Giorgio Longari

Mathematical Engineer

Google Scholar

Milan, Italy

giorgio.longari@unimib.it

+39 338 601 54 20

Introduction

Hey! I'm Giorgio, a researcher specializing in AI and geometry processing, focused on bridging theoretical advancements to real-world medical applications.

Academic

Researcher, Milan, Italy   *Mar 2024 -* **Now**

Department of Informatics (DISCo), University of Milano - Bicocca.
I am part of DIGAIR team led by Simone Melzi. I work on geometry processing, 3D shape analysis, and artificial intelligence, also applied to medical data. This research experience has led to the following results:

- Multimodal Approach for Blending Concepts with Diffusion Models. To advance multimodal learning, I developed algorithms that establish connections between different representations, such as text and images, enabling the transformation of abstract concepts into concrete visual depictions. By leveraging diffusion models, I explored how mental representations of concepts can be blended and refined using textual prompts, allowing for the controlled generation of complex visual content. This research was presented in "How to Blend Concepts with Diffusion Models", showcased at the Knowledge in Generative Models workshop at ECCV 2024, and later published in the Image Schema workshop of AIxIA. An extension of this work has been submitted to the Journal of Artificial Intelligence Research.

- In collaboration with IRCCS Eugenio Medea, I participated in the FeTa Challenge Workshop at the MICCAI 2024 conference, where I applied 3D deep learning techniques to fetal MRI data to extract key points and biometric measurements. These measurements are also displayed on selected 2D images from MRI slices for clinical validation, leveraging the advantages of both 2D and 3D representations. A challenge results paper is under review by the Journal of Medical Image Analysis.

- Statistical Shape Analysis for Medical Applications. In collaboration with IRCCS Eugenio Medea, I applied SSA techniques to analyze brainstem deformations in Joubert syndrome using MRI-derived structures. This approach allows for the identification of subtle anatomical variations that could aid clinicians in characterizing pathological conditions more effectively. Additionally, SSA can be leveraged to generate synthetic datasets, enhancing the training and validation of deep learning models in medical applications. The results of this study were submitted to the MICCAI conference under the title "Unraveling Brainstem Deformations in Joubert Syndrome: A Statistical Shape Analysis of MRI-Derived Structures."

- **ON GOING:**: In collaboration with UC Santa Barbara, I am one of three contributors to GEOMFUM, an open-source Python library for machine learning and deep learning on functional maps a powerful representation for shape analysis and correspondence. We are currently preparing a short paper on the package, which will be submitted to the Journal of Machine Learning Research.

- **ON GOING:** In collaboration with the University of Verona, supervised by Mario A. T. Figueiredo and Marco Cristani, we are developing a project that leverages Confident Learning to enhance representation learning.

- **ON GOING:** In collaboration with Humanitas Research Hospital, we are developing a zero-shot pipeline, incorporating non-rigid mesh registration to predict geometry fields for the Total Marrow and Lymphoid Irradiation technique.

Moreover, during this period, I co-supervised the Computer Science theses of both a Master's student and a Bachelor's student.

Visitor student, Rozzano, Italy   *Mar 2023 - Dec 2023*

Radiotherapy laboratory, Humanitas Research Hospital and University.

Job Experience   **TXT E-tech**, Lombardia, Italy   *Jul 2023 - Feb 2024*

Research and Development Engineer

- I am a key contributor to the ARTO (Automated Robotics for Testing Optimization) project, specializing in Computer Vision and Robotics.

IKEA s.r.l,, Lombardia, Italy   *Nov 2019 - May 2020*

Business Analyst

- Internship in the Business Support Analyst department, with responsibilities including: Developing reports using Power BI, Contributing to the implementation of a new IVR (Interactive Voice Response) system for IKEA Italia

Technical   *Languages:* Italian (Native proficiency), English (Full professional proficiency),
Information   *S*panish (Professional proficiency)

Programming Languages: Matlab, R, C++, SQL, ROS2, Python, Git

Education   **Politecnico di Milano**, Milan, Italy   *Sep 2021 - Apr 2024*

M.Sc. Mathematical Engineering, Statistical Learning

- My thesis project involved the application of Deep Learning to automate the total marrow irradiation technique using, in collaboration with a team of two physicists at Humanitas Research Hospital. The results have been published in the Medical Physics Journal and were featured on the cover of the 51st volume edition.

Link: Article

Technische Universität Berlin, Berlin, Germany   *Nov 2022- Dec 2022*

Participation for "Smart Cities School + Smart City Hackathon"

Universidad de Chile, Santiago de Chile, Chile   *Feb 2022 - Aug 2022*

University exchange program

Politecnico di Milano, Milan, Italy   *2015 - 2021*

B.Sc. Mathematical Engineering

---

[1]I authorize the processing of personal data according to EU Regulation 679/2016.