Luca Moschella

Machine Learning Researcher

Websites: luca.moschella.dev lucmos lucamoschella Scholar

Research Experience

Apple **Aug 2024 – Present**
Machine Learning Researcher *Zurich, Switzerland*
Research machine learning algorithms to process multimodal data.

IST Austria **Oct 2023 – Jan 2024**
International Research Visit *Klosterneuburg, Austria*
Research visit in the CLAI laboratory led by Prof. Francesco Locatello.

École polytechnique **Jun 2023**
International Research Visit *Paris, France*
Research visit in the GeoViC group led by Prof. Maks Ovsjanikov.

NVIDIA **Sep 2022 – May 2023**
Research Intern *Toronto, Canada (remote)*
Apply diffusion models to 3D fast prototyping with image-space supervision.

NNAISENSE **Jul 2021 – Dec 2021**
Research Intern *Lugano, Switzerland*
Designed and implemented a generic deep learning framework on top of PyTorch to bootstrap industrial projects and automate the hyperparameters tuning.

DLAI @ Sapienza University of Rome **Feb 2020 – Jun 2023**
Teaching Assistant *Rome, Italy*
Lectured and mentored 200+ students. Designed and implemented 30+ interactive and animated lab sessions in Colab, for the Deep Learning and Applied AI course.

Education

ELLIS PhD in Computer Science **Nov 2019 – May 2024**
Sapienza University of Rome *Rome, Italy*
Thesis: Latent Communication in Artificial Neural Networks
Advisors: Prof. Emanuele Rodolà and Prof. Francesco Locatello

M.Sc. in Computer Science **Sep 2017 – Oct 2019**
Sapienza University of Rome *Rome, Italy*
Grade: 110/110 magna cum laude **GPA**: 30.3/30
Relevant courses: Natural Language Processing, Computer Vision, Web and Social Information Extraction, Machine Learning, Foundations of Data Science.

B.Sc. in Computer Science **Sep 2013 – Mar 2017**
Sapienza University of Rome *Rome, Italy*
Grade: 110/110 magna cum laude **GPA**: 30.5/30
Relevant courses: Artificial Intelligence, Algorithm Design.

Selected Invited Talks

*Dedicated to impactful communication, evidenced by **15+** invited talks at renowned institutions (e.g. Cambridge, UCL Gatsby, ENS, ICL, Tübingen AI Center, AutoDesk, NVIDIA). Most of my talks are uniquely animated.*

Leveraging Emerging Similarities for Latent Communication **Sep 2023**
Universitat Pompeu Fabra, hosted by Prof. Marco Baroni *Barcelona, Spain*

Relative representations enable zero-shot latent space communication **Feb 2023**
UCL Gatsby, hosted by Prof. Andrew Saxe *London, UK*

Full list of invited talks available at: luca.moschella.dev.

Achievements

Outstanding academic contributions, including chairing a major workshop @ NeurIPS and an oral top 5% paper @ ICLR.

Notable top 5% paper **May 2023**
ICLR 2023 *Kigali, Rwanda*
- First-author paper [5] selected as notable top 5% paper, oral presentation @ ICLR 2023.
- Introduce the concept of *latent communication*, a focus of the UniReps Workshop @ NeurIPS 2023.

Program Chair **Dec 2023**
UniReps @ NeurIPS 2023 *New Orleans, US*
- Supported the ideation and organization of the UniReps Workshop @ NeurIPS 2023, which successfully attracted *800+ participants*.
- Coordinated 150+ reviewers over 90+ submissions, ensuring at least two reviews for all papers with 95% having three.

Outstanding Reviewer **Oct 2023**
ICCV 2023 *Paris, France*
- Recognized as outstanding reviewer for the International Conference on Computer Vision 2023.

Academic merits **2009-2017**
ABB & Sapienza *Italy*
- Sponsored for academic merits by ABB for ten years and by Sapienza to cover B.Sc. tuition fees.

Selected Open Source Projects

Earned over 1100 stars ★ on projects I've led or co-led on GitHub.

powermanim **Mar 2023**
Collection of manim components layouts and slide templates to design animated live presentations.

NN Template **Feb 2021**
Popular (> 600 ★) template to bootstrap a PyTorch project with Lightning, HF Datasets, Hydra, W&B, DVC and Streamlit; enforcing best practices in data versioning, code organization and reproducibility.

Ultrawide Windows **Nov 2018**
The 2th most popular Kwin script, providing simplified window tiling emulation.

Referees

Prof. Emanuele Rodolà *(ERC grantee)* **Sapienza**
Homepage

Prof. Francesco Locatello **ISTA**
Homepage

Dr. Maria Shugrina **NVIDIA**
Homepage

Selected Publications

*My research explores **latent space communication** between neural networks, a foundational concept introduced in [5]. This key observation is fundamental in understanding the universality and reusability of neural representations. Latent communication, a central theme at the UniReps Workshop @ NeurIPS 2023, has* inspired other researchers *to pursue innovative and state of the art work in fields such as natural language processing, computer vision, reinforcement learning, multimodal learning, and in supervised, weakly-supervised, and unsupervised learning settings.*

Google Scholar statistics

Total citations: 1057
h-index: 6

Collaborations

Engaged in collaborations with some of the most prominent researchers in AI and related areas, leading to peer-reviewed publications:

Leonidas Guibas	Stanford University
Maks Ovsjanikov *(ERC grantee)*	École polytechnique
Or Litany	NVIDIA & Technion
Pietro Liò *(ERC grantee)*	University of Cambridge
Francesco Locatello	IST Austria

Peer reviewed

[1] I. Cannistraci, **L. Moschella**, M. Fumero, V. Maiorca, and E. Rodolà. "From Bricks to Bridges: Product of Invariances to Enhance Latent Space Communication". In: *The Twelfth International Conference on Learning Representations **(ICLR 2024, spotlight, top 5%)***. 2024. URL: https://openreview.net/forum?id=vngVydDWft.

[2] I. Cannistraci, **L. Moschella**, V. Maiorca, M. Fumero, A. Norelli, and E. Rodolà. "Bootstrapping Parallel Anchors for Relative Representations". In: *Tiny Paper Track at the International Conference on Learning Representations **(Tiny Paper Track at ICLR 2023)***. 2023. URL: https://openreview.net/pdf?id=VBuUL2IWlq.

[3] D. Crisostomi, I. Cannistraci, **L. Moschella**, P. Barbiero, M. Ciccone, P. Lio, and E. Rodolà. "From Charts to Atlas: Merging Latent Spaces into One". In: *NeurIPS 2023 Workshop on Symmetry and Geometry in Neural Representations **(NeurReps at NeurIPS 2023)***. 2023. URL: https://openreview.net/forum?id=ZFu7CPtznY.

[4] V. Maiorca*, **L. Moschella***, A. Norelli, M. Fumero, F. Locatello, and E. Rodolà. "Latent Space Translation via Semantic Alignment". In: *Thirty-seventh Conference on Neural Information Processing Systems **(NeurIPS 2023)***. 2023. URL: https://openreview.net/forum?id=pBa70rGHlr.

[5] **L. Moschella***, V. Maiorca*, M. Fumero, A. Norelli, F. Locatello, and E. Rodolà. "Relative representations enable zero-shot latent space communication". In: *International Conference on Learning Representations **(ICLR 2023, oral, notable top 5%)***. 2023. URL: https://openreview.net/forum?id=SrC-nwieGJ.

[6] A. Norelli, M. Fumero, V. Maiorca, **L. Moschella**, E. Rodolà, and F. Locatello. "ASIF: Coupled Data Turns Unimodal Models to Multimodal without Training". In: *Thirty-seventh Conference on Neural Information Processing Systems **(NeurIPS 2023)***. 2023. URL: https://openreview.net/forum?id=XjOj3ZmWEl.

[7] **L. Moschella**, S. Melzi, L. Cosmo, F. Maggioli, O. Litany, M. Ovsjanikov, L. Guibas, and E. Rodolà. "Learning Spectral Unions of Partial Deformable 3D Shapes". In: *Computer Graphics Forum **(EG 2022)***. 2022. DOI: 10.1111/cgf.14483.

[8] G. Trappolini, L. Cosmo, **L. Moschella**, R. Marin, S. Melzi, and E. Rodolà. "Shape Registration in the Time of Transformers". In: *Thirty-Fifth Conference on Neural Information Processing Systems **(NeurIPS 2021)***. 2021. URL: https://openreview.net/forum?id=ui4xChWcA4R.

*Equal contribution.