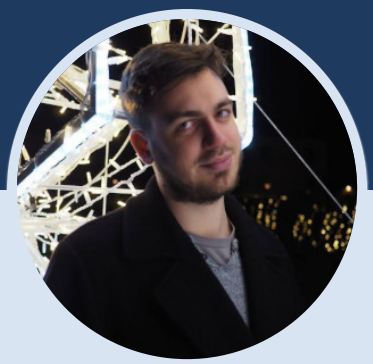

LUCA GIULIANI, PhD

Data & Computer Scientist

♂ He/Him | 27 Years | Bologna, Italy (IT) | giuluck.github.io

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I am a **post-doc researcher** at the Computer Science and Engineering Department of the University of Bologna.

I mainly work on **Constrained Machine Learning** applied to **Algorithmic Fairness**, with a PhD dissertation titled "Detection and Enforcement of Non-Linear Correlations for Fair and Robust Machine Learning Applications", but I also explored other areas of Artificial Intelligence, such as music generation models and decision-focused learning for combinatorial optimization problems.

HARD SKILLS

- Programming ~10 years
- Machine Learning ~5 years
- Data Visualization ~3 years
- Optimization ~3 years

SOFT SKILLS

- Organization
- Creativity
- Problem Solving
- Team Work

PROGRAMMING

- Python + sklearn / keras / torch
- Java / Kotlin / Scala
- Git / Docker / GitHub Actions
- Web Stack

LANGUAGES

- Italian Native
- English C1 Lev.

EDUCATION & WORK

Research Fellow at University of Bologna

11/2024 - Ongoing

Funding Project:

- PRODE: Probabilistic Declarative Process Mining (Italian RPNI).

Research Topics:

- Declarative Process Mining with Probabilistic Support.
- Integration of Causal Knowledge in Declarative Process Mining.

Teaching Assistant at University of Bologna

09/2021 - Ongoing

Artificial Intelligence in Industry: 2021/22, 2022/23, 2023/24, 2024/25.

Fundamentals of Artificial Intelligence (IT): 2024/25.

Fundamentals of Artificial Intelligence (EN): 2022/23, 2023/24.

Coordination and Support to Computer Science Exam Preparation: 2021/22.

PhD in **Computer Science & Engineering**

11/2021 - 04/2025

Institution: University of Bologna.

Thesis: "Detection and Enforcement of Non-Linear Correlations for Fair and Robust Machine Learning Applications".

Research Topics:

- Algorithmic Fairness with Discrete and Continuous Sensitive Attributes.
- Integrated Symbolic and Sub-symbolic Techniques for Trustworthy AI.
- Decision-Focused Learning for Combinatorial Optimization Problems.
- Computational Methods for Correlation Detection and Causal Discovery.

Involved Projects:

- TAILOR: Trustworthy AI through the Integration of Learning, Optimisation and Reasoning (EU Horizon — Funding).
- AI4EUROPE: An AI On-Demand Platform to Support Research Excellence in Europe (EU Horizon — Funding).
- AEQUITAS: Assessment and Engineering of Equitable, Unbiased, Impartial and Trustworthy AI Systems (EU Horizon — Correlated).
- TUPLES: Trustworthy Planning and Scheduling with Learning and Explanations (EU Horizon — Correlated).
- StairwAI: Ease the Engagement of Low-Tech Users to the AI-on-Demand Platform through AI (EU Horizon — Correlated).
- FAIR: Future Artificial Intelligence Research (Italian NRRP — Correlated).

MSc in **Artificial Intelligence** — 110/110 with Honors

09/2019 - 07/2021

Institution: University of Bologna.

Thesis: "Extending the Moving Targets Method for Injecting Constraints in Machine Learning".

Topics:

- *Languages and Technologies*: Python, Scala, Gurobi, CPLEX, MATLAB, IOTA, Prolog, NetLogo.
- *Machine/Deep Learning Theory and Frameworks*: Numpy, Pandas, Scikit-Learn, Tensorflow/Keras, PyTorch/Lightning, Matplotlib, Seaborn.
- *Foundations of Artificial Intelligence*: Combinatorial and Mathematical Optimization, Reasoning and Logic Programming, Genetic and Evolutionary Algorithms, Search Strategies, Planning.
- *Transdisciplinary Aspects of Artificial Intelligence*: AI Ethics and Regulations, Algorithmic Fairness, Cognitive Neuroscience.

Academic Internship at **University of Bologna**

02/2019 - 05/2019

Institution: University of Bologna, Cesena Campus.

Project:

- Extension of the biochemical component of the Alchemist simulator.
- Development of automated tests in *Kotlin language* to guarantee the correct functioning of internal operations.
- Employment of the software to *simulate biochemical experiments*.

BSc in **Computer Science & Engineering** — 110/110 with Honors

09/2016 - 10/2019

Institution: University of Bologna, Cesena Campus.

Thesis: "Design and Implementation of a Domain Specific Language for the Construction of Gene Regulatory Networks".

Topics:

- *Languages and Technologies*: C, C++, C#, Java, Kotlin, Python, SQL/PL-SQL, Git/GitHub, LaTeX, UML, MATLAB, Javascript/jQuery, HTML, CSS, PHP, Bash, Assembly.
- *Mathematical Foundations of Computer Science*: Calculus, Linear Algebra, Statistics, Operations Research, Computational Methods.
- *Algorithms and Data Structures*: Lists, Stacks, Queues, Heaps, Trees, Graphs, Search and Sorting Algorithms, Recursive Algorithms, Complexity Theory.

Professional Stage at **Loccioni Group**

06/2015 - 07/2015

> **Company**: Loccioni Group, Angeli di Rosora (IT).
>
> **Project**: Development of a *web application in AngularJS* for monitoring the environmental conditions of a workplace.

Scientific High School — 100/100

09/2011 - 07/2016

> **School**: "Leonardo Da Vinci" High School, Jesi (IT).
>
> **Activities**:
> - Appointed *class representative* for three years.
> - Member of the *organizational committee* of the institute representatives for two years.
> - Selected for the *national finals of the Mathematical Games* (Giochi Matematici) held at the Bocconi University, and for the regional finals of many other Olympics such as: Mathematics, Computer Science, Physics, Chemistry, Philosophy, and Culture.

PUBLICATIONS

Generalized Disparate Impact for Configurable Fairness Solutions in ML
L. Giuliani, E. Misino, M. Lombardi
ICML, 2023 (A* Conference)

Towards Symbiotic Creativity: A Methodological Approach to Compare Human and AI Robotic Dance Creations
A. De Filippo, L. Giuliani, E. Mancini, A. Borghesi, P. Mello, M. Milano
IJCAI, 2023 (A* Conference)

Achieving Intersectional Algorithmic Fairness By Constructing A Maximal Correlation Latent Space
L. Giuliani, M. Lombardi
Accepted (Not Published Yet) at ECAI, 2025 (A Conference)

MusiComb: a Sample-based Approach to Music Generation Through Constraints
L. Giuliani, F. Ballerini, A. De Filippo, A. Borghesi
ICTAI, 2023 (B Conference)

Long-Term Fairness Strategies in Ranking with Continuous Sensitive Attributes
L. Giuliani, E. Misino, R. Calegari, M. Lombardi
AEQUITAS Workshop @ ECAI, 2024 (A Conference)

Beyond Temporal Relationships: Causal Support in Declarative Process Modeling
L. Giuliani, A. Zecchini
Accepted (Not Published Yet) at PMAI Workshop @ ECAI, 2025 (A Conference)

A Geometric Framework for Fairness
A. Maggio, L. Giuliani, R. Calegari, M. Lombardi, M. Milano
AEQUITAS Workshop @ ECAI, 2023 (A Conference)

Expert-MusiComb: Injective Domain Knowledge in a Neuro-Symbolic Approach for Music Generation
L. Tribuiani, L. Giuliani, A. De Filippo, A. Borghesi
CREAI Workshop @ ECAI, 2024 (A Conference)

Towards Intelligent Music Production: A Sample-based Approach
L. Giuliani, A. De Filippo, A. Borghesi
CREAI Workshop @ AIxIA, 2023 (C Conference)

- **Towards Symbiotic Creativity: A Methodological Approach to Compare Human and AI Robotic Dance Creations**
  L. Giuliani, A. De Filippo, A. Borghesi, P. Mello, M. Milano
  CREAI Workshop @ AIxIA, 2022 (C Conference)

PROJECTS

- **MaxCorr**
  A Python Package for the Estimation of Maximal Correlation Indicators
- **Moving Targets**
  A Python Package for Constrained Machine Learning based on Bi-level Decomposition
- **Non-Linear Correlations**
  Experiments to Reproduce the Results showed in my PhD Dissertation
- **Another Genetic Circuit Transcriber**
  A Kotlin-based Domain-Specific Language for the Definition of Gene Regulatory Networks
- **Causalgen**
  A Python Package for Data Generation based on Causal Dependencies
- **Powerplantsim**
  A Graph-based Simulator for Power Plants
- **Interactive Benchmark Library**
  A Benchmark Library developed for the TUPLES European Project
- **Epidemic Model Learning**
  An Analysis of Covid Data based on Machine Learning and Mathematical Programming
- **Deep Comedy**
  A Transformer-based Neural Architecture aimed at reproducing the Style of the Divine Comedy
- **Gangster SQuAD**
  A BERT-based Natural Language Processing System for Question Answering Tasks
- **IoTrace**
  A Prototype of Contact Tracing App built with IOTA
- **Paku Paku**
  A One-Vs-One Pacman developed in C++ using OpenGL Primitives
- **Snailysis**
  A Level-based Platform Game with a Weird Focus on Calculus
- **AlmaFood**
  A Prototype of a JustEat Clone for the Cesena Campus of the University of Bologna