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Original Article

Evaluating the Rationality of Artificial Intelligence Using Soumaila's Formula: A Neuromathematical and Ethical Perspective

Évaluation de la Rationalité de l'Intelligence Artificielle à l'Aide de la Formule de Soumaila : Une Perspective Neuro-mathématique et Éthique

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ABSTRACT

Introduction. This manuscript proposes a new approach to evaluate the rationality of artificial intelligence (AI) projects through an innovative formula called "Soumaila's formula". **Methodology.** Starting from the idea that AI seeks to mimic human intelligence (HI), the author uses an analogy with a flight of stairs to explain how AI can be streamlined. The formula is based on Blondel's law and takes into account the number of objectives of the AI and the age of the founder or promoter of the project. **Results.** The results obtained show a classification of AI rationality levels, providing a practical perspective to evaluate and guide the development of AI projects. The manuscript also addresses the ethical implications of AI and the need for robust frameworks to ensure fair and responsible use of AI technologies. **Conclusion.** This innovative research opens up new perspectives for the evaluation and ethical integration of AI in various fields.

RÉSUMÉ

Introduction. Ce manuscrit propose une nouvelle approche pour évaluer la rationalité des projets d'intelligence artificielle (IA) à travers une formule innovante nommée "Formule de Soumaila". **Méthodologie.** En partant de l'idée que l'IA cherche à imiter l'intelligence humaine (IH), l'auteur utilise une analogie avec une montée en escalier pour expliquer comment l'IA peut être rationalisée. La formule se base sur la loi de Blondel et tient compte du nombre d'objectifs de l'IA et de l'âge du promoteur du projet. **Résultats.** Les résultats obtenus montrent un classement des niveaux de rationalité de l'IA, offrant une perspective pratique pour évaluer et guider le développement de projets d'IA. Le manuscrit aborde également les implications éthiques de l'IA et la nécessité de cadres robustes pour garantir une utilisation équitable et responsable des technologies d'IA. **Conclusion.** Cette recherche innovante ouvre de nouvelles perspectives pour l'évaluation et l'intégration éthique de l'IA dans divers domaines.



INTRODUCTION

In this introductory part, I would first like to provide an overview of Neurology and discuss the challenges of research relating to so-called artificial intelligence inherent in neuroscience, mathematics, etc. And this before addressing my formula, which is intended to be a contributory and complementary tool for evaluating artificial intelligence projects, particularly on their

rational nature. That being said, Neurology is a discipline that has two main facets: the study of diseases of the nervous system (peripheral and central) and the management of these.

To meet the demands of the evolution of environmental and epidemiological factors, of science in general and technological factors in particular, Neurology is constantly assigned objectives to be achieved and



confronted with challenges to be met, thus being forced to broaden its range of actions and missions.

This gave rise to the notion of Neuroscience, giving the discipline a broader capacity to respond to the questions, doubts and concerns that are objectively raised with curiosity, passion and enthusiasm by scientific research subjects.

Neuroscience is a set of fields that focus its scientific research on the nervous system (NS) as a whole. So, in addition to the clinical field, basic sciences occupy an essential place in this field for a better understanding of phenomena in order to better respond to research topics relating to the SN, in particular the brain, and including a fundamental function which is intelligence!

The Spanish physician Juan Huarte wrote in 1575: "intelligence is the faculty of learning, judging and being creative" [1],

The term "intelligence" as we use it today is derived from the Latin *intelligere*, which means to understand, that is to say, "to grasp with the mind", to apprehend knowledge in a relevant way. It is the ability to grasp a large amount of information and to create relationships between it. It is therefore defined in terms of quantity: producing many links and quality: making relevant links. For a long time, intelligence has been associated with what allows man to progress through the acquisition of something new [2].

As for artificial intelligence (AI), it brings together all the theories and techniques that can be implemented to design computers and/or machines to simulate human intelligence. So AI allows different objects equipped with computer systems (cars, telephones, computers, connected objects) to perform tasks that were previously performed by humans. In addition, when we talk about AI, we systematically refer to neural networks and deep learning [3].

The objective of this article is to present the scientific community with a formula on the rationality of AI in order to help reframe this field which seems to have an unpredictable momentum.

METHODOLOGY

For methodical and pedagogical reasons, we can compare AI to a kind of staircase with its treads and the rest of its entire composition. Indeed, AI tries to simulate human intelligence (HI), or even substitute it (which is utopian) in order to achieve a faster, more reliable and automatic result without often human intervention (on the spot), depending on the field of AI. This amounts to raising the HI from a level 1 to another level (1+n) of the staircase in question, and a normal climb with comfort requires the application of Blondel's law, which is as follows:

$$M = 2h + g$$

"M" is the stride, "h" is the step height, and "g" is the tread. To say that a good step in climbing requires a step of a staircase corresponding to 2 step heights, plus a tread.

Thus, I was able to establish a new formula for assessing the level of rationality of an AI. Then, I gave my first name to this formula by naming it The Soumaila Formula, which I will explain and explain here. The principle is based on the fact that AI corresponds to the HI associated with a material likely to imitate it, moving it from a level

1 to a second 1+n. This can be translated into the following:

$$IA = IH \times (1+n)$$

The rest of the reasoning leads to Soumaila's formula (which consists of evaluating the rationality of an AI) in the following way.

$$(1+n) = IA/IH = 2h + g \text{ (Blondel's law)}$$

$IA/IH = 2h + g$ so $IAr = 2h+g/IH$ where IH corresponds to 100 in reference to the normal intellectual quotient (IQ) of an adult and g corresponds to the age of the founder, project leader or its promoter. This corresponds to $IAr = 2h+g/100$.

However, in Soumaila's formula, the height h corresponds to the number of objectives targeted for a particular AI and the lap g is equivalent to the real age of the founder or promising of the AI in question.

RESULTS

This unprecedented scientific work in the field of AI allowed me to exploit the results of my formula presented in the methodology part of this paper.

Table 1 : Interpretation of Soumaila's formula (Soumaila Boubacar, 2024)

IA Level	Rationality
0.20 to 0.25	Maximum
0.26 to 0.30	Very excellence
0.31 to 0.35	Excellence
0.36 to 0.40	Very good
0.41 to 0.45	Good
0.46 to 0.50	Average
0.51 to 1	Weak
NB: Less than 0.20 AI with paradoxical rationality	

Rational AI means that which is reasonable and which common sense could accept and conceive.

Paradoxical rationality here would mean an AI with an unlikely, or even zero, rationality because either the founder is of a very immature age (child) or an AI with many unrealistic objectives.

The closer IAr is to 1, the less rational the AI is.

The closer IAr is to 0, the more rational the AI is.

Let's take an example, a 35-year-old with a 3-goal AI, rationality is calculated as follows:

$$IAr = 2h+g/100 \text{ so } IAr = (2 \times 3 + 35)/100 = 0.41 \text{ (good rationality!)}$$

The level of rationality of an AI can change according to the change of owner (new promoter...) and according to the readjustment of the number of objectives for the AI.

DISCUSSION

Why do we need to streamline AI? This question arises as AI is increasingly a source of opportunities for innovation in the field of human health. Artificial intelligence (AI) is developing at an impressive speed in the field of healthcare.

Indeed, AI opens the way to new practices in diagnostic assistance, preventive medicine, individualized patient monitoring, support in the choice of therapy, and assistance in interpreting the results of additional examinations. Far from being a miracle solution, the

delegation of tasks to AI raises many ethical questions, including the supervision of algorithms, equal access to innovation and the use of patient data.

Generative AI refers to algorithms/techniques capable of creating content (text, images, video, etc.) by learning from collected data that it works to imitate.

Generative AI generates content that is similar to training data, but with a degree of novelty. It can mix real and false data.[4]. Artificial intelligence consists of implementing a set of techniques and algorithms aimed at simulating or reproducing, by machines, certain traits of human intelligence, such as reasoning or learning [5].

Let's go back to the basics, understanding the basics of AI means developing two essential concepts: neural networks and deep learning.

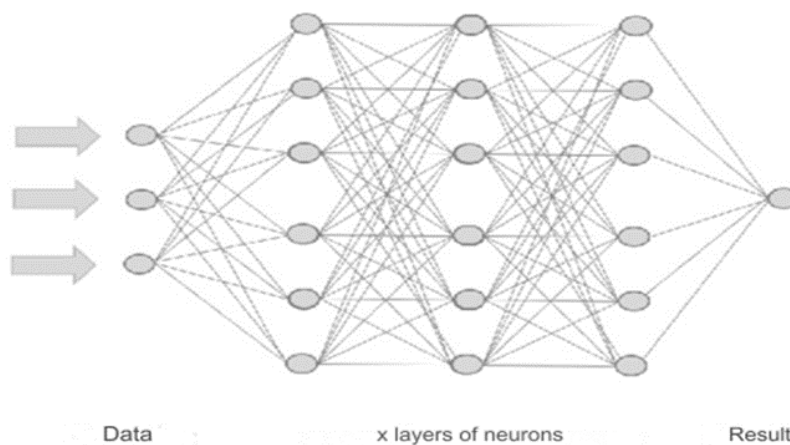


Figure 1: Artificial neural network [3]

A neural network works like a human brain, with neurons, synapses and interconnections. The larger the neural network, the smarter the machine.

As for Deep learning, it represents the computer's ability to learn through a neural network, the machine is provided with large volumes of data, it is told how to process it, what to do with it, how to vary the parameters, and the computer "learns" to create knowledge from the information it is provided [3].

Although artificial intelligence (AI) was born in the 50s, its use in the medical field is still quite recent. For several years now, the medical sphere has been undergoing a digital revolution (e-health) linked to the profusion of data available and generated as well as the ability to collect, store and process this data. These technological innovations are leading to a real paradigm shift for our healthcare system, with the digitisation of the entire care pathway. Doctors are already using AI as part of assistance systems for the interpretation of images, whether they are X-rays, CT scans, MRIs, photographs of lesions in dermatology or anatomical pathology slides. The medical sector is one of the fields of application where the use of AI is developing at an impressive speed, especially in e-health. The question is not whether AI will be used in the context of care, since it has already begun, but how can it be supervised? Far from being a silver bullet, AI raises many ethical questions, including the

oversight of algorithms, equal access to innovation, and the use of data from practitioners and patients. Regardless of its use in healthcare, AI is seen as a breakthrough that will save caregivers time and improve human performance for the benefit of the patient.

Artificial intelligence (AI) is transforming various scientific fields, including medical research, by enabling faster data analysis and more accurate forecasts. However, the age of researchers can influence the adoption and integration of AI in their work. Young researchers, who are often more familiar with digital technologies, are more inclined to use AI tools, while older researchers may find it difficult to adapt to these new technologies. The ethics of AI remains a major concern, as the use of algorithms can lead to bias, privacy violations, and questionable automated decisions. It is crucial to develop strong ethical

frameworks to guide the use of AI, ensuring transparency, accountability, and fairness. Intergenerational collaboration and ongoing education are key to overcoming age-related barriers and promoting the ethical use of AI in research. Ultimately, the seamless integration of AI into research requires careful attention to ethical implications and adequate training for all researchers. Finally, it is still difficult to predict whether AI will remain a "safety net" for the doctor or whether it will supplant him [5].

CONCLUSION

This formula allows for a rationalization of AI development projects in general and those among them related to health, which are therefore quite sensitive and ethical. The formula thus reinforces the scientific data on AI, its development of which is a dream of, among others the researchers that we are, but with a lot of concern about its application in the daily lives of humans.

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