

## PERSONAL STATEMENT

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A hardworking and ambitious individual with a great passion for Artificial Intelligence & Computer Vision. Currently, I am enrolled in the third year of the Ph.D. in Computer Science program at the Sapienza University of Rome. As a Ph.D. fellow, my main research focuses on artificial intelligence and computer vision, believing that pixels, the closest representation of the physical world constraints, are the key to next-generation artificial general intelligence.

Besides my research interest, I have a strong engineering background cultivated throughout my academic and industry journey. I possess remarkable programming prowess, particularly in Python, my principal tool for rapid prototyping, followed by essential versioning tools and deep/machine learning frameworks. Furthermore, my adeptness extends to C++ and parallel programming using CUDA. This engineering foundation and my theoretical and practical knowledge of the computer science and vision fields enable me to easily adapt my ideas into working prototypes following the best practices.

## WORK EXPERIENCE

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### Contracted Machine Learning Researcher

2021-Ongoing

Sapienza University of Rome (36 months)

- Conduct research on domains like action recognition, action anticipation, object detection, vision-language models, and medical imaging.

### Machine Learning Engineer

2020-2021

MedLea Srls, (16 months)

- Designed and deployed machine learning models at scale.
- Designed and implemented a parallel and scalable Ray-Tracing algorithm that runs on GPUs for discretizing 3D mesh representation of geometries into a volumetric representation. The implemented algorithm would cut the computational costs of the services offered by MedLea by 30% in the preparation phase.

### Applied machine learning specialist

2018-2018

PaperClicks, Internship (6 months)

- Responsible for designing and implementing machine learning algorithm for the optimization of core business operations at PaperClicks.

## EDUCATION

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### Ph.D. in Computer Science

2021-2025

Sapienza University of Rome

- Research Area/s: Computer vision and activity understanding from an egocentric perspective.
- Advisor: Prof. Luigi Cinque
- Co-advisor: Prof. Danilo Avola

### MSc. Computer Science, Sapienza University of Rome

2018-2020

- Important Courses: Machine Learning, Computer Vision, Applied Artificial Intelligence, Multimodal Interaction, Cloud Computing, Advanced Software Engineering, Distributed Systems.
- Graduated as top 1% of the class.
- Final Grade: Cum laude

### BSc. Business Computer Science, University of Tirana

2015-2018

- Important Courses: Algorithms, Data Structures, Linear Algebra, Calculus, C++, Java, Computer Architecture, Databases, Computer Networks, Information Security, Statistics.
- Thesis: Graduated as top 1% of the class.
- Final Grade: 10/10

## PROJECTS

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### **SEARCHER – Smart unmannEd AeRial vehiCles for Human likE monitoRing** 2022-Ongoing

*Italian Ministry of Defense*

Senior R&D Engineer  
(PI - Prof. Danilo Avola)

- Study and analysis about state-of-the-art anomaly detection, novelty detection, and UAV attention mechanism algorithms.
- Design and development of novel deep learning algorithms for UAV application in navigation and surveillance.
- Engineering the execution pipeline of the deep learning system on edge.

### **Action Anticipation With Causality Modeling and Latent Space Prior Injection from Text**

*2023-Ongoing*

*Individual Project, part of PhD research*

- Designed and implemented neural networks that could anticipate future human action from RGB videos.
- Introduced two novel attention mechanisms that models the causality between video events happening in different time steps and preserves temporal order.
- Achieved state-of-the-art performance on two benchmarks, namely EpicKitchens-100 and EGTEA++.

### **View-Invariant Action Anticipation exploiting relative similarities from RGB videos** 2023-Ongoing

*Individual Project, part of PhD research*

- Align the understanding of actions from multiple different non-synchronized views.
- Exploit the relative similarities between different actions to enable zero-shot learning.

### **ReViT – Enhancing Vision Transformers With Residual Attention**

*2022-2023*

*Individual Project, part of PhD research*

- Designed and implemented a novel residual connection between transformer blocks that propagates and accumulates knowledge from shallow to deeper layers.
- Enhanced Vision Transformers performance by improving their feature diversity in deeper layers.
- Obtained an improvement of +4% on ImageNet1K

### **Enabling Smart Assistants Communication with Deaf and Mute People Through Sign-Language Detection and Text-To-Speech**

*2019-2020*

*Individual Project*

- Designed and implemented a solution that could read sign languages from an RGB camera, translate the sign language into text, transform the text into speech to communicate with a smart assistant, capture the smart assistant answer and convert it into written text.
- The implemented solution could help mute and deaf people communicate with smart assistants controlled over voice commands.

### **Detecting Mobility Disorders of Walking Patients from RGB Gait Videos**

*2023-2023*

*Sapienza University of Rome (Funded project)*

Senior R&D Engineer

- In collaboration with a cross-functional team of doctors and computer scientist, designed and implemented a novel solution that could recognize mobility disorders of walking patients.
- The designed solution comprises Vision Transformer architectures capable of capturing long-term and fine-grained temporal relationships.

### **Knee Diagnosing From Real Life MRI Protocols**

*2022-2023*

*Sapienza University of Rome (Funded project)*

Senior R&D Engineer

- Designing and implementing a machine learning and computer vision solution for diagnosing knee MRIs from a real-life imaging protocol used in clinics.
- The implemented solutions achieved outstanding performances with a small cohort of training (90% of accuracy with 250 training examples and 100 validation examples).

### Hospital Resource Optimization for Post-Intervention Patients

2021-2022

*Sapienza University of Rome (Funded project)*

Senior R&D Engineer

- In a cross-functional team of physicians and computer scientist, led the designing and implementation of a novel machine learning solution that could predict the functional improvement of patients entering rehabilitation.
- The proposed solution could help hospitals manage resources better by knowing in advance the resources needed for each patient based on their functional ability after intervention.
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### House Price Prediction (Kaggle)

2019-2019

*Sapienza University of Rome*

- Designed and implemented of a novel machine learning solution that could predict the price market of houses.
- Ranked top 1% in 2019 leader board.

## SKILLS

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### Hard Skills

- **Languages:** Albanian (mother tongue), Italian (proficient), English (proficient).
- **Professional Competences:** Algorithms, computer vision, image processing, video processing, machine learning, deep learning, visual recognition, action recognition, action anticipation, object detection, semantic segmentation, homography, programming, parallel computing, transformer neural networks, convolutional neural networks, Unit testing, CI/CD, debugging, Prompting.
- **Programming Languages:** Python 3 (5+ years), C++ (2+ year), CUDA (1+ year), SQL (1+ year).
- **Tools and Frameworks (Expert):** PyTorch, OpenCV, NumPy, SciPy, Scikit-learn, Pandas, Matplotlib, PlotLy, Docker, Bash, git, MPI, OpenMP, AWS, Jenkins.
- **Tools and Frameworks (Proficient):** PyTorch-Lightning, Tensorflow, HuggingFace api, Detectron2, MMDetector, DLib, CuPy, PlotLy, Scikit-Image, MongoDB, MySQL, VTK, ITK, PoreSpy, MPI, OpenMP, AWS, Jenkins, Kubernetes.
- **Operating System:** Debian-based Linux (Ubuntu, Mint).

### Soft Skills

- Communication, teamwork, attention to detail, problem-solving, adaptability, time management, work ethic, perseverance, consistency, and persistence.

## PUBLICATIONS

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### Research articles

1. "ReViT: Enhancing Vision Transformers with Residual Attention." - (Pattern Recognition, Under Review) <https://github.com/ADiko1997/Vision.ai-PhD/tree/main/ReViT>.
2. "Real-Time GAN-Based Model for Underwater Image Enhancement" - International Conference on Image Analysis and Processing, 2023. [https://doi.org/10.1007/978-3-031-43148-7\\_35](https://doi.org/10.1007/978-3-031-43148-7_35).
3. "Low-Altitude Aerial Video Surveillance via One-Class SVM Anomaly Detection from Textural Features in UAV Images." - Information 2022, 13, 2. <https://doi.org/10.3390/info13010002>.
4. "A Novel GAN-Based Anomaly Detection and Localization Method for Aerial Video Surveillance at Low-Altitude." - Remote Sens. 2022, 14, 4110. <https://doi.org/10.3390/rs14164110>.
5. "MS-Faster R-CNN: Multi-Stream Backbone for Improved Faster R-CNN Object Detection and Aerial Tracking from UAV Images." - Remote Sens. 2021, 13, 1670. <https://doi.org/10.3390/rs13091670>.

6. "In-silico analysis of airflow dynamics and particle transport within a human nasal cavity." - Journal of Computational Science, 2021, 54, 101411, <https://doi.org/10.1016/j.jocs.2021.101411>.
7. "COVID-19 therapy optimization by AI-driven biomechanical simulations." - The European Physical Journal Plus, 2023, 138(2), p.182.

## **TUTORING STUDENTS**

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1. Davide Marincione, Bachelor Thesis (110L), "Percorso di eccellenza".
2. Emanuele Caiserini, Master Thesis (110L).
3. Yusupha Juwara, "Percorso di eccellenza".
4. Leonardo Berti, "Computer Vision Course".

## **AWARDS AND FELLOWSHIPS**

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1. Research Fellowship, Sapienza University of Rome, IT (2021-2023) (Three times).
2. LazioDisco Scholarship, Rome, IT (2018 - 2020).
3. Avvio alla ricerca, Rome, IT, 2023

## **CERTIFICATE**

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1. Advanced C++ Developer (Udemy).

## **CONFERENCES AND PUBLIC SPEAKING**

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1. Attended International Conference in Computer Vision (ICCV) 2023, Paris, FR. (Volunteering Student)
2. Invited Speaker in RomeRehab 2023 Conference, Rome, IT, 2023.