Developing Intelligent Chatbots: Driving Interaction And User Satisfaction Through Conversational Artificial Intelligence

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Summary

A documentary review was carried out on the production and publication of research papers related to the study of the variable CHATBOT and CONVERSATIONAL ARTIFICIAL INTELLIGENCE. The purpose of the bibliometric analysis proposed in this document was to know the main characteristics of the volume of publications registered in the Scopus database during the period 2017-2022, achieving the identification of 374 publications. The information provided by this platform was organized through graphs and figures categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics have been described, the position of different authors towards the proposed theme is referenced through a qualitative analysis. Among the main findings made through this research, it is found that India with 56 publications was the country with the largest scientific production registered in the

name of authors affiliated with institutions of that nation. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material referring to the study of the Chatbot and Conversational Artificial Intelligence was Computer Science with 266 published documents, and the Type of Publication most used during the period indicated above were Conference Articles with 57% of the total scientific production.

Keywords: Chatbot, Customer Satisfaction, Artificial Intelligence, Conversational Artificial Intelligence.

1. Introduction

The rapid development of AI artificial intelligence has created a new era of human-computer interaction, the most visible symbol of which is the development of intelligent chatbots. Powered by advanced artificial intelligence algorithms and natural language processing (NLP) technologies, these virtual conversational agents have become indispensable tools across industries, changing the way businesses interact with customers and users interact with the internet. The development path of intelligent chatbots is characterized by continuous innovation based on the desire to increase user satisfaction through fluid and human-like interactions.

One of the main goals of developing intelligent chatbots is to increase user satisfaction. Traditional human-machine interfaces are often frustrating due to their impersonal and rigid nature. Smart chatbots try to bridge this gap by providing a more natural conversational interface. Users can interact with these chatbots using everyday language, eliminating the need to learn complex commands or interfaces. As chatbots are better able to understand and generate human-like text, user interactions become more intuitive and satisfying. Artificial intelligence, especially machine learning, has played a key role in increasing user satisfaction with chatbots. Using techniques such as sentiment analysis, context awareness, and personalized recommendations, chatbots can tailor their responses to the needs and emotions of individual users. This adaptability creates a sense of connection and empathy that helps improve user satisfaction.

With the continuous development of artificial intelligence, the development of chatbots has entered the field of neural networks and generative models. These models can produce very consistent and context-sensitive responses that are often indistinguishable from human-generated text. The emergence of these types of technologies has led to the adoption of AI-powered virtual assistants in all areas, including customer service, healthcare, e-commerce, and more. These chatbots can handle complex queries, provide accurate information, and even engage users in casual conversations.

However, there are still challenges to developing intelligent chatbots and increasing user satisfaction. Ensuring AI works ethically, minimizes bias, and preserves data privacy remains a key challenge. Another current challenge is finding the right balance between automation and human intervention, as certain interactions may require skills and understanding that only humans can provide. In conclusion, the development of intelligent chatbots shows significant advances in artificial intelligence and natural language processing. From their beginnings as rule-based responders to today's AI-powered conversational agents, chatbots have vastly improved user satisfaction through more intuitive and human interactions. As technology continues to evolve, the potential for improved and more satisfying interactions with intelligent chatbots is certainly evident. 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 CHATBOT and CONVERSATIONAL ARTIFICIAL INTELLIGENCE, as well. As the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022.

2. General Objective

Analyze from a bibliometric and bibliographic perspective, the elaboration and publication of research works in high impact journals indexed in Scopus database on the variables CHATBOT and CONVERSATIONAL ARTIFICIAL INTELLIGENCE during the period 2017-2022.

3. Methodology

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the CHATBOT study and CONVERSATIONAL ARTIFICIAL INTELLIGENCE. On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, starting from a bibliographic approach that allows describing the position of different authors against the proposed topic. It is important to note that the entire search was performed through Scopus, managing to establish the parameters referenced in Figure 1.

3.1. Methodological design

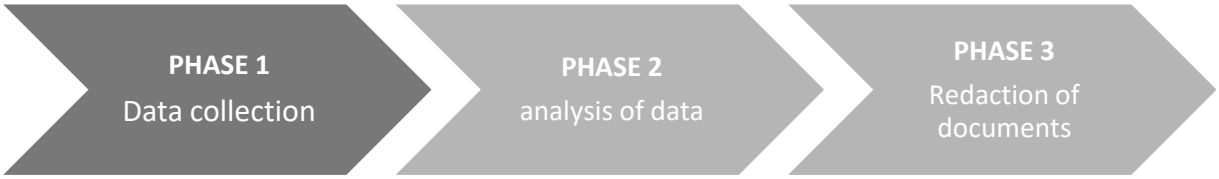

Figure 1. Methodological design
Source: Authors.

3.1.1 Phase 1: Data collection

Data collection was executed from the Search tool on the Scopus website, where 374 publications were obtained from the choice of the following filters:

TITLE-ABS-KEY (chatbot, AND conversational AND artificial AND intelligence) AND PUBYEAR > 2016 AND PUBYEAR < 2023

- Published documents whose study variables are related to the study of the variables CHATBOT and CONVERSATIONAL ARTIFICIAL INTELLIGENCE
- Limited to the period 2017-2022.
- Without distinction of country of origin
- Without distinction of area of knowledge.
- Regardless of type of publication.

3.1.2 Phase 2: Construction of analysis material

The information collected in Scopus during the previous phase is organized and subsequently classified by graphs, figures and tables as follows:

- Co-occurrence of words.
- Country of origin of the publication.
- Area of knowledge.
- Type of publication.

3.1.3 Phase 3: Drafting of conclusions and outcome document

In this phase, we proceed with the analysis of the results previously yielded resulting in the determination of conclusions and, consequently, the obtaining of the final document.

4. Results

4.1 Co-occurrence of words

Figure 2 shows the co-occurrence of keywords found in the publications identified in the Scopus database.

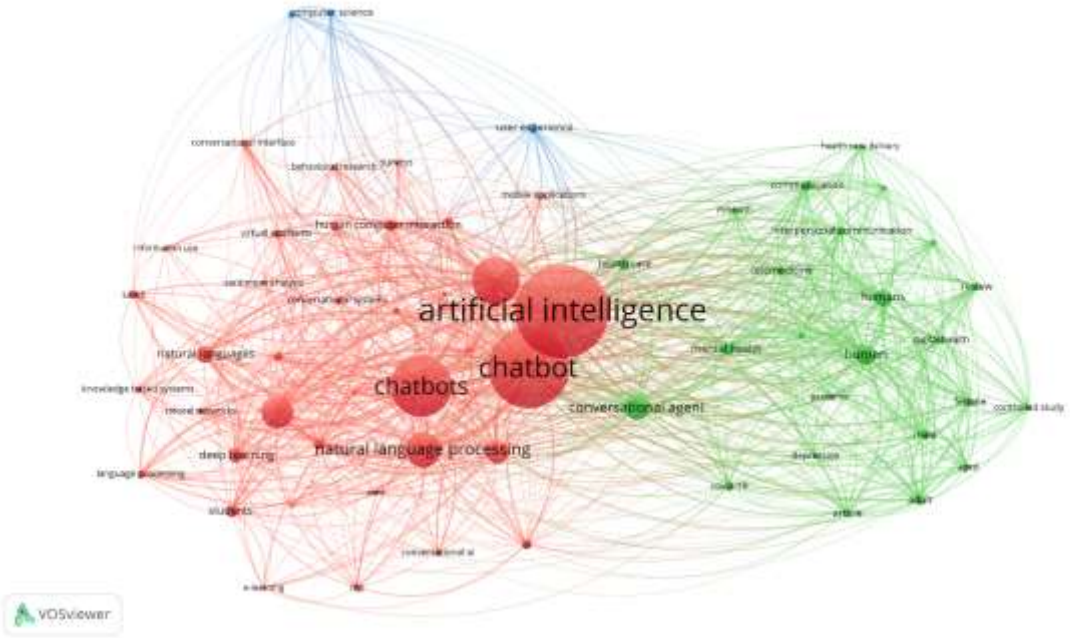

Figure 2. Co-occurrence of words
Source: Own elaboration (2023); based on data exported from Scopus.

Artificial Intelligence was the most frequently used keyword within the studies identified through the execution of Phase 1

of the Methodological Design proposed for the development of this article. Chatbot is also among the most frequently used variables, associated with variables such as Natural Language, Conversational Systems, Communication, Deep Learning, Students, Processed Language. The development of intelligent chatbots and their impact on user satisfaction through artificial intelligence is a remarkable synergy between technological innovation and human-centered design. As AI models continue to evolve, chatbots will improve understanding of user needs, personalized interactions, and genuine connections. The journey from rule-based systems to emotionally intelligent conversational agents underscores AI's transformative ability to reshape the digital landscape, ultimately improving user satisfaction and integrating AI more seamlessly into our daily lives.

4.2 Distribution of scientific production by country of origin

Figure 3 shows how scientific production is distributed according to the country of origin of the institutions to which the authors are affiliated.

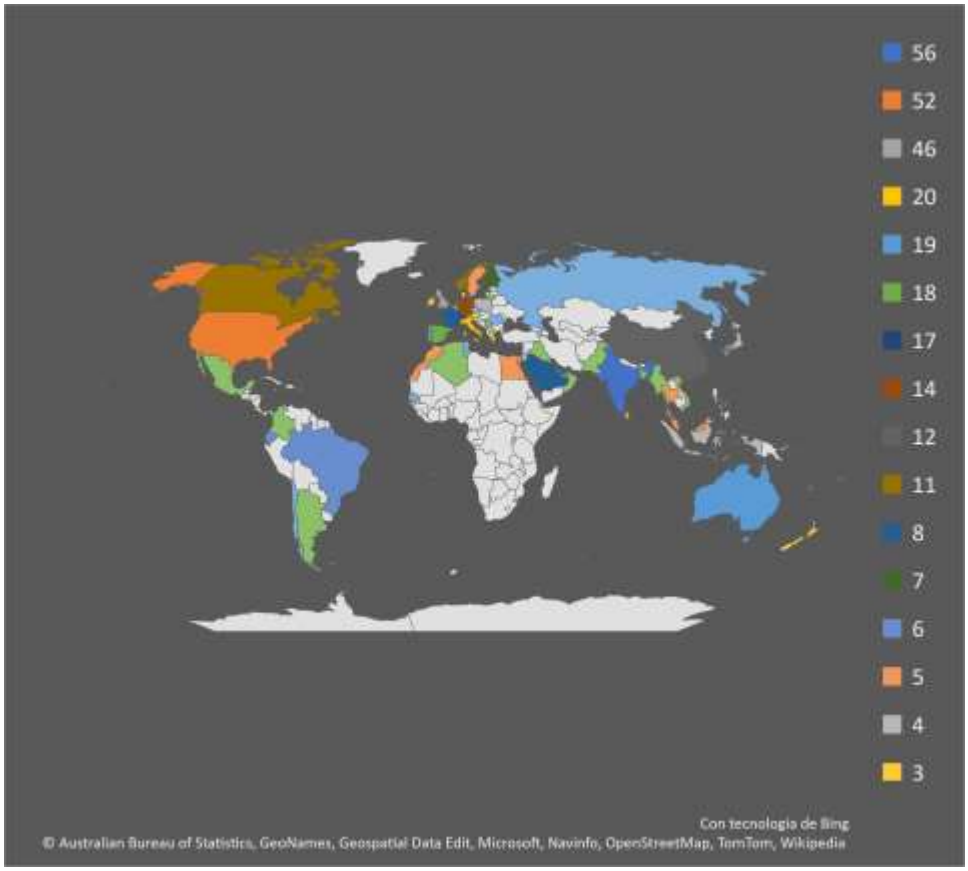

Figure 3. Distribution of scientific production by country of origin.
Source: Own elaboration (2023); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, records from institutions were taken into account, establishing India, as the country of that community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 56 publications in total. In second place, the United States with 52 scientific papers, and the United Kingdom ranked third presenting to the scientific community, with a total of 46 papers among which is the article titled "Hope, tolerance and empathy: the emotions of employees when using an AI-powered chatbot in a digitized workplace" This research focuses on understanding employees' emotional experiences when using an AI chatbot as a specific type of AI system that learns from how it is used and is conversational, showing a social presence to users. The research questions how and why employees experience emotions when using an AI chatbot, and how these emotions impact its use. Design/methodology/approach: An interpretive case study approach and inductive analysis were adopted for this study. Data were collected through interviews, document review and observation of use. Findings: The study found that employee evaluations of chatbots were influenced by the form and functional design of AI chatbot technology and its organizational and social context, resulting in a broader repertoire of evaluations and multiple emotions. In addition to positive and negative emotions, users experienced emotions of connection. The findings show that the existence of multiple emotions can encourage the continued use of an AI chatbot. Originality/value: This research expands the literature on information systems on emotions by focusing on the lived experiences of employees in the actual use of an AI chatbot, considering its characteristics and its organizational and social context. The findings inform the emerging literature on AI.(Gkinko, 2022)

4.3 Distribution of scientific production by area of knowledge

Figure 4 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

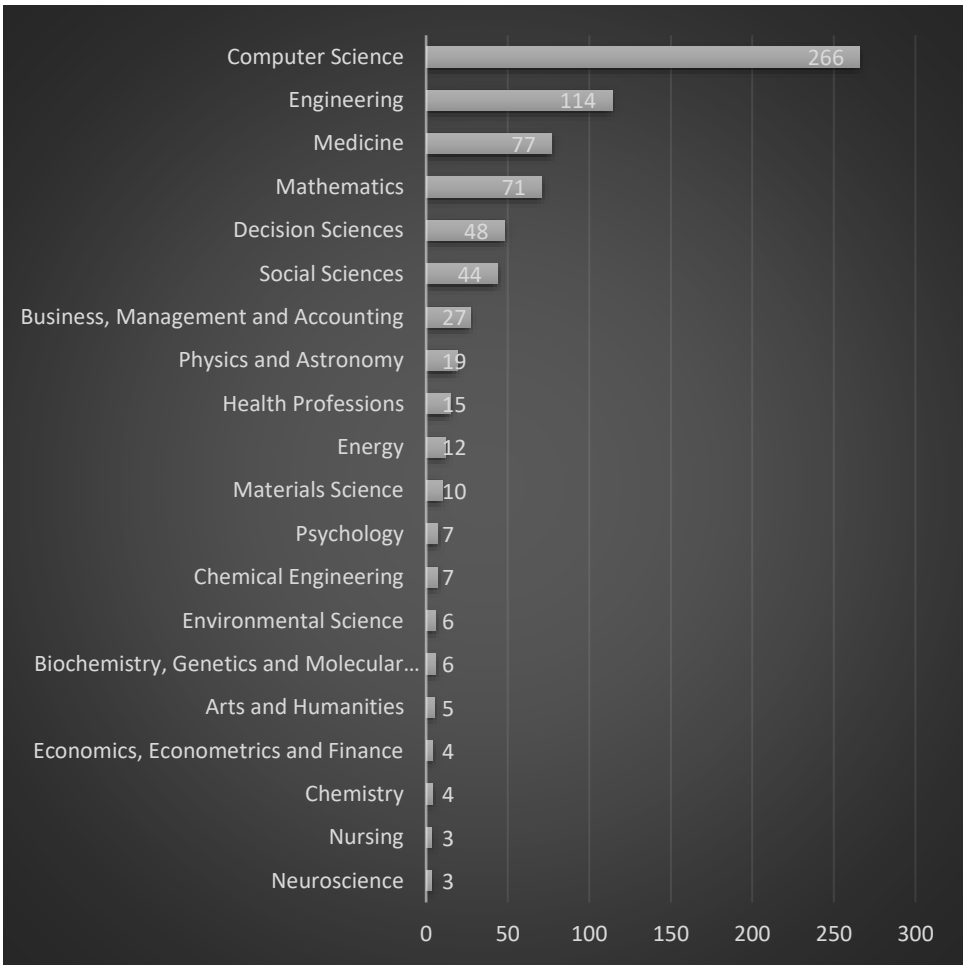

Figure 4. Distribution of scientific production by area of knowledge.
Source: Own elaboration (2023); based on data provided by Scopus

Computer Science was the area of knowledge with the highest number of publications registered in Scopus with a total of 266 documents that have based their variable methodologies CHATBOT and CONVERSATIONAL ARTIFICIAL INTELLIGENCE. In second place, Engineering with 114 articles and Medicine in third place with 77. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by the Computer Science area entitled "A systematic review on the intercultural dimensions, humor and empathy in conversational chatbots: the case of the

acquisition of a second language" the objective of this study, previous studies from 2012 and 2022 are collected and analyzed from several popular databases, including Web of Science, ProQuest, IEEE, and ScienceDirect. This study found that three dimensions, such as cultural, empathic, and humorous, have a positive influence on the application of AI L2 chatbots to improve student learning outcomes. This study also found that the development of an AI chatbot in L2 education has a lot of room for improvement. Several recommendations are made to improve the use of AI L2 chatbots including integrating cross-cultural empathic responses into L2 conversational chatbots, identifying how students perceive and react to learning content, and investigating the effects of cross-cultural humor on students' language proficiency.(Zhai, 2022)

4.4 Type of publication

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

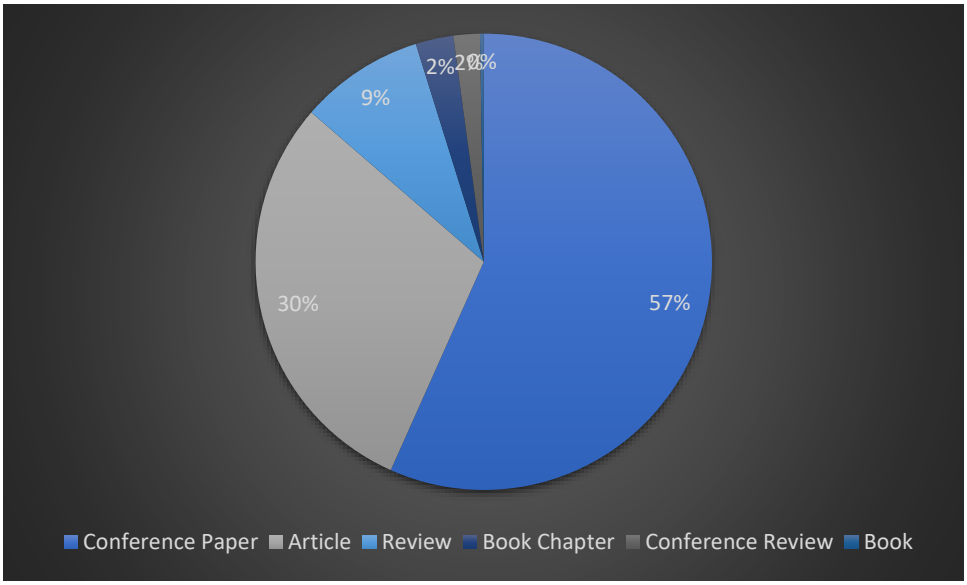

Figure 5. Type of publication.
Source: Own elaboration (2023); based on data provided by Scopus.

The type of publication most frequently used by the researchers referenced in the body of this document was entitled Session Papers with 57% of the total production identified for analysis,

followed by Journal Article with 30%. Journal are part of this classification, representing 9% of the research papers published during the period 2017-2022 in journals indexed in Scopus. In this last category, the one entitled "Design for trust: a set of design principles to increase trust in the chatbot" stands out In this study, our goal was to explore a set of design principles to build trust between users and conversational agents. Based on extensive research on trust, we proposed five design semantics and 10 design principles, and verified their effectiveness through experiments. The result of the experiment suggests that our design principles can improve users' trust towards the chatbot, thus providing guidance and suggestions for designing more reliable chatbots in the future.(Guo, 2022)

5. Conclusions

Through the bibliometric analysis carried out in the present research work, it was established that India was the country that has the largest number of records published for the variables CHATBOT and CONVERSATIONAL ARTIFICIAL INTELLIGENCE. with a total of 56 publications in Scopus database. Similarly, it was established that the application of theories framed in the area of Computer Science, were used more frequently in the impact generated by the evolution of intelligent chatbots driven by artificial intelligence, this new implementation has marked the beginning of a new era of interaction and user satisfaction. This progress has significantly improved user experiences across various industries. Artificial intelligence has enabled chatbots to not only understand the context and nuances of conversations, but also adapt and learn from user interactions, leading to more personalized and effective communication. This higher level of intelligence has contributed to greater user satisfaction by providing faster resolutions to queries, seamless support, and 24/7 availability. As AI technologies continue to advance, we can anticipate even more noticeable improvements in chatbot capabilities. Natural language processing, machine learning, and deep learning algorithms will likely result in chatbots possessing even deeper insights into users' needs, emotions, and intentions. This continuous development promises to raise user satisfaction to unprecedented levels. However, challenges remain, such as ensuring the ethical and responsible use of AI, addressing potential biases in chatbot responses, and maintaining a balance between automation and human contact.

Striking this balance will be crucial to building trust and maintaining the positive trajectory of user satisfaction. By continually honing their capabilities, chatbots are a testament to the remarkable synergy between AI and user satisfaction, presaging a future where technology not only understands us, but also genuinely enriches our lives.

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