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Bias, Literacy, and Data Structures: Assessing the Disruption of Generative AI

Prof. Ugo Pagallo

(University of Turin)

Setting the LoA

WP2 UNITO task was to develop a theoretical analysis of algorithmic unfairness and discrimination, identifying criteria, context and causes of algorithmic unfairness and discrimination across scientific domains. We opted for biases as the starting level of abstraction for WP2 task.

Unfairness, Discrimination, & Biases

Drawing on current research (e.g., S. Barocas, M. Hardt, A. Narayanan, *Fairness and Machine Learning: Limitations and Opportunities*, MIT Press, Cambridge (MA) 2023, cap. 2 «Classifying without discriminating», pp. 31-68)

We further developed the LoA in E. Loza de Siles, *Disaggregating Artificial Intelligence Biases: A Law and Systems Engineering Approach for AI Governance and Regulation*, in W. Barfield, U. Pagallo (eds.), «Research Handbook on the Law of Artificial Intelligence», 2ª ed., Cheltenham-Northampton, Edward Elgar Publishing (2025), pp. 274-295.
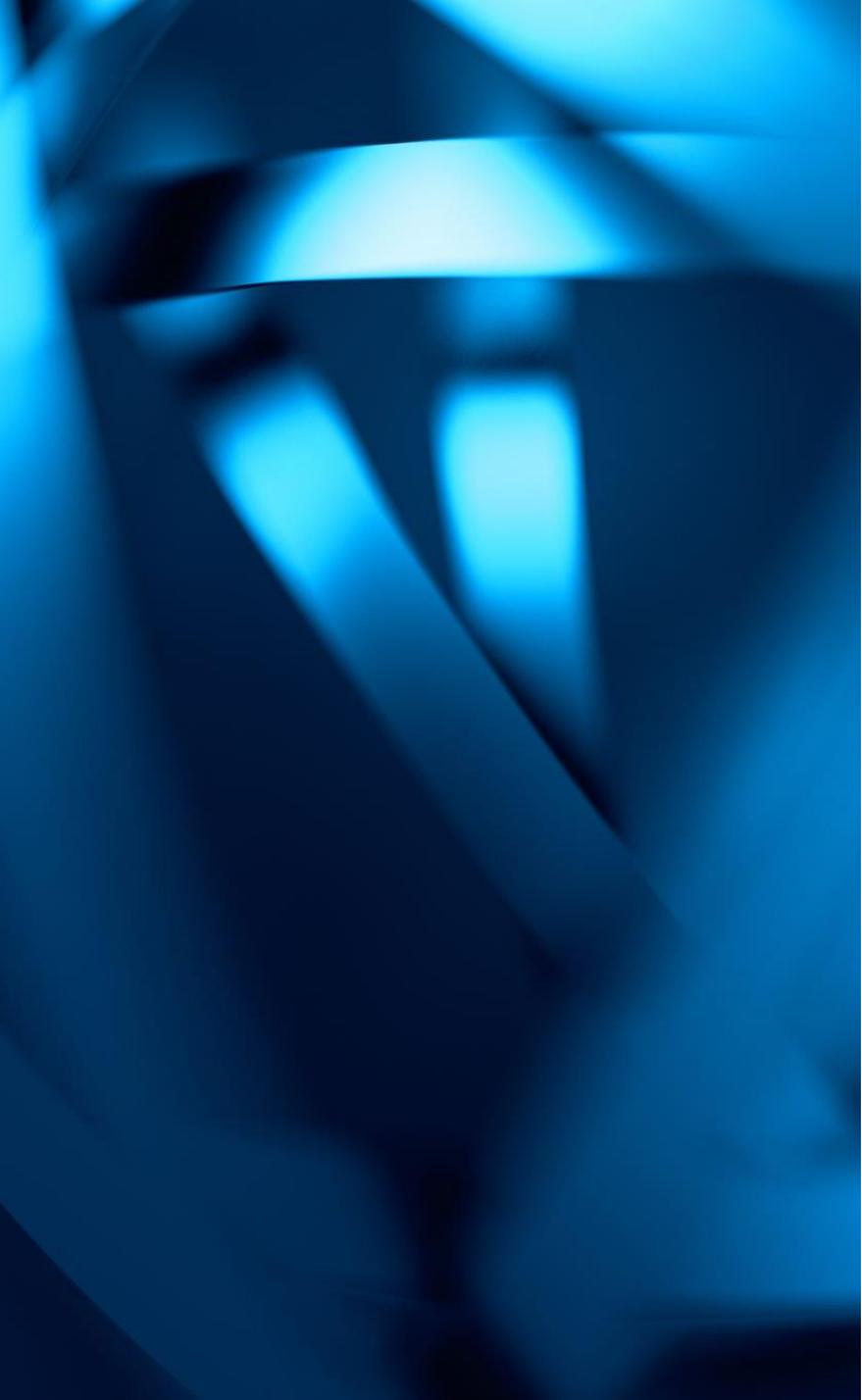
Classifying Biases

Our LoA fleshes out 50 variables related to 6 observables:

Cognitive biases

Societal biases

Data biases

Learning biases

Model biases

Use biases

Trade-offs for non (unfair) discrimination

The further intent to dissect observables and variables of the analysis, e.g., data and societal biases, acknowledged the algorithmic irreducibility of the problems we're dealing with.

See A. Chouldechova, *Fair Prediction with Disparate Impact: A Study of Bias in Recidivism Prediction Instruments*, in «Big Data», V, 2, 2017, pp. 153-163; J. Kleinberg, S. Mullainathan, M. Raghavan, *Inherent Trade-Offs in the Fair Determination of Risk Scores*, in «Proceedings of the 8th Innovations in Theoretical Computer Science Conference» (ITCS 2017), Berkeley CA, edited by C.H. Papadimitriou, Schloss Dagstuhl - Leibniz-Zentrum für Informatik, LIPIcs vol. 67, 2017, pp. 1-23.

Large Language Models

A new kid in town

Against this framework, we further considered the disruption of generative AI throughout the research years of our PRIN vis-à-vis the troubles of EU lawmakers (2021-2024).
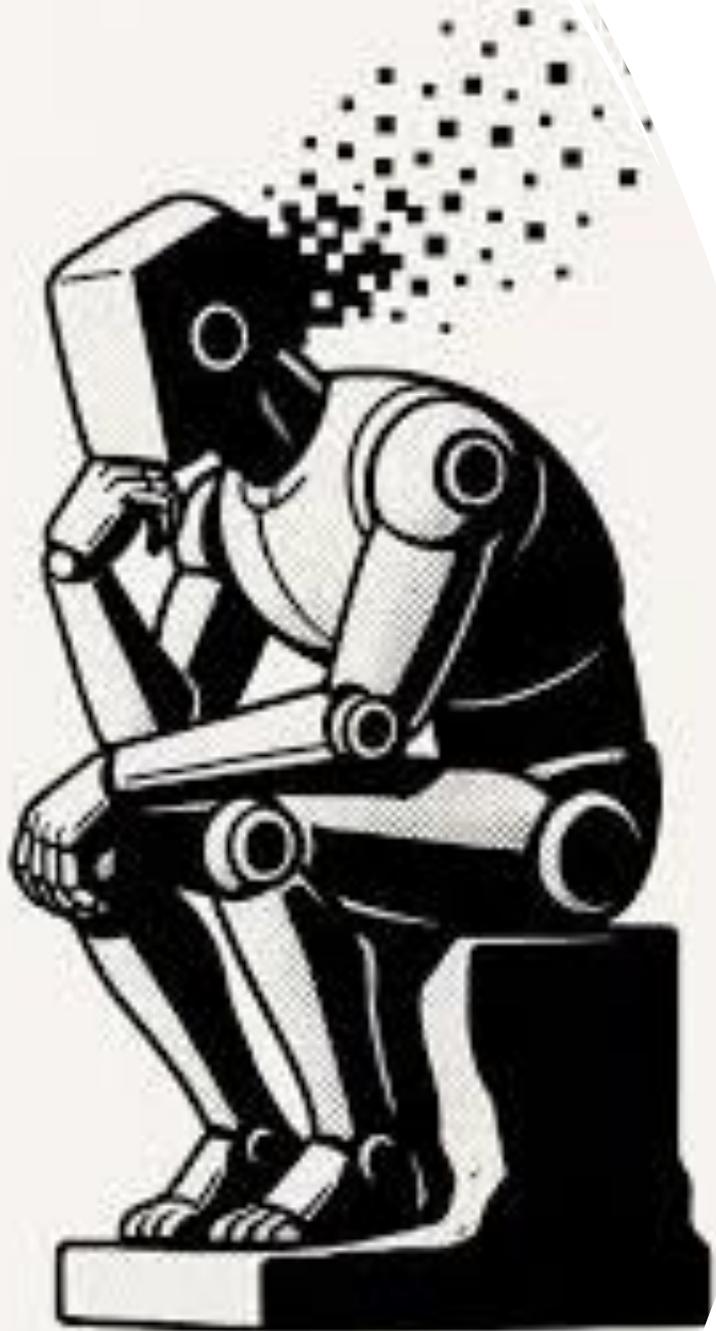
Epistemia

LLMs draw our attention to the illusion of knowledge that emerges when linguistic plausibility replaces verification: E. Loru, J. Nudo, N. Di Marco, A. Santirocchi, R. Atzeni, M. Cinelli, V. Cestari, C. Rossi-Arnaud, W. Quattrociocchi, *The simulation of judgment in LLMs*, in «Proceedings of the National Academy of Sciences», CXXII (2025), n. 42
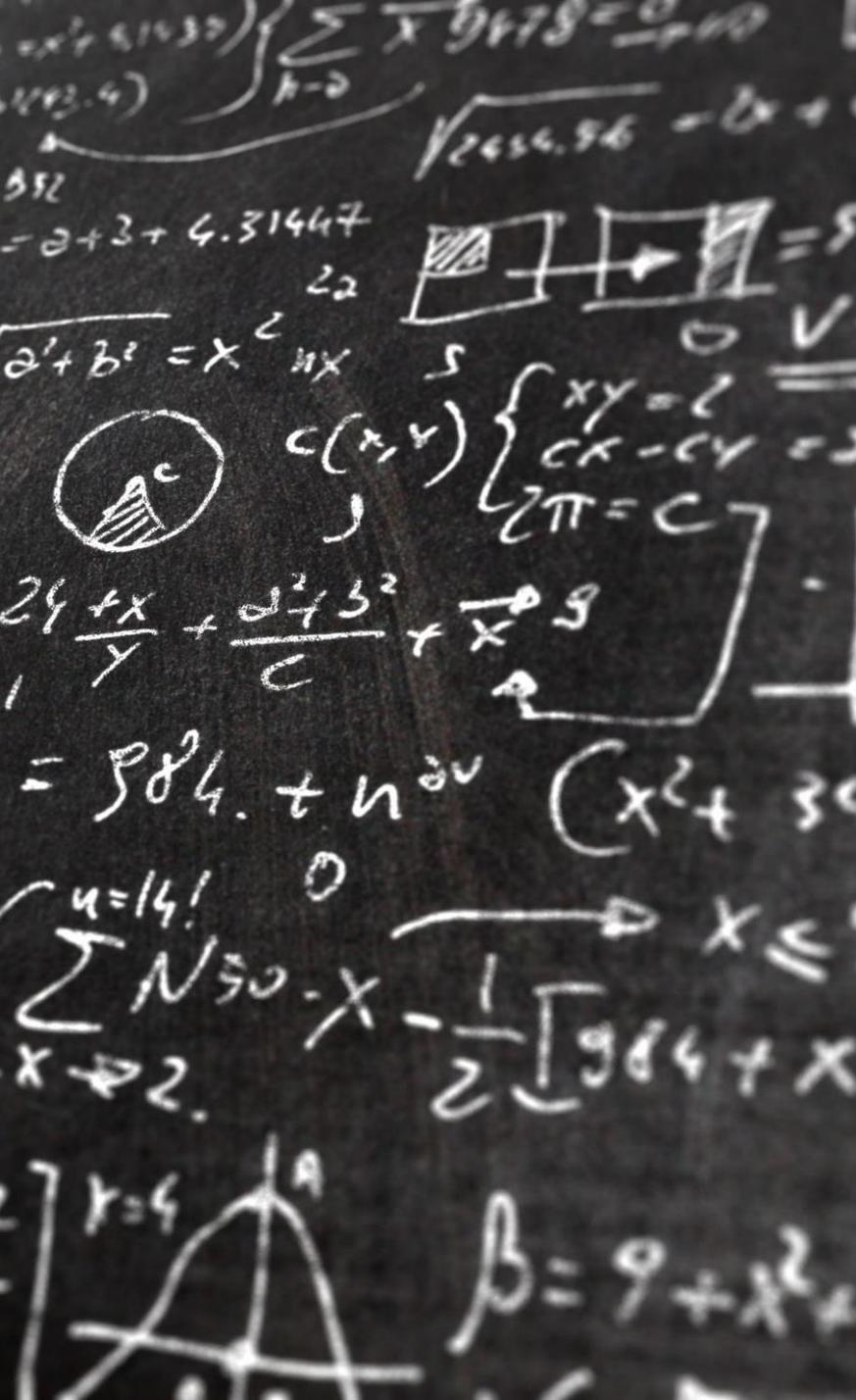
On Literacy

- Bassi, E., & Pagallo, U. (2026). Just Hallucinations? The Problem of AI Literacy with a New Digital Divide. In *International Conference on the Ethical and Social Impacts of ICT* (pp. 204-214). Springer, Cham.

- Paseri, L., Durante, M., & Pagallo, U. (2025). The Legal Challenges of AI Literacy Between Enforcement and Compliance. *MEDIA LAWS*, *1*, 1-18.

Data Structures

Criteria, context, and causes of unfair discrimination and biases have been further scrutinized through the notion of data structures since data can be comprehended as an infrastructure of their own:

Cohen, J. E. (2025). Public utility for what?: Governing AI datastructures. *Yale Journal of Law and Technology*, 27.

Pagallo, U. (Forthcoming). *Services, Platforms, and Infrastructures: Rethinking the Value Chain in the EU Law's Governance of Digital Technologies*.

On Good Practices

Strengthening the rule of law with the protection of fundamental rights through metrics and smart legal automation.

The troubles of the CSRD (Corporate Sustainability Reporting Directive, i.e. D-2022/2464) vis-à-vis the CSF (Cloud Sovereignty Framework) with the Directorate-General for Digital Services' version 1.2.1 from October 2025:

$$Sovereignty\ Score = \sum_{n=1}^{n=8} \frac{Score\ (SOVn)}{Max.Score(SOVn)} \ x\ Weight(SOVn)\%$$

Legal Theory, after all

The validity of the corresponding legal provisions appears as a second-order property of the system. This means, on the one hand, that the notion of legality is related to thresholds of enforceability, efficiency, effectiveness, and fairness of the provisions that, on the other hand, may regard the means of hard law, soft law, policies, or recommendations. This intricacy makes clear that the notion of legal compliance is not a binary, but rather, should be finetuned between 0 and 1, between compliance and noncompliance.

Thank you!

(ugo.pagallo@unito.it)