

GIUSEPPINA MONTEVERDE

EDUCATION

Sapienza, University of Rome

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

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, in Matlab and Python, 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.

Rome, IT

April 2021 - March 2024

University of Ferrara

Advanced School in Artificial Intelligence (ASAI)

80 hours of lectures - 16 CFU

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

Ferrara, IT

June 2022

Sapienza, University of Rome

MSc in Management Engineering

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 in Python 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.

Rome, IT

October 2018 - July 2020

Sapienza, University of Rome

Honours Program

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

Rome, IT

March 2020 - July 2020

Universidad de Málaga

Erasmus +, Escuela de Ingenierías Industriales

Málaga, ES

September 2017 - February 2018

Sapienza, University of Rome

BSc in Management Engineering

Final Mark: 110/110 cum Laude

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

Rome, IT

October 2015 - July 2018

OTHER RELEVANT EDUCATIONAL EXPERIENCES

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

Sapienza, University of Rome *Rome, IT*
Research contract - Bando ICE 11/2024, prot.n. 1216 07/05/24 *14 June 2024 - 8 July 2024*
· *Project Title: "Valutazione metodologica e sperimentale di algoritmi, sviluppati in ambiente Matlab, per l'individuazione di elementi di interesse in segnali a più dimensioni"*
Scientific coordinator: Vittoria Bruni

Trinity College Dublin *Dublin, IE*
Visiting research student *Jan 2023 - Feb 2023*
· Visiting research period at Electronic and Electrical Engineering Department, Trinity College Dublin.

Superelectric S.r.l. *Rome, IT*
Scientific research collaborator *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 *Rome, IT*
Stage Customer Care Analyst intern *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 *Rome, IT*
Library assistant *February 2019 - July 2020*
· My job was to take care of the customer's requests and of the library's services.

RESEARCH INTERESTS

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;
- methodologies and algorithms in Matlab and Python for computer aided monitoring: cultural heritage, defense and security, forensics, environment.

IMPLEMENTATION PROJECTS

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

PUBLICATIONS

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. Monteverde, D. Vitulano, "3D CNN filters size setting inspired by Heisenberg principle for hyperspectral data classification", submitted to IEEE International Workshop on Machine Learning for Signal Processing, London, UK, Sept. 22–25, 2024,
- 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

- *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.

ICVSS 2022

2022

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

PARTICIPATION IN RESEARCH PROJECTS AND CONTRACTS

Research project

2023

Project Title: "Advanced Numerical-Statistical Methods for Disease Classification Using Raman Spectra"

Funding Program: Sapienza Research Funding Program

Scientific coordinator: Francesca Pitolli

Role: Participant

Research project

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 project

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 project

2021

Project Title: "Wavelets, frames e basi multiscala. Nuove costruzioni, sviluppi e applicazioni nell'analisi numerica, nella probabilità e nella statistica"

Funding Program: Sapienza Research Funding Program

Scientific coordinator: Claudio Durastanti

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

Member of the Organizing Committee of the following International Conferences

- **MATCHES 2024:** 2nd Workshop on MAThematical CHallenges to and from new technologiES

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, Journal of Ambient Intelligence and Humanized Computing, Multimedia Tools and Applications*

TEACHING EXPERIENCE

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

Tutoring the “Laboratorio Multidisciplinare di Scienze Applicate”

Rome, IT

18 April 2023

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

Sapienza, University of Rome

Tutoring the course of “Metodi Numerici con Elementi di Programmazione” -

Codice BT-B2 5/2022 Prot. 4229

Rome, IT

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

Tutoring the “Laboratorio Multidisciplinare di Scienze Applicate”

Rome, IT

12 April 2022

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

Sapienza, University of Rome

Tutoring the course of “Analisi e Calcolo Numerico” - Codice ICE 39/2021 Prot. 287

Rome, IT

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

GRANTS & AWARDS

- 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

Technical skills

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

Languages

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

Communication and interpersonal skills

Problem solving, team working, proactivity, team leadership

Personal interests

Strategic and logic games, travelling

REFERENCES

Available on request

PRIVACY

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.