

# FEDERICA MANDREOLI

## Curriculum Vitae et Studiorum August 2024

### Personal Information

**Date of birth** 28/09/1973

**Place of birth** Bologna

**Nationality** Italian

**Marital status** married  
three children

**Office Address** Dipartimento di Scienze Fisiche Informatiche e Matematiche  
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### Present Appointment

Since December 2023, Full Professor in Computer Engineering (Scientific Sector IINF/05-A, Information Processing Systems) at Università di Modena e Reggio Emilia.

### Summary of Competencies

My main research area is data management and information retrieval, with expertise in:

- Non-conventional data, such as tree-structured data, graph-structured data, and streaming data
- Data evolution and temporal data
- Distributed and heterogeneous data
- Massive data management
- Scalable data science
- Data-centric AI.

Since 2002, I have led research activities and projects in the Information Systems group ([www.isgroup.unimo.it](http://www.isgroup.unimo.it)), where we study novel information management and access solutions and data-centric learning models across a wide range of application contexts; we design, develop, and evaluate system prototypes.

## **Education and Professional Experience**

Full Professor (Dec. 2023 - Present): in Computer Engineering at Università di Modena e Reggio Emilia.

Apr. 2021: Obtained the Italian National Habilitation (Abilitazione Scientifica Nazionale) as full professor in the Scientific Sector 01/B1 (Computer Science).

Dec. 2020: Obtained the Italian National Habilitation (Abilitazione Scientifica Nazionale) as full professor in the Scientific Sector 09/H1 (Information Processing Systems).

Visiting professor (Jan. 2020 – Dec. 2022): Visiting professor in the School of Computing at the Newcastle University with a research appointment on Data Analytics and Machine Learning in the medical field

Associate Professor (Nov. 2017-Nov. 2023): in Computer Engineering (Scientific Sector ING-INF/05, Sistemi di Elaborazione delle Informazioni) at Università di Modena e Reggio Emilia.

Dec. 2013: Obtained the Italian National Habilitation (Abilitazione Scientifica Nazionale) as associate professor in the Scientific Sector 09/H1 (Information Processing Systems).

Research Fellow (Feb. 2010 – March 2015): at Italian National Research Council (CNR) IEIIT (Istituto di Elettronica di Ingegneria dell'Informazione e delle Telecomunicazioni), Bologna.

Assistant Professor (Nov. 2002-Oct. 2017): in Computer Engineering (Scientific Sector ING-INF/05, Sistemi di Elaborazione delle Informazioni) at Università di Modena e Reggio Emilia.

Postdoctoral Researcher (2001–2002): in Computer Engineering at the Dipartimento di Ingegneria dell'Informazione, Università di Modena e Reggio Emilia; research topic "Integration and Querying of structured and semistructured heterogeneous sources"; supervisor: Prof. Sonia Bergamaschi

Ph.D. (1997–2001): in Computer Engineering at the Dipartimento di Elettronica Informatica e Sistemistica, Università di Bologna; degree Dottore di Ricerca in Computer Engineering, 2001. Thesis: "Temporal Schema Versioning in Object-Oriented Databases"; supervisor: Prof. Maria Rita Scalas.

University (1992–1997): Facoltà di Scienze Fisiche Matematiche e Naturali; degree in Computer Science 110/110 cum laudae, March 1997. Supervisor: Prof. Paolo Ciaccia.

## **Research**

My research interests lie in data and information management and access. Specifically, in the past I have mainly focused on indexing and querying non-conventional data, including data streams, textual information, tree-structured, and graph-structured data. Additionally, I have worked on temporal databases and schema versioning. My research primarily centered around developing data and query models for effective access, as well as addressing data structures and algorithmic challenges for efficient query processing.

Recently, I have shifted my focus towards Artificial Intelligence, emphasizing the critical role of data in the development of machine learning and deep learning models.

Specifically, I'm currently leading a research group ([www.isgroup.unimore.it](http://www.isgroup.unimore.it)) within the Department of Physics, Informatics, and Mathematics, consisting of one research associate, one postdoctoral research associate, and three PhD students. Our work, conducted in collaboration with national and international research groups, focuses on scalable data science and data-centric AI, particularly in clinical decision support systems and smart manufacturing.

The results of my research have been published in over one hundred papers. A complete list of my publications can be found at the following web page:

<https://personale.unimore.it/rubrica/pubblicazioni/fmandreoli>.

Below are some key metrics reflecting the impact of my research:

- H-Index (Google Scholar): 26
- Number of articles published in the first two quartiles (WoS JCT classification): 9 (Q1), 14 (Q2)
- Number of articles published in the first two quartiles (SJR classification): 18 (Q1), 9 (Q2)

### Best articles in the last 5 years

- *D. Ferrari, V. Guidetti, F. Mandreoli. Multi-objective Symbolic Regression for Data-Driven Scoring System Management (2022), IEEE International Conference on Data Mining (ICDM), December 2022.*
- *C. Vischioni, F. Bove, F. Mandreoli, R. Martoglia, V. Pisi, C. Taccioli. Visual Exploratory Data Analysis for Copy Number Variation Studies in Biomedical Research (2022). BIG DATA RESEARCH. - ISSN 2214-5796. - 27:(2022), pp. 100298-100300.*
- *F. Grandi, F. Mandreoli, R. Martoglia, W. Penzo. Unleashing the power of querying streaming data in a temporal database world: A relational algebra approach (2022). Information Systems vol. 103, January 2022*
- *Hribernik, K., Cabri, G., Mandreoli, F., Mentzas, G. Autonomous, context-aware, adaptive Digital Twins—State of the art and roadmap (2021). Computers in Industry, 133, art. no. 103508*
- *Ferrari, D., Milic, J., Tonelli, R., Ghinelli, F., Meschiari, M., Volpi, S., Faltoni, M., Franceschi, G., Iadisernia, V., Yaacoub, D., Ciusa, G., Bacca, E., Rogati, C., Tutone, M., Burastero, G., Raimondi, A., Menozzi, M., Franceschini, E., Cuomo, G., Corradi, L., Orlando, G., Santoro, A., Digaetano, M., Puzzolante, C., Carli, F., Borghi, V., Bedini, A., Fantini, R., Tabbi, L., Castaniere, I., Busani, S., Clini, E., Girardis, M., Sarti, M., Cossarizza, A., Mussini, C., Mandreoli, F., Missier, P., Guaraldi, G. Machine learning in predicting respiratory failure in patients with COVID-19 pneumonia —Challenges, strengths, and opportunities in a global health emergency (2020). PLoS ONE, 15 (11 November), art. no. e0239172.*
- *Nicola Bicocchi, Giacomo Cabri, Federica Mandreoli, Massimo Mecella. Dynamic digital factories for agile supply chains: An architectural approach (2019). Journal of Industrial Information Integration, Volume 15, pp. 111-121, ISSN 2452-414X, <https://doi.org/10.1016/j.jii.2019.02.001>.*

### Main scientific collaborations

I actively maintain scientific collaborations with researchers in different areas. The following list reports the most significant ones:

2019 – current: Prof. Paolo Missier (Birmingham University, UK) and Prof. Giovanni Guaraldi (Professor of Infectious disease at University of Modena and Reggio Emilia) on data analytics and machine learning in the medical domain;

2019 – current: Prof. Massimo Mecella (Università Sapienza, Italy) on smart manufacturing;

2013-2015: Dr. George H. L. Fletcher (Eindhoven University of Technology, Netherland) on query-driven mapping discovery in dataspace;

2009-2012: Prof. Stefano Rizzi and Prof. Matteo Golfarelli (Università degli Studi di Bologna, Italy) on distributed business intelligence and datawarehousing;

2004-2008: Prof. Pavel Zezula (Masaryk University, Ceck Republic) on XML query processing;

1999-2001: Prof. Enrico Franconi (Manchester Univeristy, UK) on description logics and schema versioning and evolution semantics;

2001-2022: Prof. Fabio Grandi (Università di Bologna, italy) on temporal databases and data evolution;

1998-2000: Prof. John Roddick (Flinders University, Australia) on schema versioning.

### **Participation to Research Projects**

I have participated/participate to the following peer reviewed projects as a co-investigator or principal investigator, by coordinating the research activities of the Information Systems group and contributing to the results and deliverables of the project:

- [P1] EU Horizon Europe IP "WASABI: White-label shop for digital intelligent assistance and human-AI collaboration in manufacturing" (2023-2027)– **PI of UNIMORE unit**
- [P2] Giliad Inc. funded project "Assessment of well-being state through Intrinsic capacity, in Post-COVID Syndrome: an international multicentre prospective cohort study" - **coPI**
- [P3] POR-FES Project - Region Emilia Romagna "Smart digital twin e condivisione intelligente di dati per l'Industria 4.0" - **PI**
- [P4] EU Horizon 2020 Marie Marie Skłodowska-Curie RISE Project "FIRST: virtual Factories: Interoperation suppoRting buSiness innovation" (2017-2022) – **PI of UNIMORE unit**
- [P5] EU Horizon 2020 COST (European Cooperation in Science and Technology) Action IC1302 "KEYSTONE: semantic KEYword-based Search on sTructured data sOurces" (2014-2017)
- [P6] Italian Ministry of Economic Development Project Industria 2015 "PEGASUS: ProgEtto per la Gestione della mobilità Attraverso Sistemi infotelematici per l'ambito Urbano, per la Sicurezza di passeggeri, veicoli e merci" (2009-2012)
- [P7] Italian Ministry of University and Research (MIUR) project FIRB "NeP4B: Networked Peers for Business" (2006-2009)
- [P8] MIUR project PRIN "WISDOM: Ricerca Intelligente su Web basata su Ontologie di Dominio" (2004-2006)
- [P9] MIUR project ex-40% "Il cittadino europeo nell'e-governance: profili filosofico-giuridici, giuridici, informatici ed economici" (2003-2005)
- [P10] Italian National Research Council (CNR) funded project "ECD: Technologies and Services for Enhanced Content Delivery" (2002-2005)
- [P11] EU 5th framework IST project "SEWASIE: SEmantic Webs and AgentS in Integrated Economies" (2002-2005)
- [P12] MIUR project ex-40% "D2I: Data 2 Integration" (2000-2002)
- [P13] MIUR project ex-40% "INTERDATA Metodologie e tecnologie per la gestione di dati e processi su reti Internet e Intranet" (1997-1999)

### **Technology transfer and Participation to Projects in Collaboration with Industry**

I'm a member of Scientific Committee of the Interdepartmental Research Centre in Artificial Intelligence AIRI (<http://www.airi.unimore.it/site/en/home.html>).

I participated as a co-investigator or principal investigator to the following projects in collaboration with industry:

- [I1] Research contract between FIM Department and ExpertAI SpA within the Project "Ibrid AI – Approccio Ibrido al Natural Language Understanding" founded by Emilia Romagna Region (2022-2023, € 180K) **PI**
- [I2] Industrial Project PRRIITT "OUTDOOR VIDEO PROTECTION: visione artificiale e tecnologie informatiche innovative per la sicurezza di ambienti di lavoro all'aperto" in collaboration with BRIDGE 129 SPA SAFETY AND SECURITY (2009-2011).
- [I3] Industrial Project FIT - Fondo di Innovazione Tecnologica between Dipartimento di Ingegneria dell'Informazione and Idea Paper S.r.l (2006-2007).
- [I4] "Adoption of computer science methodologies to the linguistic field" between Dipartimento di Ingegneria dell'Informazione and Logos S.p.A (2000-2002).
- [I5] "Development of a system for the monitoring of risks related to car accidents in urban areas" between Dipartimento di Ingegneria dell'Informazione and USL Modena (2001).

## **Other Scientific Achievements and Services**

### **Associate and Guest editorship**

2022 – present: Associate Editor of Frontiers in High-Performance Computing – High Performance Big Data Systems

2022 – present: Review Editor of Frontiers in Artificial Intelligence – AI in Business

2018 - 2022 present: associate editor of the International Journal of Knowledge-Based and Intelligent Engineering Systems (KES), IOS Press

2019 – present: associate editor of the Journal of Data Science and Engineering (DSEJ), Springer

2024: Guest (co-)editor of the special issue "Machine Learning Theory and Applications" on Mathematics (MDPI)

2022: Guest (co-)editor of the special issue "Autonomous, context-aware, adaptive digital twins" on Computers in Industry (Elsevier)

2021: Guest (co-)editor of the special issue "Big Data Management in Industry 4.0" on Frontiers in Big Data – Data Mining and Management Section

2016: Guest (co-)editor of the special issue "Query Answering on Graph-Structured Data" on Journal of Computer and System Sciences (Elsevier) 82(1)

### **Reviewing Activity, Program Committee Membership and Organization of Scientific Events**

#### *Organization and Chair of Scientific events*

- PC vice-chair of the IEEE Big Data Conference (2024)
- PC chair of the 32nd SYMPOSIUM ON ADVANCED DATABASE SYSTEMS (SEBD 2024)
- General chair of the International Workshop on Data-Centric Artificial Intelligence – DEARING co-located with the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD 2024)

- Scientific coordinator of the Webinar Live "MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE: WHICH APPLICATION IN INFECTIOUS DISEASES" 12 CME Italian Credits (2022)
- General chair of the International Workshop on Key Enabling Technologies for Digital Factories – KET4DF co-located with the International Conference on Advanced Information Systems Engineering (CAiSE) (2018-2022)
- General chair of the International Workshop on Querying Graph Structured Data – GraphQ
  - o 2010 Edition co-located with 14th East-European Conference on Advances in Databases and Information Systems (ADBIS 2010)
  - o 2013-2017 Editions co-located with International Conference on Extending Database Technology / International Conference on Database Theory (EDBT/ICDT Joint Conference).

*Program and Scientific Committee Member*

- AAAI Conference on Artificial Intelligence 2023-2025
- IEEE International Conference on Data Science and Advanced Analytics (DSAA) 2023-2024
- International Conference on Scientific and Statistical Database Management (SSDBM) 2022-2023
- International Symposium on Temporal Representation and Reasoning (TIME): 2015, 2016, 2019, 2024
- International Conference on Knowledge Management and Information Sharing (KMIS): 2015- 2022
- Workshop on Advances in Programming Languages (WAPL): 2011-2015, 2017, 2019
- East-European Conference on Advances in Databases and Information Systems (ADBIS): 2010, 2011, 2014, 2017-2024
- International Conference on Knowledge-Based and Intelligent Information & Engineering Systems (KES): 2018-2021
- Italian Symposium on Advanced Database Systems (SEBD): 2008,2019-2023
- 13TH Italian Research Conference on Digital Libraries (IRCDL): 2017
- 2nd International KEYSTONE Conference: 2016
- 12th EDBT Summer School on Graph Data Management: 2015
- ACM International Database Engineering and Applications Symposium - IDEAS: 2010-2012
- ACM International Workshop on Web Information and Data Management - WIDM (ACM CIKM Workshop): 2012;
- 3rd International Workshop on Graph Structures for Knowledge Representation and Reasoning (GKR): 2011
- International Workshop on Database Technologies for Handling XML Information on the Web - DATAX (EDBT Workshop): 2008-2009
- ACM 6th International Workshop on Data Warehousing and OLAP - DOLAP: 2003;
- International Workshop on Evolution and Change in Data Management - ECDM (ER workshop): 2006, 2008, 2012

*Journal Referee*

- IEEE Transaction on Knowledge and Data Engineering,
- IEEE Internet Computing,
- ACM Transaction on Database Systems,
- Information Systems (Elsevier),
- Journal of Intelligent Information Systems (Elsevier),
- Artificial Intelligence in Medicine (Elsevier),
- Journal of Biomedical Informatics (Elsevier),
- Computers in Biology and Medicine (Elsevier),
- Data and Knowledge Engineering (Elsevier),
- Journal of Systems and Software (Elsevier),
- Data Science and Engineering (Elsevier),
- Computer Languages, Systems & Structures (Elsevier),

- Journal on Data Semantics (Springer)
- Distributed and Parallel Databases (Springer)
- Multimedia Tools and Applications (Springer),
- Transactions on Large-Scale Data and Knowledge Centered Systems (LNCS Transactions).

#### *Top Conference Reviewer*

- ACM SIGMOD Conference, International Conference on Very Large DataBases (VLDB), International Conference on Data Engineering (ICDE), International Conference on Conceptual Modelling (ER), and ACM International Conference on Information and Knowledge Management (CIKM).

#### *Referee*

- European Research Council (ERC) Starting Grant year 2014
- Italian Ministry of University and Research (MIUR) years 2013 and 2014
- France-South America STIC AmSud Program 2015
- Austria FWF Program 2016-2017

#### **PhD student supervision**

I'm currently a member of the Doctoral Board of the **PhD Course in Computer and Data Science** (cds.unimore.it) at the University of Modena and Reggio Emilia. In the past, I was a member of the Doctoral Board of the **PhD program in Information and communication technology** at Università di Modena e Reggio Emilia.

I was PhD co-supervisor of Simona Sassatelli, student of the XXI cycle, on the topic "Query processing in a PDMS", and PhD supervisor of the following students:

- Luca Mariotti, XXXIX cycle, topic "LLMs for Knowledge Graph Enrichment"
- Mattia Billa, XXXIX cycle, topic "Bayesian Symbolic Machine Learning"
- Federico Motta, XXXVIII cycle, topic "Data Analytics and Machine Learning for P4 medicine"
- Luca Carafoli, XXVI cycle, topic "Data management in intelligent transport systems".
- Razia Haider, XXIV cycle, topic "Peer-to-peer systems and wireless sensor networks" (from 2010)
- Giorgio Villani, XXII cycle, topic "Managing a network of peers for data and service sharing"