

Francesco Congiu

PHD STUDENT

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Internship

Apply

Cagliari, Italy

APPLIED SCIENTIST

Mar 2025 - Jul 2025

- Engineered a Confidentiality-Preserving RAG system using Python and HuggingFace, ensuring data privacy for enterprise-level document retrieval.
- Optimized retrieval accuracy by integrating custom EM-based reranking algorithms, reducing false-positive rates in query responses.
- Collaborated with the engineering team to deploy scalable LLM pipelines, improving internal document processing speed.

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Cagliari, Italy

FULL STACK DEVELOPER

Mar 2023 - Jul 2023

- Architected a document digitization pipeline using C# and .NET, automating the ingestion of legacy records into modern databases.
- Designed a core infrastructure module currently utilized to manage 5.000+ digital assets.

Education

University of Cagliari (UniCa)

Cagliari, Italy

PH.D. IN TEACHING & LEARNING SCIENCES — SPECIALIZATION IN AI & EDUCATIONAL TECHNOLOGIES

Nov 2025 – Current

- Research Areas:** Retrieval-Augmented Generation Systems, Confidentiality-Aware Systems, Natural Language Processing, Information Retrieval.

University of Cagliari (UniCa)

Cagliari, Italy

M.S. IN APPLIED ARTIFICIAL INTELLIGENCE, SUMMA CUM LAUDE

Sep 2023 - Sep 2025

- Thesis:** "RetrievEM: Confidentiality-Preserving RAG via Expectation-Maximization"
- Relevant Coursework:** Information Retrieval, Natural Language Processing, Machine Learning, Deep Learning.

University of Cagliari (UniCa)

Cagliari, Italy

B.S. IN COMPUTER SCIENCE

Sep 2020 - Jul 2023

- Thesis:** "Development of a web application for blood donation management".
- Relevant Coursework:** Algorithms & Data Structures, Software Engineering, Programming 1, Programming 2, Operating Systems

Publications

Confidential Retrieval-Augmented Generation in Educational Contexts

WAILS 2025

BORATTO L., CONGIU F., FENU G., MEDDA G., PAU A.

Oct. 2025

- Validated confidentiality-preserving architectures by benchmarking against Beir/FiQA dataset, achieving a MAP@10 of 0.3506 through an optimized Linear Fusion strategy that outperforms standard RRF and dense retrieval.
- Introduced Backfill, a search-depth expansion algorithm that improved HIT@10 by 0.09, effectively balancing pedagogical utility with strict document access-control policies.

Research Projects

RetrievEM: Open-source Framework for Confidentiality-Aware RAG

GitHub

CREATOR & LEAD MAINTAINER

Sep. 2025

- Designed and open-sourced a modular RAG framework integrating dense retrieval, cross-encoder reranking, and score-level fusion.
- Implemented an Expectation-Maximization (EM) inspired reranking algorithm to maximize query relevance while enforcing strict 100% confidentiality constraints.
- Developed a synthetic persona generation module to enable access-aware evaluations on benchmarks lacking native confidentiality metadata.

Key Skills

Languages

Python, SQL, C++, C#, Java, LaTeX

AI & Machine Learning

PyTorch, HuggingFace, RAG, LangChain, EM Algorithm, NLP, IR

Tools & Infrastructure

Docker, Git, Linux (Ubuntu/Arch), .NET, MongoDB, PostgreSQL, Qdrant