

# GIUSEPPINA MONTEVERDE

## EDUCATION

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### **Sapienza, University of Rome**

*PhD in Mathematical Models for Engineering,  
Electromagnetics and Nanosciences*

*Rome, IT*

*April 2021 - Current*

*Curriculum: Mathematical Models for Engineering*

*Thesis: Transform-based signal representations for efficient AI-based hyperspectral imaging (MAT/08)*

*Project: HYPERspectral imaging through Artificial intelligence for Building Control (HYPER ABC)*

*Thesis Supervisor: prof. Vittoria Bruni*

The PhD project aims to the study and development of innovative methodologies based on Artificial Intelligence for the control of vertical wall structures through the processing of hyperspectral images. In particular, the thesis concentrates on the formulation of transform-based signal representations to enable efficient AI-based classification of multiresolution multispectral and hyperspectral images.

### **University of Ferrara**

*Advanced School in Artificial Intelligence (ASAI)*

*Ferrara, IT*

*June 2022*

80 hours of lectures - 16 CFU

Further information is provided at: <https://asai.unife.it>

### **Sapienza, University of Rome**

*MSc in Management Engineering*

*Rome, IT*

*October 2018 - July 2020*

*Final Mark: 110/110 cum Laude with mention of excellence*

*Curriculum: Optimization models and algorithms to support strategic and operational decision making*

*Thesis: Defects detection and classification of PCB using image processing operations and machine learning*

Development of an automatic defect detection and classification model on printed circuit boards. Image processing and subtraction operations are applied for defect detection. Then, machine learning methods that use pre-trained convolutional neural networks are applied for the classification of defects.

### **Sapienza, University of Rome**

*Honours Program*

*Rome, IT*

*March 2020 - July 2020*

Honours Program provided by the University to the ten most deserving students of the faculty.

### **Universidad de Málaga**

*Erasmus +, Escuela de Ingenierías Industriales*

*Málaga, ES*

*September 2017 - February 2018*

### **Sapienza, University of Rome**

*BSc in Management Engineering*

*Rome, IT*

*October 2015 - July 2018*

*Final Mark: 110/110 cum Laude*

*Thesis: Operations Research Laboratory: realization of an optimization model in Ampl language*

## **OTHER RELEVANT EDUCATIONAL EXPERIENCES**

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**University of Trento** *Trento, TN*  
*Machine Learning and Artificial Intelligence Methods Summer School* *September 2023*  
32 hours of lectures - 4 CFU  
Further information is provided at:  
<https://edu.eledia.org/courses/phd-school-2023-machine-learning/>

**Trinity College Dublin** *Dublin, IE*  
*Course "Motion Picture Engineering"* *Jan 2023 - Apr 2023*  
*MPhil in Music and Media Technology*  
Provided by Prof. Anil Kokaram

**Sapienza, University of Rome** *Rome, IT*  
*Course "Introduzione alla trasformata wavelet e sue applicazioni"* *Nov 2022 - Dec 2022*  
*1 CFU - MAT/08*

**University of Catania** *Catania, IT*  
*International Computer Vision Summer School (ICVSS 2022)* *July 2022*  
*Further information is provided at: <https://iplab.dmi.unict.it/icvss2022/>*

**Sapienza, University of Rome** *Rome, IT*  
*Course "Deep Learning and Applied Artificial Intelligence"* *Feb 2022 - June 2022*  
*MSc in Computer Science*  
*6 CFU - INF/01*

**Sapienza, University of Rome** *Rome, IT*  
*Course "Metodi Numerici per l'Ingegneria Biomedica"* *Oct 2021 - Dec 2021*  
*MSc in Biomedical Engineering*  
*6 CFU - MAT/08*

**Summer School University of Bari "Aldo Moro"** *Bari, IT*  
*Mathematical Methods in Data Science - MMDS 2021* *July 2021*  
*40 hours of lectures - 6 CFU*  
*Further information is provided at:*  
<https://alumnimathematica.org/summer-school-in-data-science/>

**Summer School University of Campania "Luigi Vanvitelli"** *Napoli, IT*  
*Course "Data Sciences: an algorithmic approach"* *May 2021 - June 2021*  
*16 hours of lectures - 4 CFU*  
*Further information is provided at:*  
<https://www.matfis.unicampania.it/dipartimento/convegni-seminari-appuntamenti/113>

**Sapienza, University of Rome**  
License to practice as Information Engineer, section A

Rome, IT  
16 November 2020

**PMI Central Italy Chapter**  
Course "The road to Project Management" participation  
*24 hours of lectures*

Rome, IT  
October 2020 - December 2020

## RELEVANT WORK & RESEARCH EXPERIENCE

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**Trinity College Dublin**  
*Visiting research student*

*Dublin, IE*  
*Jan 2023 - Feb 2023*

- Visiting research period at Electronic and Electrical Engineering Department, Trinity College Dublin.

**Superelectric S.r.l.**  
*Scientific research collaborator*

*Rome, IT*  
*April 2021 - March 2024*

- Collaboration with the company Superelectric S.r.l. as a PhD student for the "HYPERspectral imaging through Artificial intelligence for Building Control" project placed in the context of the development of high resolution monitoring systems of cultural heritage by the use of hyperspectral and multispectral drones and sensors.

**Enel X**  
*Stage Customer Care Analyst intern*

*Rome, IT*  
*November 2020 - April 2021*

- With the main purpose of improving the customer experience, I have worked on identifying process improvements to optimize operational performance, while aiming for innovation and digitalization.

**Sapienza, University of Rome**  
*Library assistant*

*Rome, IT*  
*February 2019 - July 2020*

- My job was to take care of the customer's requests and of the library's services.

## RESEARCH INTERESTS

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My research interests span over the following topics:

- mathematical processing of multidimensional data, in particular hyperspectral images;
- radiometric calibration and atmospheric correction;
- representation of data complexity and dimensionality reduction, using multiscale representations such as wavelet scattering;
- Artificial Intelligence methodologies, in particular Deep Learning with Convolutional Neural Networks.

## PUBLICATIONS

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### Abstracts in International Conferences

- V. Bruni, S. Marconi, G. Monteverde, D. Vitulano, "Contrast-based Image Enhancement for Source Camera Identification", in IMACS Series in Computational and Applied Mathematics, vol. 23, (Session: Modeling Human Perception of Visual Information), Rome, Italy, Sept. 2023.

## International Journals

- V. Bruni, S. Marconi, G. Monteverde, D. Vitulano, "Radon transform of image monotonic rearrangements as feature for noise sensor signature", Journal of Computational and Applied Mathematics, Elsevier, vol. 457, 2023

## International Conferences

- V. Bruni, G. Maiello, G. Monteverde, A. Paglialunga, D. Vitulano, "A wavelet-based band selection method for hyperspectral image classification", in Proceedings of Workshop on Hyperspectral Image and Signal Processing: Evolutions in Remote Sensing (WHISPERS), Athens, Greece, Nov. 2023.
- V. Bruni, G. Monteverde, D. Vitulano, "An entropy-based speed up for hyperspectral data classification via CNN", in Proceedings of Workshop on Hyperspectral Image and Signal Processing: Evolutions in Remote Sensing (WHISPERS), Rome, Italy, Sept. 2022.

## Posters in International Conferences

- V. Bruni, G. Monteverde, D. Vitulano, "Data-driven non-linear approximation methods for dimensionality reduction of hyperspectral images", in "Calcolo scientifico e modelli matematici: alla ricerca delle cose nascoste attraverso le cose manifeste" (CSMM), Naples, Italy, Jan. 2024.
- G. Monteverde, "Deep learning and machine learning for hyperspectral imaging", in "Workshop on MAThematical CHallenges to and from new technologiES" (MATCHES), Rome, Italy, 2022
- G. Monteverde, "Deep learning for hyperspectral imaging", in "International Computer Vision Summer School" (ICVSS), Sicily, Italy, 2022

## PARTICIPATION IN CONFERENCES

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### CSMM 2024

2024

- *Abstract and poster presentation* "Data-driven non-linear approximation methods for dimensionality reduction of hyperspectral images" at "Calcolo scientifico e modelli matematici: alla ricerca delle cose nascoste attraverso le cose manifeste".

### WHISPERS 2023

2023

- *Paper and poster presentation* "A wavelet-based band selection method for hyperspectral image classification" at IEEE GRSS Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing.

### Dia Nacional de Espaço - Embassy of Italy and Brazil

2022

- *Talk* "Un approccio entropico per un incremento delle performance di reti neurali profonde nella classificazione di immagini satellitari" at "Desenvolvimento de parcerias entre Itália e o Brasil no setor espacial: a análise das imagens satelitares, a teoria e a prática".

### WHISPERS 2022

2022

- *Paper presentation* "An entropy-based speed up for hyperspectral data classification via CNN" at IEEE GRSS Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing.

### MATCHES 2022

2022

- *Poster presentation* "Deep Learning and Machine Learning for hyperspectral imaging" at 1st Workshop on MAThematical CHallenges to and from new technologiES.

- *Poster presentation* "Deep learning for hyperspectral imaging" at "International Computer Vision Summer School".

## PARTICIPATION IN RESEARCH PROJECTS AND CONTRACTS

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### Research contract

2023

*Project Title:* "IMAGO – Imaging Multispettrale per l'Arte, Gamification e realtà Aumentata"

*Funding Program:* Regione Lazio - MUR (APQ6 – DTC – Centro di Eccellenza prot. n. 305-2020-35551 del 20/05/2020 CUP F85F21001090003)

*Scientific coordinator:* Anna Candida Felici

*Role:* Participant

### Research contract

2022

*Project Title:* "Metodologie di elaborazione di immagini iperspettrali basate su reti neurali convoluzionali per il monitoraggio di strutture murarie"

*Funding Program:* Sapienza Research Funding Program

*Role:* Scientific coordinator

### Research contract

2022

*Project Title:* "Sustainable reduction of CO2 through Electrochemical Devices with Advanced Materials and diverse cell configurations (SED-AM)"

*Funding Program:* Sapienza Research Funding Program

*Scientific coordinator:* Passeri Daniele

*Role:* Participant

### Research contract

2021

*Topic:* Sensor Model-based image registration: a feasibility study

*Funding Program:* "Provision of Consultancy Services for Exploiting Motion Imagery Content" SATCEN-NP-16/21

*Contract holder:* Superelectric Srl

*Scientific coordinator:* Vittoria Bruni

*Role:* Participant

### Research contract

2020

*Topic:* "2D/3D registration of multispectral images"

*Project Title:* IPER3D - Procedure e sistemi per rilievi Iperspettrali 3D di Beni Culturali

*Funding Program:* POR FESR 2014-2020 Beni Culturali e Turismo, Regione Lazio Project

*Contract holder:* IAC/CNR

*Scientific coordinator:* Vittoria Bruni

*Role:* Participant

## REVIEWER AND EDITORIAL ACTIVITY

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**Session technical manager for the following International Conferences**

- **WHISPERS 2022:** IEEE GRSS Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing
- **MATCHES 2022:** 1st Workshop on MAThematical CHallenges to and from new technologiES

## Reviewer for the following International Journals

2022-present

- **IET**: IET Image Processing
- **IEEE**: Transactions on Image Processing
- **Springer**: Pattern Analysis and Applications
- **Springer**: Journal of Ambient Intelligence and Humanized Computing

## TEACHING EXPERIENCE

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**Sapienza, University of Rome** Rome, IT  
*Tutoring the course of "Analisi e Calcolo Numerico" - Codice BT-B2 1/2024 Prot. 899* 2023-2024

- Course of study in Energy Engineering, faculty of Civil and Industrial Engineering
- Activity: Tutoring students in utilizing Matlab as a programming tool for implementing Numerical Methods

**Sapienza, University of Rome** Rome, IT  
*Tutoring the course of "Analisi e Calcolo Numerico" - Codice BT-B2 9/2023 Prot. 1016* 2022-2023

- Course of study in Energy Engineering, faculty of Civil and Industrial Engineering
- Activity: Tutoring students in utilizing Matlab as a programming tool for implementing Numerical Methods

**Sapienza, University of Rome** Rome, IT  
*Tutoring the "Laboratorio Multidisciplinare di Scienze Applicate"* 18 April 2023

- PCTO Project 88487 - Percorsi per le Competenze Trasversali e l'Orientamento

**Sapienza, University of Rome** Rome, IT  
*Tutoring the course of "Metodi Numerici con Elementi di Programmazione" - Codice BT-B2 5/2022 Prot. 4229* 2022 - 2023

- Course of study in Aerospace Engineering, faculty of Civil and Industrial Engineering
- Activity: Tutoring students in utilizing Matlab as a programming tool for implementing Numerical Methods

**Sapienza, University of Rome** Rome, IT  
*Tutoring the "Laboratorio Multidisciplinare di Scienze Applicate"* 12 April 2022

- PCTO Project 63740 - Percorsi per le Competenze Trasversali e l'Orientamento

**Sapienza, University of Rome** Rome, IT  
*Tutoring the course of "Analisi e Calcolo Numerico" - Codice ICE 39/2021 Prot. 287* 2021-2022

- Course of study in Energy Engineering, faculty of Civil and Industrial Engineering
- Activity: Tutoring students in utilizing Matlab as a programming tool for implementing Numerical Methods

## IMPLEMENTATION PROJECTS

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- *Continuous Optimization field*: Newton's method for local optimization (Python); Filled Function method for global optimization (Python)
- *Artificial Intelligence field*: Multilayer Perceptron (MPL) and Radial Basis Functions (RBF) for regression problems (Python); Support Vector Machine (SVM) and Convolutional Neural Network (CNN) models for regression and classification problems (Python and Matlab)

- *Image processing field*: algorithm for radiometric calibration of multispectral and hyperspectral images (Python); algorithm for registration of different resolution images (Matlab)

## GRANTS & AWARDS

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- Research grant “Fondi per avvio alla ricerca” funded by Sapienza, University of Rome (2022)
- Full scholarship provided by University of Ferrara to attend to Advanced School in Artificial Intelligence (June 2022)
- Full scholarship provided by Sapienza, University of Rome to attend the Honours Program (March 2019)

## SKILLS & PERSONAL INTERESTS

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### Technical skills

Python, Matlab, SQL, Weka, AMPL, MiniZinc, Nuke, GitHub, Power BI, MS Office (Word, Excel, Power Point, Access)

### Communication and interpersonal skills

Problem solving, team working, proactivity, team leadership

### Languages

Italian (native speaker), English (C1), Spanish (C1), French (A2)

### Personal interests

Strategic and logic games, travelling

## REFERENCES

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Available on request

## PRIVACY

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*In compliance with the GDPR and the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document.*

*Autorizzo il trattamento dei miei dati personali ai sensi del GDPR 679/16 e del Decreto Legislativo 30 giugno 2003 n. 196 (“Codice in materia di protezione dei dati personali”) ai fini di attività di ricerca e selezione del personale e contatti lavorativi.*

*Autorizzo alla pubblicazione sul sito di Ateneo nella sezione Amministrazione Trasparente ai sensi del Decreto Legislativo n. 33/2013 Articolo 1.*