

Nicholas Moratelli

INTERNATIONAL DOCTORATE IN INFORMATION AND COMMUNICATION TECHNOLOGY @ AIMAGELAB (UNIMORE)

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<https://nicholasmoratelli.github.io>

About Me

I am a PhD student at AlmageLab (UNIMORE). My research primarily focuses on Multimodal Large Language Models, Vision and Language, and Foundation Models. My research is driven by a deep interest in Generative AI and HPC systems. I leverage advanced AI technologies to lead innovative solutions, tackling both emerging and enduring challenges with adaptability and expertise.

Experience

Research Internship

UNIVERSITY OF MODENA AND REGGIO EMILIA (UNIMORE) @ AIMAGELAB

Modena, Italy

Jan. 2022 - Oct. 2022

- Development of a deep neural network for image captioning with retrieval capabilities on large-scale datasets.
- Supervisors: *Prof. Rita Cucchiara* and *Dr. Lorenzo Baraldi*.

Research Internship

UNIVERSITY OF MODENA AND REGGIO EMILIA (UNIMORE) @ NETLAB

Modena, Italy

Mar. 2020 - Sept. 2020

- Conducted an in-depth analysis of network congestion in TCP and UDP protocols using Python and Secure Shell (SSH). Created a tutorial on the Flent framework.
- Supervisors: *Prof. Maurizio Casoni* and *Dr. Carlo Augusto Grazia*.

Education

International Doctorate in Information and Communication Technology

UNIVERSITY OF MODENA AND REGGIO EMILIA (UNIMORE)

Modena, Italy

Nov. 2022 - Present

- Supervisors: *Prof. Rita Cucchiara* and *Dr. Lorenzo Baraldi*.
- Research topics: Multimodal Large Language Models - Foundation Models - Image Captioning - Generative AI - Vision and Language.

M.Sc. in Computer Engineering - Curriculum in Artificial Intelligence Engineering

UNIVERSITY OF MODENA AND REGGIO EMILIA (UNIMORE)

Modena, Italy

Oct. 2020 - Oct. 2022

- Thesis title: Generating Natural Language Description by retrieving knowledge on large scale datasets through a novel attention operator.
- Supervisors: *Prof. Rita Cucchiara* and *Dr. Lorenzo Baraldi*.
- Grade: 110 cum laude / 110.

Participation to National and European Projects

FAIR PNRR Project

FUTURE AI RESEARCH

Europe

July 2023 - Present

- FAIR is a project that aims to develop ethical and sustainable AI systems through a holistic and multidisciplinary approach, addressing legal, ethical, and environmental considerations.
- I am involved in the project as a PhD student, contributing to the development of the first Italian Multimodal Large Language Model.
- I am a member of the TP2: Vision, Language and Multimodal Challenges.

PRIN MUCES Project

PLATFORM FOR CONTENT ENRICHMENT AND SEARCH IN AUDIOVISUAL ARCHIVES

Italy

Jan. 2024 - Present

- PRIN MUCES is a project committed to the development, training, and public release of fully multimodal foundation models.
- I am involved in the project as a PhD student, where I work on the creation of Multimodal Large Language Model with content-based retrieval capabilities on a large scale.

Skills

Programming Python, JAVA, C/C++, LaTeX, MatLab, Node.js

Miscellaneous TensorFlow, PyTorch, Numpy, Github, AWS, OpenCV, Faiss, REST API, HTML5, Django, Arduino

Languages English, Italian

Honors & Awards

2018	Best Project Award , “Tecnicamente” sponsored by “Adecco”	Mantova, Italy
2021	Scholarship , Best Student Award at University of Modena and Reggio Emilia	Modena, Italy
2024	Scholarship , Best Student Award at University of Modena and Reggio Emilia	Modena, Italy

Publications

Positive-Augmented Contrastive Learning for Visual Language Models Evaluation and Training	Journal
UNDER REVIEW AT IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE (TPAMI)	2024
• Authors: S. Sarto*, N. Moratelli* , M. Cornia, L. Baraldi, R. Cucchiara	
Revisiting Image Captioning Training Paradigm via Direct CLIP-based Optimization	Conference
BRITISH MACHINE VISION CONFERENCE (BMVC) - ORAL	2024
• Authors: N. Moratelli* , D. Caffagni*, M. Cornia, L. Baraldi, R. Cucchiara	
Wiki-LLaVA: Hierarchical Multimodal Retrieval Augmented Generation	Conference
IEEE/CVF CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION WORKSHOP (CVPRW)	2024
• Authors: D. Caffagni*, F. Cocchi*, N. Moratelli* , S. Sarto*, M. Cornia, L. Baraldi, R. Cucchiara	
The Revolution of Multimodal Large Language Models: A Survey	Conference
FINDINGS OF THE ASSOCIATION FOR COMPUTATIONAL LINGUISTICS (ACL)	2024
• Authors: D. Caffagni*, F. Cocchi*, L. Barsellotti*, N. Moratelli* , S. Sarto*, L. Baraldi*, L. Baraldi, M. Cornia, R. Cucchiara	
Fluent and Accurate Image Captioning with a Self-Trained Reward Model	Conference
INTERNATIONAL CONFERENCE ON PATTERN RECOGNITION (ICPR)	2024
• Authors: N. Moratelli , M. Cornia, L. Baraldi, R. Cucchiara	
Personalizing Multimodal Large Language Models for Image Captioning: An Experimental Analysis	Conference
EUROPEAN CONFERENCE ON COMPUTER VISION WORKSHOP (ECCVW)	2024
• Authors: D. Bucciarelli, N. Moratelli , M. Cornia, L. Baraldi, R. Cucchiara	
Fashion-oriented image captioning with external knowledge retrieval and fully attentive gates	Journal
SENSORS MDPI	2023
• Authors: N. Moratelli , M. Barraco, D. Morelli, M. Cornia, L. Baraldi, R. Cucchiara	
Are Learnable Prompts the Right Way of Prompting? Adapting Vision-and-Language Models with Memory Optimization	Journal
IEEE INTELLIGENT SYSTEMS	2023
• Authors: N. Moratelli , M. Barraco, M. Cornia, L. Baraldi, R. Cucchiara	

Academic Service

I had the opportunity to act as a reviewer for various prestigious conferences. Here is a list of them.

2024	Reviewer , 18th European Conference on Computer Vision	ECCV, Milan
2024	Reviewer , 35th British Machine Vision Conference	BMVC, Glasgow
2024	Reviewer , 27th International Conference on Pattern Recognition	ICPR, Kolkata
2024	Reviewer , 32nd International Conference on ACM Multimedia	ACM, Melbourne
2024	Reviewer , Pattern Recognition Letters	
2023	Reviewer , 31st International Conference on ACM Multimedia	ACM, Ottawa
2023	Reviewer , Pattern Recognition Letters	
2022	Reviewer , Pattern Recognition Letters	