Giancarlo **Paoletti**

AI Research Fellow · PhD

Computer Vision · Machine Learning · Human Pose Estimation · Unsupervised Human Action Recognition · HPC Large-Scale Computing

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About Me

I am an AI Research Fellow at Leonardo Labs.
My studies include computer science, 3D geometric modelling, machine learning, psychology, and neuroscience. My current research focuses on the development of algorithms that can accurately estimate human poses and learn human behaviour (i.e., *actions* and *emotions*) without supervision, using *privacy-preserving* skeletal poses. I am also actively involved in maintaining multi-GPU and sensor network systems for research purposes such as 2D-and-3D pose estimation, skeleton-based action recognition, and privacy-preserving pipelines for healthcare monitoring.

Research Work Experience

Leonardo Labs

Genova, Italy

AI Research Fellow

Apr. 2023 - Present

- Developer of Multi-Modal Deep Learning algorithms.
- HPC specialist on Leonardo's Davinci-1 Cluster and active supporter of Large-Scale algorithms for other research fellows.

PAVIS (Italian Institute of Technology)

Genova, Italy

Research Fellow

Nov. 2022 - Mar. 2023

- Active maintainer and developer of the PAVIS Sensor Network, a modular sensor-based Hardware and Software infrastructure for computer vision tasks (including real-time) for researchers and PhDs.
- Designed and implemented libraries and algorithms for the Sensor Network. This includes Python-based end-to-end custom algorithms for social distancing and human pose estimation, skeleton-based action recognition, etc.
- Experience with RGB cameras, Kinect, depth and event cameras (e.g., Intel RealSense and Prophesee event cameras), controlling the data using Redis stream.
- Experience with supporting platforms for the Sensor Network to provide developers and end-users with a flexible containerised environment for various computer vision applications and tasks. This includes, e.g., Docker containers, Singularity containers, Portainer, PostgreSQL, and Docker Swarm for multiple-machines configurations.
- Enhanced usage of NVIDIA CUDA framework, OpenMPI, and Altair PBS Pro to set up parallel-computing pipelines for the end-users needs. This spans from single-to-multiple local machines up to HPC applications.

Education

PAVIS (Italian Institute of Technology)

Genova, Italy

PhD in Computer Vision

Nov. 2019 - Feb. 2023

- PhD in Science and Technology for Electronic and Telecommunication Engineering
  Curriculum: Computational Vision, Recognition and Machine Learning (Advisor: Dr Alessio Del Bue)
- Research on Unsupervised feature learning for Skeletal Human Action Recognition
- Development of Subspace Clustering and temporal pruning algorithms
- Analysis of Graph Laplacian and viewpoint-invariance methods
- Investigation on Denoising Transformers for real-world scenarios of Human Action Recognition and Pose Estimation
- Experience with containers (e.g., Docker and Singularity) and parallel-computing solutions
  (e.g., NVIDIA CUDA, OpenMPI, Altair PBS Pro, HPC deployment) to conduct experiments about PhD research topics.
- *Thesis title:* Unsupervised Human Action Recognition using 3D Skeleton Poses

Università degli studi di Torino

Turin, Italy

M.S. in Psychology

Nov. 2016 - Jul. 2019

- Master of Science in Scienze del Corpo e della Mente (Body and Mind Sciences)
- *Thesis title:* Deep Learning and Neuroscience: an integration

Università degli studi di Urbino Carlo Bo *Urbino, Italy*

B.S. in Psychology *Nov. 2013 - Sep. 2016*

- Bachelor of System in Scienze e Tecniche Psicologiche (Psychology Sciences and Techniques
- *Thesis title:* Intelligenza Artificiale: Definizione, Evoluzione ed Utilizzo in Ambito Psicologico (*transl.* Artificial Intelligence: Definition, Evolution and Applications in Psychology)

Publications

2023 **SKELTER: Unsupervised Skeleton Action Denoising and Recognition using Transformers**
Paoletti, G., Beyan, C., & Del Bue, A.
Frontiers in Computer Science

2022 **Graph Laplacian-Improved Convolutional Residual Autoencoder for Unsupervised Human Action and Emotion Recognition**
Paoletti, G., Beyan, C., & Del Bue, A.
IEEE Access

2021 **Unsupervised human action recognition with skeletal graph Laplacian and self-supervised viewpoints invariance**
Paoletti, G., Cavazza, J., Beyan, C., & Del Bue, A.
32nd British Machine Vision Conference (BMVC)

2020 **Subspace clustering for action recognition with covariance representations and temporal pruning**
Paoletti, G., Cavazza, J., Beyan, C., & Del Bue, A.
25th International Conference on Pattern Recognition (ICPR)

Technical Skills

Machine Learning Libraries	PyTorch, PyTorch Lightning, OpenCV, Numpy, Scikit-learn, Tensorflow, Keras, Scipy, Matplotlib, Pandas, MXNet (basic)
Programming Languages	Python, MATLAB, Bash, C++ (basic), JavaScript (basic)
Parallel Computing Libraries	NVIDIA CUDA, Horovod, OpenMPI, HPC custom bash scripts, Altair PBS Pro, OpenPBS
OS Platforms	Windows, Linux
Specialized Software/Libraries	SMPL, VIBE, T3DP, PYSKL, OpenPose, Detectron2, YoloPose, MMPose, Yolo, Deep SORT, MMDetection, MediaPipe, E2Pose, Omni3D, Cube R-CNN
Other Tools/Libraries/Proficiencies	LaTeX, Redis stream, PostgreSQL (basic)
DevOps/Containers	Docker, Docker Swarm, Singularity, Portainer, Kubernetes (basic), Grafana (basic)

Languages

- **Italian**: *Native*
- **English**: *C1*

Coursework

Online courses	Workshop on *Fundamentals of Deep Learning for Multi-GPUs* (NVIDIA Deep Learning Institute)
Summer schools	DeepLearn 2021 Summer School, Vision and Sports 2022 Summer School