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Regulation of Artificial Intelligence and Penal Factors: Legal and Ethical Challenges

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Abstract

This bibliometric review analyzes the scientific production related to the variables Artificial Intelligence, Regulation and Ethics registered in the Scopus database during the period 2018-2023. The main objective of the study was to identify and characterize the volume of publications, achieving a total of 552 documents. The information collected was organized by graphs, categorizing it by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. The results reveal that the United States is the country with the highest number of publications, reaching a total of 99 scientific papers. The area of Computer Science stood out as the most prolific in terms of bibliographic contribution, with 236 documents. Likewise, Journal Articles represented 50% of total publications. This analysis also includes a qualitative study on the positions of various authors in relation to the topics addressed, providing a comprehensive view of the current state of research in this field. Among the main conclusions, it is stated that the regulation of AI is an evolving field that requires collaboration between legislators, technologists, ethicists and society in general, and managing flexible regulations is completely necessary taking into account the changing and constant evolution of everything related to AI today.

Keywords: *Artificial Intelligence, Regulation, Ethics.*

INTRODUCTION

Currently, the regulation of Artificial Intelligence (AI) faces multiple challenges in terms of legal and ethical issues, which give rise to a debate that requires balanced considerations and to be taken point by point with absolute neutrality in favor of the growth in technological terms of each of the tools at the service of people. so it is possible to establish the following aspects to take into account:

In the legal field, responsibility and accountability, since it is crucial to establish legal frameworks that clarify the responsibility, whether of the developer, the user or the manufacturer of the AI, since it is precisely one of the most important legal challenges, when determining liability at the time of a failure or an error that is detrimental to the physical or mental integrity derived from said error, even more so when it comes to autonomous AI devices.

In terms of privacy and data protection, the handling of large amounts of information and its treatment requires great responsibility from the operators of the same, since they constitute property for people and their violation represents a delicate crime. Therefore, it is essential to establish strong ethical principles in the development and implementation of AI. Fairness, transparency, privacy, and security must be present at all stages of AI

To ensure the ethical and legal use of AI, a collaborative and multidisciplinary approach needs to be promoted. However, the ethics of artificial intelligence must be addressed together with the scientific community, researchers and society in general. Governments must establish regulations and ethical frameworks that comprehensively guide the development and use of AI responsibly.

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Finally, the regulation of artificial intelligence focuses on maximizing benefits while reducing risks and protecting users' fundamental values and rights. the ethical use of AI should not only be a technical issue, but also a matter of social and moral responsibility that requires the collaboration of all the authors involved. Doing so would result in greater regulation of AI benefiting its users and respecting fundamental ethical and legal principles. For this reason, this article seeks to describe the main characteristics of the compendium of publications indexed in the Scopus database related to the variables Artificial Intelligence, Regulation and Ethics, as well. Such as the description of the position of certain authors affiliated with institutions, during the period from 2018-2023.

METHODOLOGY

This bibliometric review was carried out with the aim of analyzing the scientific production related to the variables Artificial Intelligence, Regulation and Ethics, using the Scopus database during the period 2018-2023. The steps followed for this review are detailed below:

Definition of the Objective and Scope

The main objective was to identify and characterize scientific publications in the study area. The period of analysis spanned from January 2018 to December 2023, and all relevant publications in English and Spanish were included.

Literature Search

A comprehensive search was conducted in the Scopus database using the following keywords: "Artificial Intelligence", "Regulation", "Ethics". Boolean operators were used to refine the results (AND):

TITLE-ABS-KEY (artificial AND intelligence, AND regulation, AND ethics) AND PUBYEAR > 2017 AND PUBYEAR < 2024

The initial search yielded a total of 552 articles.

Selection of Studies

The following inclusion criteria were applied:

Relevance Of The Topic

The studies chosen for analysis are in accordance with the objective set out in this document, ensuring that the results obtained are concise, clear, objective and coherent with the purpose proposed.

Publication Date

Studies published within the period between 2018-2023 are included.

Type Of Study

The documents reported in Scopus are analyzed, without distinction of their type. Journal Articles, Conference Articles, Books, Book Chapters, Reviews, among others.

Language

The search is carried out in Scopus with the variables in English, ensuring that the results are reported in that language, and thus ensuring the universality of the documents consulted.

Post Source

Studies published in peer-reviewed scientific journals are preferred, guaranteeing a minimum standard of quality and academic rigor.

Data Analysis

Various bibliometric analyses were carried out, including:

Analysis of co-occurrence networks: to visualize the relationships between studies cited together. The data was analyzed and visualized using VOSviewer software, allowing the creation of network maps and distribution graphs.

Publication Count: To determine the number of studies published per year.

Publications by country of origin: In order to know the distribution of scientific production according to its country of origin.

Influence Of The Areas Of Knowledge: to identify the interference of the different areas of knowledge in the execution of research work related to the variables studied.

Publication Type: To determine the number of publications corresponding to each type of format accepted in Scopus.

Data Visualization

Graphs were prepared to represent the distribution of publications by year, country, area of knowledge and type of publication.

In addition, heat maps were generated to visualize the density of publications by country and network diagrams to show the co-occurrence of keywords.

Interpretation and Discussion of Results

The patterns and trends observed in the bibliometric data were interpreted, comparing them with previous studies and discussing their implications for the field of research.

Emerging areas of research and gaps in the current literature were identified.

RESULT

Word Co-Occurrence

In the following figure, it is possible to identify a cattle diagram to show the co-occurrence between the keywords identified in the data search for the proposed bibliometric analysis.

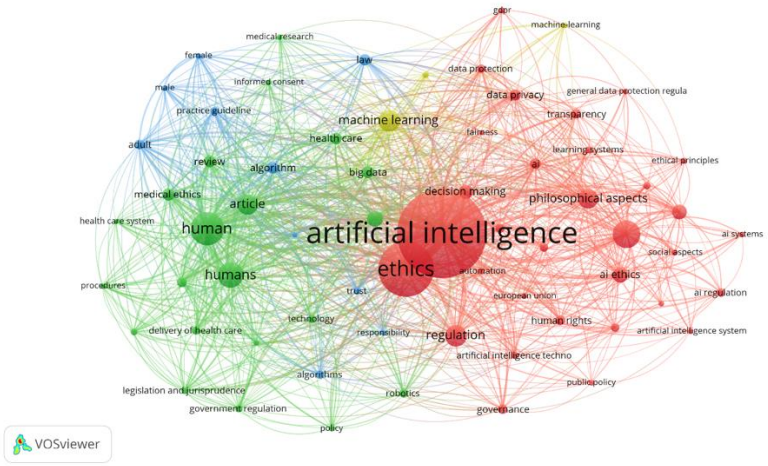

Figure 1. Word co-occurrence

Source: Own elaboration (2024); based on data exported from Scopus.

This term co-occurrence map provides a clear view of how different topics and terms are interrelated in the scientific literature on artificial intelligence. The red, green, and blue term clusters show different subject areas, while core nodes such as Artificial Intelligence and Ethics stand out as key topics of discussion. Artificial

Intelligence was the most influential keyword in the execution of research projects published in journals indexed in Scopus. Its frequency shows a high usability within the research identified for analysis within this document and presents a significant proximity to keywords such as Ethics, Regulation, Decision Making and Psychological Aspects. It is important to highlight that keywords such as Health Care, Human, Medical Ethics, constitute an important number of works, which allows us to infer that the legislation that could be regulating the use of Artificial Intelligence for multiple purposes, hopes to control aspects that have to do with health care in people, either due to its prolonged use, or by creating and using Artificial Intelligence tools that have functions that allow self-medication and others.

Post Count

Figure 2 shows how scientific production is distributed according to the year of publication.

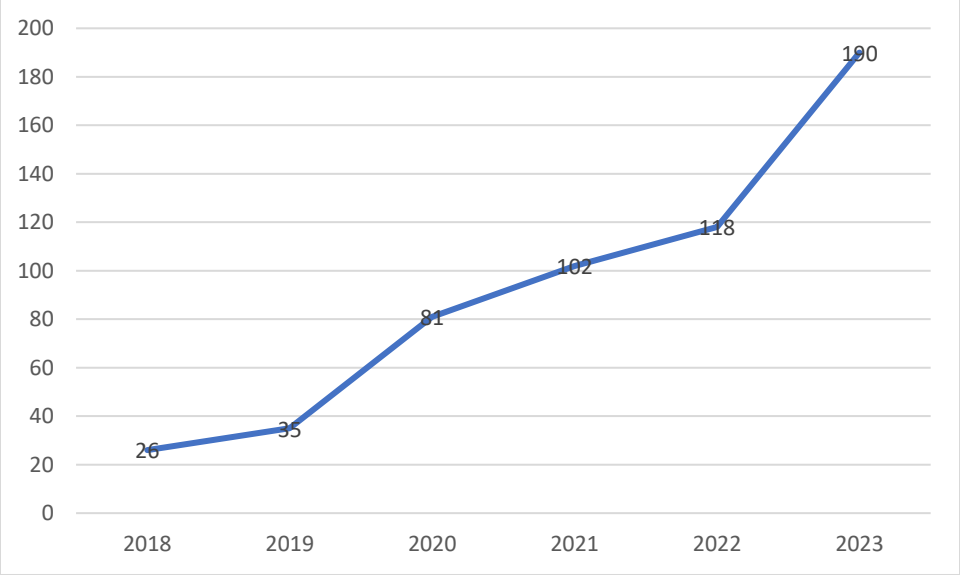

Figure 2. Annual distribution of scientific production

Source: Own elaboration (2024); based on data exported from Scopus

As evidenced in the figure above, the growth of scientific production around the variables Artificial Intelligence and Ethics has had a great growth in terms of the volume of annual records, in 2018 the global was 26 publications while in 2023 there were 190, which allows us to infer that issues related to Ethics within the use of AI tools increasingly arouse the interest of the scientific community. And this is thanks to the technological advances that year after year surprise the world more and more frequently and that raise the need for rules that regulate their use. Among the most outstanding articles of this last year, is the one entitled "Ethics of artificial intelligence and challenges in healthcare applications: an exhaustive review in the context of the European mandate of the GDPR" whose purpose was to review and analyze everything related to ethics in terms of AI in healthcare, specifically in nursing, according to the European General Data Protection Regulation (GDPR) The analysis examines the application of the GDPR in AI projects in the healthcare sector, ranging from data collection to decision-making, and revealing the ethical implications at each stage. A comprehensive review of the literature classifies research into three main categories: Ethical Considerations in AI; Practical Challenges and Solutions for AI Integration; and Legal and Policy Implications of AI.(Mohammad Amini, y otros, 2023)

Publications By Country Of Origin

Figure 4 shows how scientific production is distributed geographically.

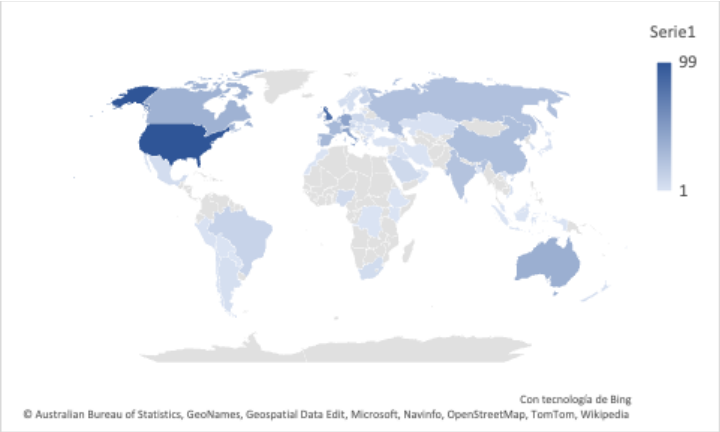

Figure 3. Geographical distribution of scientific production.

Source: Authors' elaboration (2024); based on data provided by Scopus.

The figure above shows the distribution of scientific production by country of origin. The map uses a color scale to indicate the level of scientific production in each country, with darker colors representing higher production and lighter colors representing lower production. The United States was the country with the highest number of publications with a total of 99 records in Scopus during the period 2018-2023 that address the debate between advances in AI and the legal and ethical aspects of its use in different areas of knowledge. Brazil was the Latin American country with the highest participation with a total of 12 publications in total, among which is the article entitled "Legal, regulatory and ethical frameworks for the development of standards in artificial intelligence (AI) and autonomous robotic surgery" whose objective was to advance the debate on the potential of AI and autonomous robotic surgery with a particular focus on ethics, regulation and legal aspects such as civil law, international law, tort law, liability, medical malpractice. To comply with it, the authors conducted an exhaustive literature search regarding AI and its applications in military and medical technology, and devices designed for cybersecurity. Within the main discussion, the authors provide the debate on the unique challenges faced by robotic surgery in relation to proposals for AI in general (e.g., explainable AI) and machine learning specifically (e.g., black boxes). In the same way, they establish three categories within the responsibility conceived in the use of AI, which were Accountability, Responsibility and Guilt, the latter being the one that generated the greatest ambiguity since it is foreseen, by the same authors, that, in the near future, a surgical robot will be able to learn and perform routine operational tasks. which can then be supervised by a human surgeon. This represents a surgical parallel with self-driving vehicles.(O'Sullivan, y otros, 2019)

Distribution Of Scientific Production By Area Of Knowledge

Figure 4 shows the distribution of scientific production, according to the prevalence of theories in different areas of knowledge.

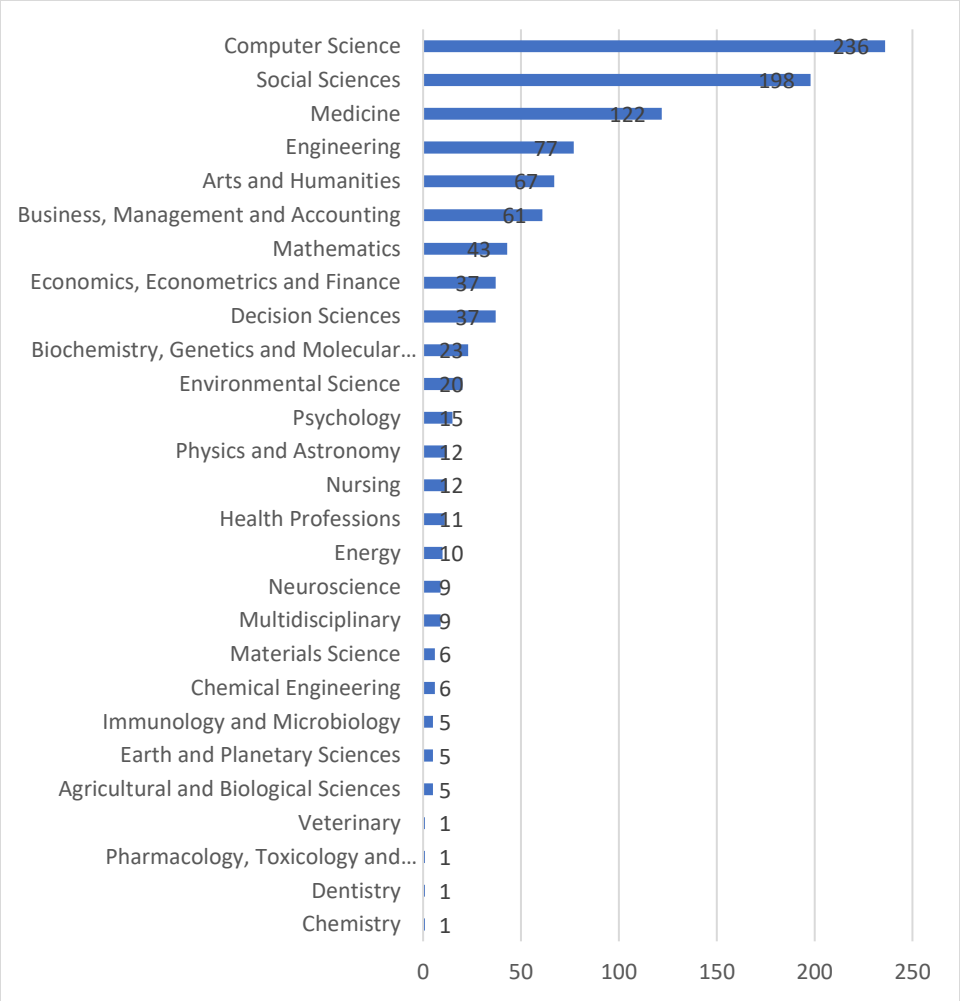

Figure 4. Distribution of scientific production by area of knowledge.

Source: Authors' elaboration (2024); based on data provided by Scopus.

Computer Science was the area of knowledge with the greatest influence in the preparation of research papers related to the study of AI and the ethical and legal debate with a total of 236 publications, followed by Social Sciences with 198 and Medicine with 122. It must be explained in this world that, thanks to the multidisciplinary nature of the proposed topic, it is possible for the same article to be registered by one, two or more areas of knowledge, which explains why the total number of scientific documents identified does not coincide with the number of units recorded in the previous figure. One of the most impactful research papers recorded in the area of computer science was "Bridging the Gap Between Ethics and Practice: Guidelines for Trustworthy, Secure, and Trustworthy Human-Centered AI Systems," which aimed to try to put an end to the debate between ethical principles of human-centered AI and practical steps for effective governance. The article has a total of 256 citations since its publication in 2020 and helps to establish key aspects between the ethical component and the use of AI tools that have been discussed so much historically since the first technological advances that allowed practices that have always been carried out by human beings.(Shneiderman, 2020)

Type of Publication

In the following graph, you will see the distribution of the bibliographic find according to the type of publication made by each of the authors found in Scopus.

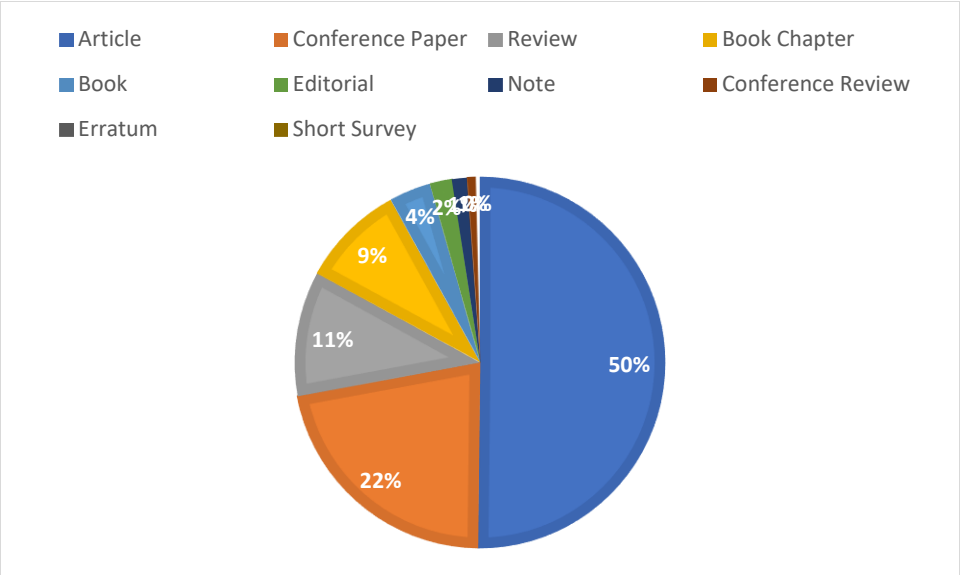

Figure 5. Type of publication.

Fountain: Own elaboration (2024); based on data provided by Scopus.

The graph reflects a diversity of types of scientific publications, with a clear predominance of articles and conference papers. Reviews and book chapters also have a significant presence. The other types of publications, although less frequent, complete the panorama of how academic and scientific work is distributed. Journal Articles represent 50% of the total publications, it was the most common and dominant type of publication in this distribution. Secondly, Conference Articles represent 22% of the total publications. Reviews, in third place, constitute 11% of the total publications, which allows us to infer a significant number of publications dedicated to reviewing and summarizing the existing literature in a particular field.

CONCLUSION

Thanks to the bibliometric analysis carried out in this document, it is possible to conclude that, in terms of the geographical distribution of scientific production around the variables Artificial Intelligence, Regulation and Ethics, the United States was the country with the highest number of publications registered in Scopus during the period between 2018 and 2023 with a total of 99 documents, followed by the United Kingdom with a total of 81 publications. As for the areas of knowledge with the greatest influence on the writing and publication of research papers related to the topic proposed for this article, Computer Sciences, Social Sciences and Medicine stand out. From the above, it can be said that the current debate, with greater intensity, focuses on medical procedures carried out with the support of technological tools. Therefore, AI regulation is an evolving field that requires collaboration between legislators, technologists, ethicists and society in general, and handling flexible regulations is entirely necessary considering the changing and constant evolution of everything related to AI today. Therefore, it is crucial to develop frameworks that not only address current legal and ethical challenges, but are also flexible enough to adapt to future innovations. The key is to find a balance that maximizes the benefits of AI while minimizing its risks and protecting fundamental human rights.

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