Nicolò Donati

PhD Candidate in Artificial Intelligence & NLP Engineer

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Final-year PhD Candidate at the University of Bologna (DISI) specializing in Generative AI, Computational Argumentation, and Natural Language Processing (NLP). Expert in designing and deploying LLM-based systems for the publishing and educational sectors. Proven track record of bridging the gap between state-of-the-art research and industrial application, with a specific focus on Automated Accessibility, Reasoning Validation, and Editorial Workflow Optimization. Collaborator with industry leaders including Zanichelli Editore (Italy), Porto Editora (Portugal), and Expert.ai.

RESEARCH & PROFESSIONAL EXPERIENCE

NLP Researcher & Industry Collaborator, 11/2023 - Present
Language Technologies Lab (LT-Lab) & Zanichelli Editore Bologna, Italy
Editorial AI Systems: Designing writing assistants aligned with professional editorial standards. Analyze workflows to identify inefficiencies and apply NLP techniques (summarization, stylistic transfer) to enhance content quality. Production Deployment: Leveraged LLMs to evaluate textual coherence and compliance with editorial guidelines, building robust tools that meet expert-level criteria. Industrial R&D: Maintained active research collaborations with Expert.ai, NIER Engineering, BitBang, BiRex, and Bonfiglioli.

Visiting Researcher, 06/2025 - 12/2025
Faculty of Engineering (FEUP) & Porto Editora Porto, Portugal
Argumentation Mining: Led the development of "LAV," a module designed to assess the quality of reasoning traces generated by LLMs using rule-based and supervised neural architectures. Educational Digitization: Partnered with Porto Editora to develop a Vision-Language pipeline for extracting exercises and solutions from PDF textbooks. Human-in-the-Loop: Designed a system where human reviewers validate low-confidence AI extractions before database insertion, ensuring data trust and accuracy.

Academic Tutor for Genomics Python Programming, 2023 - Present
Department of Pharmacy and Biotechnology, University of Bologna Bologna, Italy
Assisted students in learning Python programming applied to genomics.

EDUCATION

PhD in Artificial Intelligence, *University of Bologna (DISI)* 11/2023 - Present
Thesis: "Generative AI for Innovative Writing and Editing Support Systems" Advisors: Prof. Paolo Torroni. Focus: LLM Evaluation, RAG, Abstractive Summarization, Stylistic Adaptation. Key Achievement: Developed methods to assess LLMs as reliable evaluators for educational writing, identifying challenges in hierarchical criteria interpretation.

Visiting PhD Researcher, 06/2025 – 12/2025
University of Porto, Faculty of Engineering (FEUP) Porto, Portugal
Advisors: Prof. Henrique Lopes Cardoso and Prof. Paolo Torroni. Key Achievement: Developed the "Lightweight Argumentation Validator" (LAV) to meta-evaluate LLM reasoning traces.

Master in Artificial Intelligence, *University of Bologna* 2021 – 2023
Bologna, Italy

Bachelor in Computer Engineering, *University of Bologna* 2019 – 2023
Bologna, Italy

RECENT PROJECTS

Automated Reasoning Validation for LLMs ("LAV" Module),
Research conducted at FEUP (Porto) on ensuring reliability in multi-step reasoning.
Architecture: Utilized ModernBERT with Pointwise (absolute scoring) and Pairwise (comparative ranking) supervised architectures to capture nuanced argumentative patterns. Key Discovery ("Conciseness Threshold"): Discovered that LAV's predictive power correlates positively with task completion only for short traces (<1,534 characters, Spearman's $\rho \approx 0.43$). Metrics Analysis: Proved that Vocabulary Diversity and Conciseness were stronger predictors of task correctness ($\rho \approx 0.37$) than aggregate argumentation quality scores, identifying that verbose traces often indicate "hallucination loops".

Automated STEM Accessibility Pipeline (Production Deployed),
Designed to solve accessibility bottlenecks for scientific publishing (Zanichelli).
Architecture: Created a hybrid Human-AI workflow to generate accessible alt-text for scientific imagery, integrating o4-mini for superior reasoning and cost-effectiveness. Methodology: Implemented a two-phase prompting pipeline for function plots: Identification: Extracting graphical elements (axes, asymptotes) with confidence scoring. Generation: Producing targeted descriptions to minimize hallucinations. Impact: Deployed within the Zanichelli Editore environment, significantly accelerating alt-text production while maintaining accuracy through a mandatory expert-in-the-loop validation process.

TECHNICAL SKILLS

Core Areas
- Natural Language Processing (NLP)
- Computational Argumentation
- Large Language Models (LLMs)
- RAG
- Computer Vision

Development
- Python
- PyTorch
- Hugging Face Transformers
- WandB

Models & Architectures
- GPT/Gemini/Claude/Open-Source(DeepSeek,Qwen)
- Azure/AWS/GCP
- BERT/ModernBERT/XGBoost
- CV Classifiers (Yolo,EfficientNet)

Concepts
- Writing Assistance/Content Generation
- Supervised Fine-Tuning (SFT)
- Human-in-the-Loop (HITL) workflows
- Generative AI evaluation
- Summarization

PUBLICATIONS

AI and accessibility: describing graphs with alternative texts, 09/03/2026
CSUN Assistive Technology Conference (CSUN 41)
Donati, N., et al.

[Submitted] Book Chapter on Argumentation and Large Langauge Models, *Humane AI* 2026

Do Large Language Models understand how to be judges?, 26/10/2025
LUHME Workshop at ECAI 2025
Donati, N., et al.

Generative AI for Innovative Writing and Editing Support Systems, *ECAI 2025 Doctoral Consortium* 25/10/2025
Donati, N.

Generation and Evaluation of English Grammar Multiple-Choice Cloze Exercises, *CLiC-it 2024* 04/12/2024
Donati, N., et al.