



Camillo Maria Caruso

Curriculum Vitae

Personal Information

Sex Male
Date of birth September 2, 1995
Nationality Italian
OrcID 0000–0002–7320–4173

Professional Experience

November 2021 – Today **PhD student of the National PhD in Artificial Intelligence - Health and life sciences**, *University Campus Biomedico of Rome*, Rome, Italy.
Unit of Computer Systems and Bioinformatics (CoSBi), Department of Engineering, University Campus Bio-Medico of Rome.
Research Exchange: Department of Diagnostics and Intervention, Radiation Physics, Biomedical Engineering, Umeå University.

June 2021 – **Graduate Research Associate**, *University Campus Biomedico of Rome*, Rome, Italy.

October 2021 Collaborator of the Unit of Computer Systems and Bioinformatics (CoSBi), Department of Engineering, University Campus Bio-Medico of Rome.

Education

June 2021 **Licence to practice as an industrial engineer**.

October 2018 – May 2021 **Master's Degree in Biomedical Engineering**, *University Campus Biomedico of Rome*, Rome, Italy.

- Taught in Italian and English
- Curriculum "E-Health Systems"
- **Final grade**: 110/110 cum laude
- **Thesis title**: "Analysis and classification of relevant interventions to the National Fire Corps"
- Thesis Subject: Machine Learning and Big Data Analysis
- **Relevant Modules**: Machine Learning & Big Data Analysis, IoT System Design, Telematic Applications, Industrial Informatics, Image Processing.

September 2014 – May 2018 **Bachelor's Degree in Industrial Engineering**, *University Campus Biomedico of Rome*, Rome, Italy.

- Taught in Italian
- **Final grade**: 100/110
- **Thesis title**: "Analysis and classification of satellite images using Machine Learning techniques"
- Thesis subject: Machine Learning
- **Relevant Modules**: Modular Programming, Signal Processing, Fundamentals of Informatics.

September 2009 – June 2014 **High School Diploma**, *Liceo Classico Dante*, Florence, Italy.

Post-master courses

June 10-14, 2023 **ACDL 2023: 6th Advanced Course on Data Science & Machine Learning**, Castiglione della Pescaia (Grosseto).

Directors: Giuseppe Nicosia and Panos Pardalos

September 4-8, 2023 **International Summer School on Machine Vision (VISMACH) 2023**, Padova.

Directors: Lamberto Ballan, Giovanni Maria Farinella, Sebastiano Vascon

Personal Grants

2021 **Grant for the XXXVII Italian National PhD Program in Artificial Intelligence**, *Università Campus Bio-Medico di Roma*, Duration: 3 years.

Research Activities

Research Interests My research activity concerns artificial intelligence, particularly its application in the biomedical field. We are indeed witnessing a widespread diffusion of artificial intelligence, and recent advancements in deep learning should allow for improvements in diagnosis, prognosis, and treatment decisions in healthcare. To have a complete picture of the phenomenon under consideration, deep learning models must combine information from different sources, as doctors do daily. For this reason, my research seeks to advance multimodal deep learning, studying how deep neural networks can learn shared representations between different modalities. Among the various available modalities, my research has mainly focused on analyzing tabular (J1, J2, J3, S1) and imaging data (J1). Both have their complexities: the former are usually composed of multiple types of information and may have missing values; the latter show strong dependencies on the parameters and machines with which they are acquired. For these reasons, both modalities require specific preprocessing and analysis.

Collaboration in the activities of international research groups

2024 **Collaboration with Professor Christer Grönlund**, *Department of Diagnostics and Intervention, Radiation Physics, Biomedical Engineering, Umeå University*.

The research is focused on developing novel AI-based multimodal approaches to improve the accuracy and efficiency of the prevention of cardiovascular disease.

List of all scientific publications

- International Journals**
- J4** Guarrasi V, Aksu F, Caruso CM, Di Feola F, Rofena A, Ruffini F, Soda P. "A Systematic Review of Intermediate Fusion in Multimodal Deep Learning for Biomedical Applications". *Image and Vision Computing*. 2025 Mar 25;105509. <https://doi.org/10.1016/j.imavis.2025.105509>.
 - J3** Caruso CM, Guarrasi V, Ramella S, Soda P. "A deep learning approach for overall survival prediction in lung cancer with missing values". *Computer Methods and Programs in Biomedicine*. 2024 Sep 1;254:108308. <https://doi.org/10.1016/j.cmpb.2024.108308>.
 - J2** Caruso CM, Soda P, Giammichele C, Rotilio F, Sicilia R. "A Cascade of Learners for Firemen' Emergency Events Classification". *IEEE Access*. 2023 Oct 26;11:122399-410. <https://doi.org/10.1109/ACCESS.2023.3327913>.
 - J1** Caruso CM, Guarrasi V, Cordelli E, Sicilia R, Gentile S, Messina L, Fiore M, Piccolo C, Beomonte Zobel B, Iannello G, Ramella S. "A multimodal ensemble driven by multi-objective optimisation to predict overall survival in non-small-cell lung cancer". *Journal of Imaging*. 2022 Nov 2;8(11):298. <https://doi.org/10.3390/jimaging8110298>.

- Conferences **C2** Aksu F, Bria A, Caragliano AN, Caruso CM, Chen W, Cordelli E, Coser O, Francesconi A, Furia L, Guarrasi V, Iannello G. "Towards AI-driven Next Generation Personalized Healthcare and Well-being". In *Ital-IA 2024, 4th National Conference on Artificial Intelligence*, organized by CINI, Naples, Italy, May 29-30, 2024 (pp. 360-365). CEUR-WS.
- C1** Guarrasi V, Tronchin L, Caruso CM, Rofena A, Manni G, Aksu F, Paolo D, Iannello G, Sicilia R, Cordelli E, Soda P. "Building an AI-enabled metaverse for intelligent healthcare: opportunities and challenges". In *Ital-IA 2023, Italia Intelligenza Artificiale Thematic Workshops*, co-located with the 3rd CINI National Lab AIIS Conference on Artificial Intelligence (Ital IA 2023), Pisa, Italy, May 29-30, 2023 (pp. 134-139). CEUR-WS.
- Submitted Works **S2** Caruso CM, Soda P, Guarrasi V. "MARIA: a Multimodal Transformer Model for Incomplete Healthcare Data". Submitted to *Computers in Biology and Medicine* on April 2025. Available at <https://doi.org/10.48550/arXiv.2412.14810>.
- S1** Caruso CM, Soda P, Guarrasi V. "Not Another Imputation Method: A Transformer-based Model for Missing Values in Tabular Datasets". Submitted to *AI Open* on April 2025. Available at <https://doi.org/10.48550/arXiv.2407.11540>.

Languages

- Italian Native
- English
 - o Understanding (Listening/Reading) C1
 - o Speaking B2
 - o Writing B2

Computer skills

- Python Advanced knowledge
- MATLAB Advanced knowledge
- C++ High knowledge
- Word processor
 - o LaTeX: Advanced knowledge
 - o Microsoft Word: High knowledge
- Presentations
 - o Beamer: Advanced knowledge
 - o Microsoft PowerPoint: Intermediate knowledge

Certifications & Training

- 2011 **First Certificate in English (FCE)**, *University of Cambridge ESOL Examinations*.

Activities and Interests

- Boy Scouts Team leader, Procurement management for scout camps

I authorize the processing of personal data as current legislation (Legislative Decree no. 196/2003, containing the Code on the Protection of Personal Data, and EU Regulation no. 679/2016 GDPR).

18 May. 2025