Amedeo Pachera

PhD Candidate in Computer Science

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RESEARCH SUMMARY

I am a PhD candidate working at the intersection of Machine Learning, Graph Neural Networks, and Data Management. My research focuses on developing intelligent systems that combine Machine Learning and human expertise to improve graph data quality, causal analysis, and interactive data management. My work spans graph representation learning, optimization, and Human-AI collaboration, with publications in leading venues including SIGMOD, VLDB, and ICDE.

RESEARCH INTERESTS

Machine Learning · Graph Neural Networks · Graph Representation Learning · Human-AI Collaboration · Interactive Machine Learning · Causal Machine Learning · Data-centric AI · Knowledge Graphs

RESEARCH EXPERIENCE

PhD Candidate - Université Claude Bernard Lyon 1 Oct 2023 - Present

Supervisors: Prof. Angela Bonifati, Dr. Andrea Mauri

Research focuses on machine learning methods for graph data management, combining automatic inference with human expertise to improve data quality and decision-making.

Main research topics: Graph Neural Networks · Human-AI collaboration · Interactive Machine Learning · Graph data quality · Property graph repair · Graph representation learning · Causal analysis on graph databases

Selected contributions:

- Developed Graph Neural Network models for estimating graph repair difficulty.
- Designed optimization algorithms for budget-aware Human-AI collaboration.
- Built interactive systems for property graph repair.
- Developed graph-based causal analysis frameworks.

Visiting PhD Researcher - University of British Columbia Jan 2026 – June 2026

Host: Prof. Laks V. S. Lakshmanan

Research topics: Graph Machine Learning · Data-driven causal analysis · Graph representation learning

Activities

- Conducted collaborative research within the Database Research Group.
- Presented research seminar during the visiting period.

Research Fellow - Politecnico di Milano Jun 2022 – Oct 2023

Supervisor: Prof. Marco Brambilla

Research activities focused on Knowledge Engineering within the European Horizon 2020 PERISCOPE project.

Main contributions

- Data extraction and enrichment from heterogeneous textual sources.
- Knowledge Engineering techniques for COVID-19 impact analysis.
- Development of the PERSEUS strategic decision-support platform.

SELECTED PUBLICATIONS

Budgeted Interactive Property Graph Repair with Graph Neural Networks - ***ACM SIGMOD 2027 (To Appear)***

Introduces a Graph Neural Network-based framework for interactive property graph repair that combines representation learning, optimization, and human expertise under budget constraints.

WhatIf: Causal Analysis with Graph Databases - ***Proceedings of the VLDB Endowment (PVLDB), 2025***
Proposes graph-based techniques for interactive causal analysis over property graph databases, enabling efficient exploration of causal relationships in complex data.
DOI: https://doi.org/10.14778/3749646.3749671

User-Centric Property Graph Repairs - ***Proceedings of the ACM on Management of Data (PACMMOD), 2025***
Introduces a Human-AI collaborative framework for repairing inconsistent property graphs by combining automatic inference with user expertise.
DOI: https://doi.org/10.1145/3709735

Grafixer: Enabling User-Centric Repairs for Property Graphs - ***PACMMOD Demonstration, 2025***
Demonstrates an interactive system implementing user-centric property graph repair workflows with intelligent repair recommendations.
DOI: https://doi.org/10.1145/3722212.3725105

Understanding Students' Errors in Graph Query Formulation - ***ACM Transactions on Computing Education, 2025***
Empirical study of common errors in graph query formulation, providing insights for the design of graph database education tools.
DOI: https://doi.org/10.1145/3743687

PROFESSIONAL ACTIVITIES

- ACM SIGMOD Availability & Reproducibility Initiative (ARI), 2024–2025
- Web Chair, International Conference on Web Engineering (ICWE) 2026
- Co-organizer, CODATA Workshop on Computational Data Intelligence and AI Design (CHI) 2026
- Reviewer, IEEE Transactions on Knowledge and Data Engineering (TKDE)
- Program Committee Member, EmpatiCH Workshop

TEACHING EXPERIENCE

Teaching Assistant - Université Claude Bernard Lyon 1
- Advanced Databases
- Big Data Processing and Analytics (English)
- Big Data Processing and Analytics (French)
- Soft Skills I and II

Lecturer - Bocconi University
- Foundations of Prompt Engineering

INDUSTRY EXPERIENCE

Chief Technology Officer - Focal SRL Jun 2022 – Oct 2023
Led the development of an AI-powered platform connecting professionals with clients using semantic search and vector databases.
Main technologies: Next.js · Vector Databases · AWS · Semantic Search · Retrieval-Augmented Generation

RESEARCH & TECHNICAL EXPERTISE

Machine Learning & AI: Graph Neural Networks, Graph Representation Learning, Human-AI Collaboration, Interactive Machine Learning, Causal Machine Learning, Data-centric AI, Large Language Models, Retrieval-Augmented Generation.

ML Frameworks: PyTorch, PyTorch Geometric (PyG), DGL, TensorFlow, Hugging Face Transformers, Optuna

Graph Data Management: Property Graphs, Graph Databases, Neo4j, Cypher, Knowledge Graphs, RDF, OWL, SPARQL

Data Science & Distributed Computing: Python, NumPy, Pandas, Apache Spark

Software Engineering: Docker, Git, Next.js, AWS, Java, C++, SQL
Research Software: LangChain, Vector Databases, research code accompanying published papers

EDUCATION

PhD in Computer Science - Université Claude Bernard Lyon 1 **2023 - Present**
Thesis: Human-Machine Intelligence Integration for Data-Intensive Application

M.Sc. in Computer Science and Engineering - Politecnico di Milano **2019 - 2022**
Thesis: KlevR and DeepR — A benchmark for exploring deductive reasoning functionalities of variational autoencoders.
Advisor: Prof. Emanuele Della Valle

B.Sc. in Computer Science and Engineering - University of Padua **2015 - 2019**
Thesis: Sensor Fusion for Android Devices
Advisor: Prof. Stefano Tommasin

INVITED TALKS

Improving Data Quality and Reasoning in Graph Databases: Human-in-the-Loop, Machine Learning, and Causal Approaches - University of British Columbia

LANGUAGES

Italian — Native
English — C1
French — B2