AU.

TEACHING & MENTORING

Teaching:

- Advanced Course for CNR Firenze of foundation of representation learning, self-supervised learning (SimCLR, BYOL, DINO, Barlow Twins), and vision transformers.

- *IMAGE AND VIDEO ANALYSIS (CURRICULUM: MULTIMEDIA SYSTEMS - B024271 (B339)* *2025 - 2026*
  Together with Prof. Pietro Pala, lessons on multimodal learning (CLIP, SigLIP), promptable segmentation (SAM, SAM2, SAM3), and video understanding foundation models (VJEPA).
- *COMPUTER VISION AND INTELLIGENT MEDIA RECOGNITION B031289 (B241)* *2024 - 2025*
  Together with Prof. Pietro Pala, advanced MSc class on the fundamentals of deep learning, computer vision (at UniFi).
- *COMPUTER VISION AND INTELLIGENT MEDIA RECOGNITION B031289 (B241)* *2023 - 2024*
  Together with Prof. Alberto Del Bimbo, advanced MSc class on the fundamentals of deep learning and computer vision (at UniFi).

Students' supervision:

6. Francesco Correnti, *Can MRI Teach US? Spatiotemporal Weak Pairing for Fetal Brain Development Analysis*, M.Sc. thesis 110/110 cum laude and honor, 11/2025 under the supervision of Prof. Pietro Pala
5. Martina Tuccio *A Unified Framework For Text-Driven And Context-Aware Medical Image Segmentation*, M.Sc. thesis, 11/2025 under the supervision of Prof. Pietro Pala
4. Giulia Manno, *Generalized Referring Expression Segmentation in Medical Images*, M.Sc. thesis, 11/2025 under the supervision of Prof. Pietro Pala
3. Edoardo Cappelli, *Event Guided Day to Night Domain Generalization and Adaptation for Robust Semantic Segmentation*, M.Sc. thesis, 11/2025 under the supervision of Prof. Pietro Pala
2. Chisci Marco, *Continual Representation Learning for Visual Search*, M.Sc. thesis 110/110 cum laude, 11/2024 under the supervision of Prof. Ferderico Pernici
1. Barletti Tommaso, *Continual Representation Learning for Visual Search*, M.Sc. thesis, 12/2021 under the supervision of Prof. Alberto Del Bimbo and Ferderico Pernici

ACADEMIC SERVICE

Regular reviewer for IEEE TPAMI, IEEE TNNLS, IEEE TMM, IEEE TAES, and MDPI Sensors, and for NeurIPS, CVPR, ICCV, ECCV, ACM MM, ICMR, ICME, ICPR, ICPRAI, and ICIAP.

TECHNICAL SKILLS

- **Languages:** Python (primary); C/C++ if applicable ; LaTeX.
- **Frameworks & libraries:** PyTorch, Hugging Face, scikit-learn, NumPy, OpenCV.
- **Tools & infrastructure:** Git/GitHub, Linux, Docker if used ; CUDA and multi-GPU / HPC training (CINECA clusters).

ATTENDED SCHOOLS & CONTINUING EDUCATION

6th Advanced Course on Data Science & Machine Learning (ACDL 2023)	2023-Jun
International Computer Vision Summer School (ICVSS 2022)	2022-Jul
Machine Learning Summer School (MLNN^{N} 2022)	2022-Jun
High Performance Deep Learning with GPU (NVIDIA)	2022-Jun

Advanced School on Parallel Computing (CINECA) 2021-Mar

HACKATHON *AIRtificial Intelligence* 2019-Dec
Aeronautica Militare ISMA and Leonardo SPA

- Focusing on investigate machine learning solution to improve standard procedures in aeronautics