



Gaetano Settembre

PhD Candidate in Computer Science and Mathematics
University of Bari Aldo Moro

✉ gaetanosettembre@gmail.com | [gaetanosettembre.github.io](https://github.com/gaetanosettembre)

📍 Gravina in Puglia, 70024, Bari, Italy

WORK AND ACADEMIC EXPERIENCE

• Planetek Italia S.r.l.

Nov 2022 - Sep 2023

Visiting Researcher

Bari, Italy

- Designed and developed methodologies for the analysis of PRISMA (PRecursore IperSpettrale della Missione Applicativa) hyperspectral imagery [C.4, C.5].
- Contributed to the definition, prototyping, and implementation of a land cover change detection framework in wildfire-affected areas using PRISMA hyperspectral data [J.1].

• Institute of Crystallography - CNR

Oct 2021 - Mar 2022

Academic Internship

Bari, Italy

- Designed and implemented ETL processes for crystallographic data ingestion from open-source databases.
- Trained, evaluated, and optimized machine learning models for crystal system classification (multi-class task).
- Contributed to the deployment of trained models and the development of the web platform *CrystalMELA* (Crystallography MachinE LeArning) [J.3].

• SER&Practices S.r.l.

Nov 2018 - Apr 2019

Academic Internship

Bari, Italy

- Designed and developed "serious games" based on the Red Team vs. Blue Team approach.
- Conducted penetration testing and vulnerability assessments to identify and mitigate security flaws.
- Performed data collection and analysis (e.g., logs, alerts), producing security reports using IBM QRadar SIEM.

EDUCATION

• PhD Program in Computer Science and Mathematics

Oct 2022 - Oct 2025

University of Bari Aldo Moro, Department of Mathematics

Bari, Italy

- PhD scholarship awarded under D.M. 352/22 in collaboration with Planetek Italia S.r.l., Curriculum Mathematics (ex. MAT/08, now MATH-05/A).
- Research topics: low-rank approximation models, NMF variants, spatial regularization, deep subspace learning models (DeepNMF, Autoencoders), and Earth Observation applications.
- Thesis title: "Low-dimensional Learning Models for Hyperspectral Data Analysis in Environmental Monitoring".
- Supervisor(s): Prof. Nicoletta del Buono (academic sup.), Dr. Nicolò Taggio (industrial sup.)

• Short Master - Generative AI: From Theory to Practice

Oct 2025 - Present

University of Bari Aldo Moro, Department of Computer Science

Bari, Italy

- Postgraduate Short Master (I Level), 100 hours (4 CFU), focusing on theoretical and practical foundations of Generative Artificial Intelligence.
- Main topics: Transformer architectures and attention mechanism, Large Language Models (LLMs), advanced prompt techniques (Chain-of-Thought, Tree-of-Thought), fine-tuning and access to external knowledge via Retrieval Augmented Generation (RAG).
- Laboratory activities on prompt engineering, fine-tuning and application case studies in real contexts.

- **Master's Degree in Data Science (LM-91)**

Oct 2019 - Mar 2022

University of Bari Aldo Moro, Department of Computer Science

Bari, Italy

- Final grade: **Full mark with honors - 110/110 & Lode** (highest possible grade in the Italian system).
- Thesis: "*Analisi di dati cristallografici e costruzione di modelli predittivi*". Supervisors: Prof. N. Del Buono; Dr. R. Rizzi; Dr. N. Corriero

- **Bachelor's Degree in Computer Science (L-31)**

Sep 2015 - Apr 2019

University of Bari Aldo Moro, Department of Computer Science

Bari, Italy

- Final grade: **107/110**
- Thesis: "*Red Team vs Blue Team: Data Exfiltration in Government*". Supervisor: Prof. D. Caivano.

SKILLS

- **Data Science & AI:** scikit-learn, pytorch, tensorflow, numpy, pandas, matplotlib, seaborn, Tableau, Apache Spark, spaCy, NLTK, Knime, Weka, Orange, giotto-tda
- **Programming Languages:** Python, MATLAB, R, Java, C/C++
- **Web Technologies:** HTML, CSS, JavaScript, PHP
- **Database Systems:** MySQL, PostgreSQL + PostGIS, GeoDB, MongoDB, Neo4j
- **DevOps & Version Control:** Git, GitHub, GitLab CI/CD, Docker
- **Mathematical & Statistical Tools:** MATLAB Toolboxes, SciPy, R (tidyverse, caret)
- **Other Tools & Technologies:** QGIS, SNAP ESA, IBM QRadar, XAI tools (e.g., SHAP, Grad-CAM)
- **Research Skills:** Scientific writing, Literature and peer review, Experimental design, Data preprocessing, Model evaluation, Reproducible research

SELECTED COURSES AND CERTIFICATIONS

All badges of verified achievements from IBM are available at the following link: [Credly profile](#)

- **University of Bari**, Short Master – Generative AI: From Theory to Practice Oct 2025 – Present
- **Summer School**, 6th Advanced Course on Data Science & Machine Learning (ACDL) Jun 2023
- **Spring School**, DeepLearn - 9th International School on Deep Learning Apr 2023
- **Politecnico of Bari**, Satellites Systems for Remote Sensing and Geolocation Oct 2022 - Jan 2023
- **Planetek Italia**, Processing of Remote Sensing Data Oct 2022
- **IBM**, Machine Learning with Python Apr 2022
- **IBM**, Deep Learning Essentials Apr 2022
- **IBM**, Data Analysis using Python Oct 2021
- **IBM**, Data Visualization using Python Oct 2021
- **IBM**, Data Science Methodologies Oct 2021
- **IBM**, Data Science Foundations - Level 1 and 2 (V2) Oct 2021
- **University of Bari**, Corso su Sicurezza e Tutela della salute dei lavoratori May 2020
- **Dati360.it - Legal Suite**, Basic Course GDPR Regulation 679/2016 Dec 2019

PARTICIPATION IN NATIONAL AND INTERNATIONAL RESEARCH PROJECTS

- **MODA: Model-based and Data-Driven Methods for Multiscale Biological Systems** Mar 2025 - Present
Coordinator: Assist. Prof. Marta Menci (University Campus Biomedico Rome, Italy)
 - Funded by Gruppo Nazionale Calcolo Scientifico - Istituto Nazionale di Alta Matematica (GNCS-INdAM). CUP: E53C24001950001.
 - Team: M. Menci, M. Biani, E. Onofri, S.G. De Benedictis, G. Gargano, G.S.
- **MBI: Marine Biomass Innovation** Oct 2022 - Present
Principal Investigator: Prof. Raymond Thomas (Western University Ontario, Canada)
 - Funded by New Frontiers in Research Fund - Transformation Stream, Canada. NFRFT-2020-00452.
 - Local Team: Prof. N. Del Buono, Dr. F. Esposito, Dr. L. Selicato, G. Gargano, G.S.
- **Low-rank models and Optimization algorithms for Data Analysis** Mar 2024 - Mar 2025
Coordinator: Prof. Margherita Porcelli (University of Florence, Italy)
 - Funded by Gruppo Nazionale Calcolo Scientifico - Istituto Nazionale di Alta Matematica (GNCS-INdAM). CUP: E53C23001670001.
 - Team: S. Bellavia, S. Bonettini, N. Del Buono, F. Esposito, B. Morini, A. Papini, L. Selicato, G. Gargano, F. Tudisco, F. Camellini, G. Malaspina, F. Marini, S. Portaro, G. Seraghiti, G.S., M. Silei, M. Yousefi

CONFERENCE AND WORKSHOP ORGANIZATION

- **Innovative Medical image Processing with AI-driven preCision Technologies** Sep 15, 2025. Rome, IT
International Workshop (1st Edition) 
 - At 23rd International Conference on Image Analysis and Processing (ICIAP 2025)
- **SOAP4Earth: Smart Observation And Preservation for Earth** Sep 10-12, 2025. Osaka, JP
International Invited Session (1st Edition) 
 - At 29th International Conference on Knowledge-Based and Intelligent Information & Engineering Systems (KES 2025)
- **Advanced Numerical Methods and Machine Learning Techniques in Applied Science** Sep 1, 2025. Trieste, IT
International Minisymposium (1st Edition) 
 - At Biennial congress of the Italian Society of Applied and Industrial Mathematics (SIMAI 2025)
- **Mathematics for Artificial Intelligence and Machine Learning** Jan 29-31, 2025. Bari, IT
National UMI Group Workshop (3rd Edition) 
- **LDTH: Leveraging Digital Twins in Healthcare** Sep 11-13, 2024. Seville, ES
International Invited Session (1st and 2nd Edition) 
 - At 28 and 29th International Conference on Knowledge-Based and Intelligent Information & Engineering Systems (KES 2024, 2025)
- **PRIMO: Post-graduate Researches in Inverse Problems, ML, and Optimization** Sep 20-22, 2023. Bari, IT
National Workshop (3rd Edition) 

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, P=PATENT, S=IN SUBMISSION, T=THESIS

- [J.1] **G. Settembre**, F. Esposito, N. Del Buono (2025). Advancing blind hyperspectral unmixing in remote sensing: comparing deep-inspired subspace learning methods. *Advanced Modeling and Simulation in Engineering Sciences*.
- [J.2] **G. Settembre**, N. Taggio, N. Del Buono, F. Esposito, P. Di Lauro, A. Aiello (2024). A Land Cover Change Framework Analyzing Wildfire-affected Areas in Bitemporal PRISMA Hyperspectral Images. *Mathematics and Computers in Simulation*, vol. 229, pp. 855-866.
- [J.3] S.G. De Benedictis, G. Gargano, **G. Settembre** (2024). Enhanced MRI brain tumor detection and classification via topological data analysis and low-rank tensor decomposition. *Journal of Computational Mathematics and Data Science*, vol. 13, pp. 100103.

- [J.4] N. Corriero, R. Rizzi, **G. Settembre**, N. Del Buono, D. Diacono (2023). CrystalMELA: a new crystallographic machine learning platform for crystal system determination. *Journal of Applied Crystallography*, vol. 56, pt. 2, pp. 409–419.
- [S.1] G. Gargano, **G. Settembre**, S.G. De Benedictis, N. Del Buono (2025). TopoMED: A Topological Deep Learning Framework for Enhancing Medical Image Classification. [In preparation]
- [C.1] C. Russo, **G. Settembre**, G. Gargano, M.S. de Biase, R. De Fazio (2025). AI in Pediatric Urology: Deep Learning-based Approach supporting Posterior Urethral Valves Diagnosis on VCUG Imaging. In *International Conference on Image Analysis and Processing (ICIAP 2025)*. Lecture Notes in Computer Science. [In press]
- [C.2] **G. Settembre**, G. Gargano, N. Del Buono (2025). Superpixel-based plastic litter detection in UAV hyperspectral imaging using spectral-textural features. In *International Conference on Knowledge Based and Intelligent information and Engineering Systems (KES 2025)*. Procedia Computer Science. [In press]
- [C.3] G. Gargano, **G. Settembre**, N. Del Buono (2025). AI-Driven Insights into Microbial Biomarkers for Colorectal Cancer Progression. In *International Conference on Knowledge Based and Intelligent information and Engineering Systems (KES 2025)*. Procedia Computer Science. [In press]
- [C.4] **G. Settembre**, N. Del Buono, F. Esposito, N. Taggio (2024). Deep NMF and Autoencoder: A Comparative Analysis for Hyperspectral Unmixing Using PRISMA Real Images. In *IGARSS 2024 - IEEE International Geoscience and Remote Sensing Symposium*. pp. 3708-3712.
- [C.5] **G. Settembre**, N. Taggio, N. Del Buono, A. Aiello, F. Esposito (2023). Low-rank hierarchical clustering of PRISMA hyperspectral images to identify burned areas. In *European Conference on Machine Learning and Knowledge Discovery in Databases. (ECML-PKDD 2023)*. Communications in Computer and Information Science, vol. 2135, pp. 412-423.
- [C.6] **G. Settembre**, N. Corriero, N. Del Buono, F. Esposito, R. Rizzi (2023). Machine Learning approaches for Predicting Crystal Systems: A brief Review and a case study. In *Int. conference on Machine Learning, Optimization, and Data Science (LOD 2023)*. Lecture Notes in Computer Science, vol 13810. pp. 93-107.

PARTICIPATION AS SPEAKER AT NATIONAL AND INTERNATIONAL SCIENTIFIC MEETINGS

- **Oral Presentation** Sep 10-12, 2025, Osaka, JP
Int. Conf. on Knowledge Based and Intelligent information and Engineering Systems (KES)
 - Talk title: " Superpixel-based plastic litter detection in UAV hyperspectral imaging using spectral-textural features"
- **Oral Presentation** Jul 15, 2025, Bari, IT
PhD Days 2023-2025
 - Talk title: "Updates on low-rank models for the analysis of Earth Observation data"
- **Poster Presentation** Jan 29-31, 2025, Bari, IT
Math4AIML - Workshop on Mathematics for Artificial Intelligence and Machine Learning
 - Poster title: "Spatial Informed Hierarchical Clustering for Hyperspectral Imagery via Total Variation"
- **Poster Presentation** Jul 11, 2024, Athens, GR
IGARSS 2024 - IEEE International Geoscience and Remote Sensing Symposium
 - Poster title: "Deep NMF and Autoencoder: A Comparative Analysis for Hyperspectral Unmixing Using PRISMA Real Images"
- **Oral Presentation** Sep 18, 2023, Turin, IT
Eur. Conf. on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)
 - Talk title: "Low-rank hierarchical clustering of PRISMA hyperspectral images to identify burned areas" in MACLEAN: Workshop on Machine Learning for Earth Observation
- **Invited Speaker** Dec 21, 2023, Bari, IT
XMaths Workshop, Ed. 2023
 - Talk title: "Unlocking insights from the sky: low-rank methods in remote sensing"
- **Oral Presentation** Jul 06, 2023, Athens, GR
Int. Conf. on Numerical Analysis and Scientific Computation with Applications (NASCA)
 - Talk title: "A low-rank based approximation framework for real world data integration"
- **Oral Presentation** Sep 18, 2022, Castiglione della Pescaia, IT
Int. Conf. on Machine Learning, Optimization and Data science (LOD)
 - Talk title: "Advanced Machine Learning approaches for Predicting Crystal Systems"

PROFESSIONAL MEMBERSHIPS

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| • SIMAI : Italian Society of Applied and Industrial Mathematics member | <i>Apr 2025 - Present</i> |
| • KBIES : Knowledge-Based and Intelligent Engineering Systems Society member | <i>Mar 2025 - Present</i> |
| • IEEE : IEEE Student & Geoscience and Remote Sensing Society (GRSS) member | <i>Jan 2024 - Present</i> |
| • INdAM-GNCS : Gruppo Nazionale Calcolo Scientifico member | <i>Sep 2023 - Present</i> |
| • PRIMO : Post graduate Researchers in Inverse problems, ML and Optimization member | <i>Dec 2022 - Present</i> |

JOURNAL/CONFERENCE REVIEWING

ALL REVIEWS ARE VERIFIED AND AVAILABLE ON THE **WOS/ORCID** PROFILE

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| • Journal of Systems and Software | <i>ISSN: 1873-1228</i> |
| • Scientific Reports | <i>ISSN: 2045-2322</i> |
| • Discover Applied Sciences, <i>formerly "SN Applied Sciences"</i> | <i>ISSN: 3004-9261</i> |
| • Journal of Computational Mathematics and Data Science | <i>ISSN: 2772-4158</i> |
| • WSEAS Transactions on Business and Economics | <i>ISSN: 1109-9526</i> |
| • Forum Geografi | <i>ISSN: 0852-0682</i> |
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| • IEEE International Joint Conference on Neural Networks | <i>IJCNN 2025</i> |
| • International Conference on Image Analysis and Processing | <i>ICIAP 2025</i> |
| • International Academic Conference on Optics and Photonics | <i>IACOP 2024</i> |
| • International Conference on Knowledge-Based and Intelligent Information & Engineering System | <i>KES 2024, 2025</i> |

ADDITIONAL INFORMATION

- **Languages**: Italian (Mother tongue), English (B1 - Intermediate level)
- **Driving licence**: AM, B

Gravina in Puglia, October 7, 2025

Gaetano Settembre