

# OMAR GARRAOUI

Milan, Italy

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## EDUCATION

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**B.Sc. Mathematical Engineering (Applied Mathematics)**, Politecnico di Milano Sep 2025 – Jun 2028  
Collegio di Milano – Competitive merit fellowship, full scholarship *Milan, Italy*

Coursework: Mathematical Analysis I & II, Linear Algebra and Geometry, Fundamentals of Computer Science

**High School Diploma**, ITST J.F. Kennedy Sep 2020 – Jun 2025  
GPA: 3.9/4.0 Curriculum: Computer Science, Programming, Telecommunications *Pordenone, Italy*

## HONORS & COMPETITIONS

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**Italian Mathematics Olympiad** (2024) – National Semifinals qualifier; team captain.

**ITACPC** (Italian Collegiate Programming Contest) – 3rd place, competing individually.

**Collegio di Milano Fellowship** (2025) · **Fratelli Zilli Scholarship** (2024, 2025) · **Top Student** (2024, 2025)

## PROJECTS

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**Contradiction Tensor** [GitHub]

A decision-making tool that scores every pair of beliefs for **logical contradiction** via a **local NLI model** into an  $N \times N \times K$  tensor indexed by market regime, then computes the minimum belief set to drop for internal consistency via a **greedy 2-approximation of Minimum Vertex Cover**.

**Prediction Market Arbitrage Scanner** [GitHub]

Detects **risk-free arbitrage** across prediction market venues by pricing binary contracts under taker ( $c = \text{ask}(1+r)$ ) and profit-deferred ( $c = \text{ask}/(1 - (1 - \text{ask})r)$ ) fee regimes; flags when  $c_{\text{YES}} + c_{\text{NO}} < 1$  and allocates capital as  $s_i \propto 1/c_i$  to **equalize expected payout** across outcomes.

**CausalPulse** [demo]

Treats the global news stream as a mixture of  $K$  **unobserved causal forces** and recovers them via **StrADiff** (arXiv:2604.04973); surfaces which upstream force is driving apparently unrelated coverage across domains, where standard topic classification sees only surface similarity.

## EXPERIENCE

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**Member – Research & Projects**, Polimi Data Scientists Feb 2025 – Present

- Weekly ML paper reading group: reproduce and present methods from recent DS literature.
- Company-sponsored projects: apply statistical and ML methods to partner datasets.

**Academic Mentor – Mathematics & Physics**, ITST Kennedy Sep 2023 – May 2025  
Tutored students 1-on-1 in calculus, linear algebra, and physics; designed individualized curricula.

## PUBLICATIONS

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**Optimizing Exact String Matching via Statistical Anchoring** [arXiv:2601.03271] – Enhances Boyer-Moore-Horspool by anchoring first mismatch checks to  $c^* = \arg \min_{c \in P} \Pr(c | \text{corpus})$ ; faster window rejection at no added shift-heuristic complexity.

**What Is Intelligence?** [GitHub] – Unifies seven accounts of intelligence (Spearman through Deutsch) under the *Generative Model Revision* framework: intelligence as capacity to build and revise compressed world models under uncertainty.

## SKILLS

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<b>Technical</b>	Python, NumPy, Pandas, PyTorch, scikit-learn, C, C++, Java, Swift, Git, $\text{\LaTeX}$
<b>Mathematics</b>	Real Analysis, Linear Algebra, Probability & Statistics, Number Theory, Combinatorics
<b>Languages</b>	Arabic (native), Italian (native), English (C1), French (B2)