An analysis on the definitions of "AI System"

Executive summary - Alessandro Lorenzi, Luca Cazzola

1 The problem

In the contemporary context, delineating precisely what constitutes an Artificial Intelligence system (AI system) has assumed utmost importance. As technology swiftly advances and permeates various facets of our daily routines, the distinctions between conventional computing and artificial intelligence continue to blur. Establishing a clear and comprehensive definition for AI systems is crucial for several reasons. First and most important, to create effective regulations not just for the design and for the correct use of AI systems, but also for the entering into the market of these technologies. That leads to legal interpretation and enforcement. Furthermore, specifying which techniques are under the scope of AI, ensures the public has a clear understanding of what AI is, avoiding or mitigation issues related to both the underused and overused of AI systems. Last but not least, a well-defined concept of AI is essential for establishing ethical guidelines.

2 The analysis

In order to determine, from both a legal and technological standpoint, which definition would be the most appropriate, we have conducted an analysis of the structure, differences, and common points of the formulations provided by various organizations. Particular focus has been given to the European High-Level Expert Group on AI (2018 version), the European Commission, Council and Parliament working on the AI Act draft, the OECD Artificial Intelligence Policy Observatory (OECD.AI) and to the Luciano Floridi proposal in the "On the Brussels-Washington consensus about the legal definition of Artificial Intelligence" paper (2023). In the next page the first image reported the summarize table of the analysis, the bold column contains the most common and important concepts included into the different formulations of "AI System". The check mark indicates the presence of the concept in the definition by the corresponding organization. The second table instead shows a list of real cases applied to the previous definitions, to understand if there are systems mistakenly recognized as AI systems, or vice versa, if they are ignored even though they are AI. Note here that if the color is green, both the "x" and check marks are positive.

3 Conclusion

This report shows that most of the explanations presented contain issue or ambiguity in at least one of the points considered. However, the best definition seems to be the Floridi's one: *"Artificial Intelligence (AI) refers to an engineered system that can, for a given set of human-defined objectives, generate outputs – such as content, predictions, recommendations, or decisions – learn from historical data, improve its own behaviour, and influence people and environments"*. In the last column of both the tables, in fact,

	AI EU GROUP	COMMISSION	COUNCIL	PALIAMENT	OECD	FLORIDI[1]
SOFTWARE	✓[2]	✓	✓	✓	✓	✓
HARDWARE			✓	✓	✓	✓
AUTONOMY			✓	*"varying levels"*	*"varying levels"*	✓
HUMAN DEFINED OBJECTIVES		✓	✓			
PREDICTIONS, DECISIONS, RECOMMENDATIONS IN OUTPUT		✓	✓	✓	✓	✓
CONTENT IN OUTPUT		✓	✓		✓	✓
REFERENCES TO AI TECHNIQUES		*Annex 1*	✓[3]			
PROCESS INFORMATION	✓		✓		✓	✓
INFLUENCE AND INTERACT WITH ENVIRONMENT	✓	✓	✓	✓	✓	✓

(1) Floridi, Luciano, *On the Brussels-Washington consensus about the legal definition of Artificial Intelligence* (December 3, 2023)
(2) Only human designed (3) Programming approaches that execute operations automatically

Figure 1: Analysis on different definitions.

	AI EU GROUP	COMMISSION	COUNCIL	PALIAMENT	OECD	FLORIDI
MODEL-BASED ALGORITHM	maybe	maybe	X	maybe	maybe	X
SMARTWATCH	X	X	X	maybe	maybe	X
CHATGPT	X	✓	✓	X	✓	✓
AUTONOMOUS VEHICLES	X	X	✓	✓	✓	✓
GPAIS	X	X	✓	✓	✓	X
AI SYSTEM BY AI SYSTEMS	X	maybe	maybe	✓	✓	✓

Figure 2: Real case application of the definitions.

there is a higher number of green check marks. That is the sole option that encompasses all the most pertinent attributes of AI Systems, specifically the transformative and autonomous variants, without being excessively broad or specific. Furthermore, highlighting the ability to learn from experience and improve behavior, there is a distinct distinction between simple model-based algorithms (not AI) and systems that we consider artificial intelligence. Even though some concepts, such as the "human-defined objectives", aren't really clear and other issues can pop up, we can still conclude that, from a technical standpoint, this definition seems to be the most appropriate for defining what an AI system is.