

Giselle Beiguelman, Carnívoras, da série Venenosas, Nocivas e Suspeitas, 2024. Imagens geradas com Inteligência Artificial (LLM), 50 cm x 50 cm



# INTELLIGENCE AND ARTIFICIAL INTELLIGENCE

The 21st has been hailed as the century of biology. Craig Venter and Daniel Cohen (2004) formulated this idea «If the 20th century were the century of physics, the 21st century would be the century of biology. While combustion, electricity and nuclear energy defined scientific advancement in the last century, The new biology of genomic research – which will provide the complete genetic blueprint for a species, including the human species – will define the next.” One may question whether recent advances in Artificial Intelligence, and their potential for transforming current practices in society, do not challenge the supposedly profound impact of biological sciences as a dominant field of research. Evolving with ups and downs since the last century. AI has shown its potential to interfere with decision-making and decisions in many aspects of human activity. Recent developments in natural languages challenge the old perception that the replacement of human labor by machines would be restricted to robots performing unsafe or tedious mechanical tasks. The recent pandemic has brought changes to human practices that minimize the need for personal presence in the workplace, exponentially spreading working methods that were previously restricted to select environments, providing an additional boost to the changes caused by AI.

Some underlying ethical issues involve the control of decision-making processes by algorithms that are proprietary, designed, and knowledge restricted to a small number of large conglomerates; the influence of the new division of labor between nations and individuals, accelerating current trends of concentration and exclusion and hyper-distribution of wealth; the risks of attributing decisions to machines and programs without human criteria and many others. According to Duarte (2019), facial recognition algorithms can already identify, for example, the entire group of four million subway users in a city like São Paulo, so recently proposed as a security tool (to «protect»

subway users). system) and blocked after a legal dispute. It should also be mentioned that the set of uncertainties about the impact of AI on society includes the possibility that there are deeper risks to humanity, linked to the direct manipulation by machines of the very «operating system» on which our civilization is built: our language. Smaller-scale examples of the type of difficulties that will likely be encountered are social media algorithms, which have had an unexpected and still little-understood impact on various aspects of our social organization. Note that these algorithms are much simpler than the generalist AI that is now advertised.

The Institute for Advanced Studies in Paris and Belo Horizonte organized a project to discuss and coordinate a group of researchers called “Intelligence and Artificial Intelligence”. Due to the Covid crisis, the project was extended from 2020 to 2023. The relevance and depth of the discussions motivated us to propose and edit this issue of the UFMG Magazine, to which we draw your attention.

The potential for transformation and improvements embedded in AI systems is showing more and more applications. Recently developed natural language algorithms have brought surprising new possibilities, from preparing a judicial report to solving an exam, advancing to the ability to write a computer language program for different specific applications. The AI revolution is part of a larger context of technologies that drive digital transformation in the global economy, industry and governments - these digital transformation technologies, including AI, present risks and opportunities. The current challenge for society is to develop an environment where AI can be a tool to improve quality of life, impacting energy, food production, health and medicine, disaster response, justice and politics.

The guest edition on the topic of Intelligence and Artificial Intelligence publishes articles to discuss these positive and negative impacts, aspects and applications of AI technology, and reflections on all aspects of natural and artificial intelligence. The topics for this issue are the development of techniques now collectively treated as AI, their interfaces with neurosciences and cognitive sciences, transformative applications of AI in economic activities, ethical aspects and impacts on governance, work and automation of cognitive and intellectual tasks, limits of control and freedom, government practices, health and educational applications.

Natural language processing is an area of AI that deals with language models. An

interesting task is topic modeling from text. Using this technique, we used AI to automatically categorize and group the 25 articles in the edition into thematic areas (Figure 1). The result was the emergence of four very coherent groupings for the 25 works that can be seen in this thematic issue of the UFMG Magazine:

Ethics, philosophy and social aspects

Generative art and digital arts

Legal aspects and practical impacts of AI

Heuristics and Applications in mobility, logistics and industry

We invite you to read the articles published in this edition!

We would like to express special thanks to the PhD student in Computer Science at UFMG, Giulia Zanon de Castro, for generating the clusters through topic modeling with an LLM (Large Language Model) language model.

A great read to everyone!

Frederico Gadelha Guimarães

Estevam Barbosa de Las Casas

André Fujita

Toshio Fukuda

1 A traditional expression of Brazilian literature containing rimed poems created from oral stories.

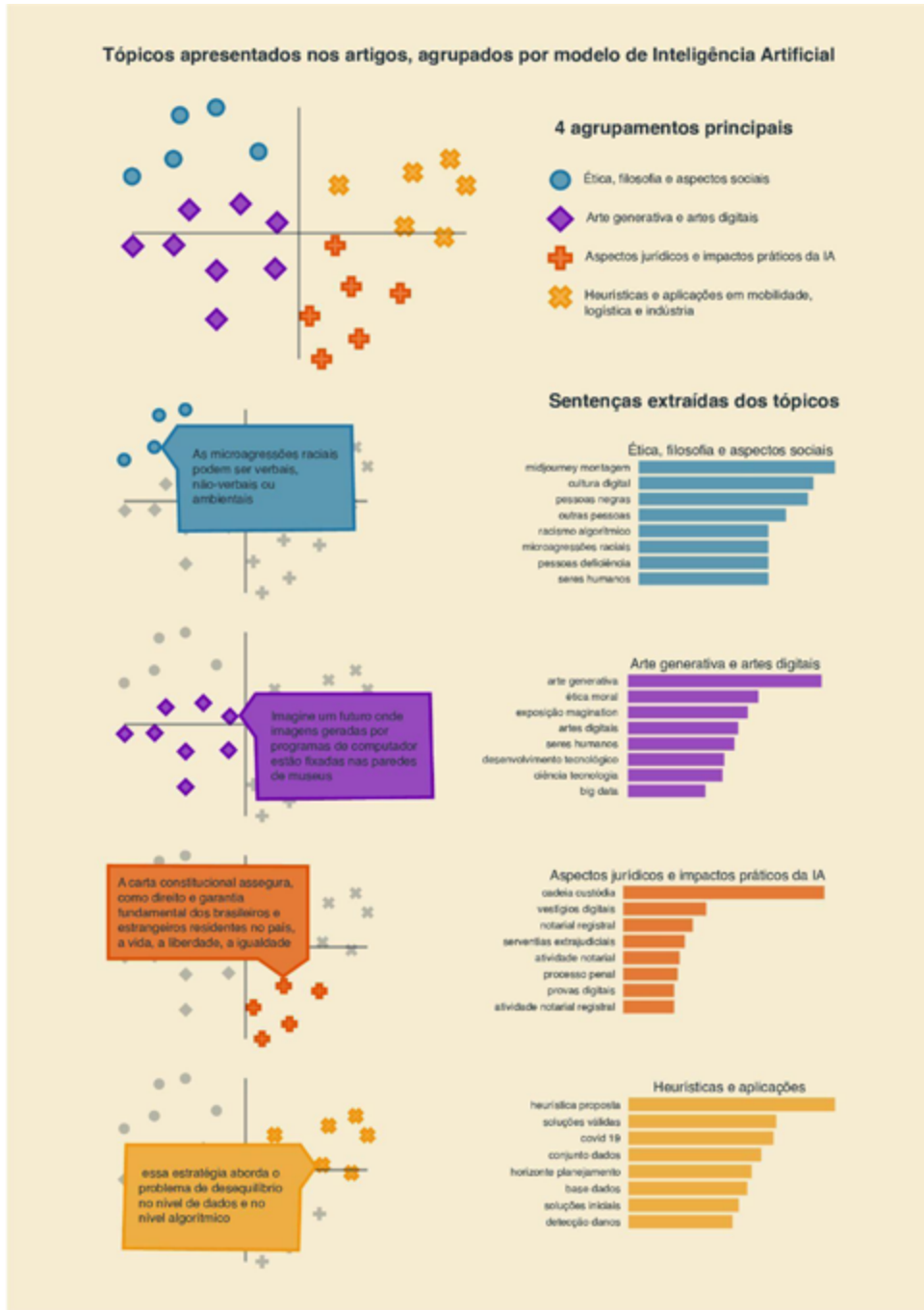


Figure 1 - Groupings of articles. Source: prepared by Giulia Zanon de Castro (2024).

## References

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