

# Marco Mistretta

PhD Student in Artificial Intelligence  
Amazon Applied Scientist Intern

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## Professional Summary

PhD researcher in *Artificial Intelligence* at *MICC, University of Florence*, under the supervision of **Prof. Andrew D. Bagdanov** and **Prof. Marco Bertini**. Published as **first author in top-tier conferences** such as *ICLR 2025 (main conference)*, *ECCV 2024 (main conference)* and *NeurIPS 2023 (workshop)*. Research focuses on *Computer Vision*, *Multimodal Vision-Language Models* (MLLMs and LLMs), and *Incremental Learning*. Currently completing an internship as **Applied Scientist Intern** at **Amazon RufusX** in London.

## Professional Experience

- Jul 2025 **Applied Scientist Intern, Amazon RufusX Team**, London, UK
- Present
  - Working on cutting-edge AI solutions within the RufusX team.
  - Fine-tuned, evaluated, and deployed MLLMs impacting millions of customers.

## Education

- Nov 2023 **PhD Student in Artificial Intelligence, University of Florence, Italy**
- Present
  - Topic: *Multimodal Vision-Language Models, Incremental Learning, Prompt Learning*.
  - Supervisors: **Prof. Andrew D. Bagdanov, Prof. Marco Bertini**
- Sep 2021 **Master's in Artificial Intelligence, University of Florence, Italy**
- Jul 2023
  - Thesis: *"RE-Tune - Incremental Fine-Tuning of Biomedical Vision-Language Models"*
  - Supervisors: **Prof. Andrew D. Bagdanov, Prof. Marco Bertini** Final Grade: 110/110L
- Sep 2018 **Bachelor's in Computer Engineering, University of Florence, Italy**
- Sep 2021
  - Thesis: *"Scarlatti-Gen - AI-Driven Sonata Generation Using Weighted Graphs and CNNs"*
  - Supervisors: **Prof. Paolo Frasconi, Prof. Simone Conforti** Final Grade: 105/110

## First-Author Publications

- **Mistretta M.\***, Baldrati A.\*, Agnolucci L.\*, Bertini M., Bagdanov A. D. (2025). "**Cross the Gap: Exposing the Intra-modal Misalignment in CLIP via Modality Inversion.**" (**ICLR 2025 main conference**). We show that the common practice of individually exploiting the text or image encoders of VLMs is highly suboptimal for intra-modal tasks like image-to-image retrieval. We argue that this is inherently due to the CLIP-style inter-modal contrastive loss that does not enforce any intra-modal constraints, leading to what we call *intra-modal misalignment*.  
**Code:** [github.com/miccunifi/Cross-the-Gap](https://github.com/miccunifi/Cross-the-Gap) **Paper:** <https://openreview.net/forum?id=VVVfulcmKR>
- **Mistretta M.\***, Baldrati A.\*, Bertini M., Bagdanov A. D. (2024). "**KDPL: Improving Zero-shot Generalization of Learned Prompts via Unsupervised Knowledge Distillation.**" (**ECCV 2024 main conference**). Proposed KDPL, a novel unsupervised approach for improving the generalization of learned prompts without labeled data, achieving significant performance gains across multiple benchmarks.  
**Code:** [github.com/miccunifi/KDPL](https://github.com/miccunifi/KDPL) **Paper:** [arxiv.org/abs/2407.03056](https://arxiv.org/abs/2407.03056)
- **Mistretta M.**, Bagdanov A. D. (2023). **RE-tune: "Incremental Fine Tuning of Biomedical Vision-Language Models for Multi-label Chest X-ray Classification."** (**Workshop Medical Imaging NeurIPS**). Introduced RE-tune, a novel approach for fine-tuning Multimodal Biomedical VLMs in incremental learning scenarios for multi-label chest disease diagnosis, achieving efficient, privacy-preserving classification.  
**Website:** [neurips.cc/virtual/2023/82487](https://neurips.cc/virtual/2023/82487) **Paper:** [arxiv.org/abs/2410.17827](https://arxiv.org/abs/2410.17827)

## Reviewer Roles

- **Conferences:** NeurIPS 2024, ICLR 2025, NeurIPS 2025
- **Journal:** IEEE Transactions on Multimedia/Circuits and Systems for Video Technology

## Research Interests

- **Multimodal Learning:** Combining vision and language for richer model understanding.
- **Prompt Learning:** Optimizing prompts to effectively guide AI models for improved task performance.
- **Few-Shot Learning:** Adapting AI to new tasks with limited examples.
- **Incremental Learning:** Enabling models to continuously learn without forgetting previous knowledge.
- **Contrastive Self-Supervised Learning:** Extracting insights from unlabeled data.

## Teaching and Mentoring

Jan 2024 **Teaching Assistant**, *University of Florence*

Present ○ Delivering interactive lessons on C/C++ and Python to over 200 bachelor students.

Apr 2024 **Thesis Co-Supervisor**, *University of Florence*

Sep2024 ○ "*Mitigating Catastrophic Zero-shot Forgetting in CLIP via Distillation of Low-Rank Adapters from Learned Prompts*", Proposed a novel method to efficiently few-shots fine-tune CLIP models that mitigates catastrophic forgetting and preserves zero-shot capabilities, based on distilling learned prompts in LoRa adapters.

Jan 2020 **Student Ambassador**, *University of Florence*

Nov 2020 ○ Mentoring students on exams projects, internships, and career development.

## Technical Skills

Programming Python, Java, C++, MATLAB, R

Frameworks PyTorch, TensorFlow, NumPy, OpenCV

Miscellaneous Git, Docker, Bash

**GitHub Profile:** [github.com/marcomistretta](https://github.com/marcomistretta)

**KDPL Repository:** [github.com/miccunifi/KDPL](https://github.com/miccunifi/KDPL) (ECCV 24)

**Cross The Gap Repository:** [github.com/miccunifi/Cross-the-Gap](https://github.com/miccunifi/Cross-the-Gap) (ICLR 25)

## Personal Interests

Music ○ **Flute Player:** Played transverse flute for 10 years in local bands and orchestras.

○ **Chorister** at "Coro Giovanile Effetti Sonori" (National Competition Winner)

○ **Guitarist and Songwriter** for "I Green Clouds" (Provincial Competition Winner)

Gaming Enjoying strategic and cooperative games that enhance problem-solving and teamwork.

## Languages

English Professional working proficiency

Italian Native