Artificial Intelligence (AI) and algorithms have become a fixture in our lives. Many organizations need to implement AI in order to stay competitive. In the brand-new AI book *"Data Science for Decision-Makers and Data Professionals"*, the author takes you through this field in ten chapters, covering the hallmarks of intelligent, data-driven organizations and the importance of AI Covered topics range from formulating an AI-first strategy to Big Data architecture, the many types of algorithms, privacy legislation, and ethics. A bright future for AI The author of this book envisions a bright future where artificial intelligence (AI) and business intelligence. (BI) can contribute to solving complex issues in business and society. He introduces the AI-first principle and describes how the latest developments in the field of data science and machine learning can benefit you, but not without casting a critical eye on them. This book also addresses the dark sides, pitfalls, and failure factors of this novel technology AI enables data-driven working Empower.

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ABOUT BOOK CHAPTER

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Empowered by AI and many kinds of algorithms, organizations can now make essential improvement efforts and effectively innovate to stay ahead of the competition. The most essential algorithms and machine learning models are covered in this unique AI handbook, bringing data-driven working to life. From simple functions and business rules to regression models, random forests, cluster analyses, and Bayesian networks, including so-called genetic algorithms.

Artificial Intelligence book contributes to a better world

Entirely up-to-date and presented in beautiful hardcover, this edition of the AI book contains many practical examples. The author covers positive and inspiring AI stories that illustrate how AI can benefit people and society when it comes to health, safety, sustainability, and economics. Continuous improvement and innovation using data are two important themes that run through this essential book for ambitious (business) managers, project managers, executives, and their employees.

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Artificial Intelligence and Machine Learning to Enhance Service robots Privacy of Cloud

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Abstract: Service robots (SRs) are becoming increasingly prevalent in various service industries, including hotels and restaurants, as well as in retail settings. However, there is limited research on the actual impact of SRs in retail stores. While studies have compared the effectiveness of robots with other forms of media, none have yet explored different placement strategies for SRs in retail. This research also seeks to address the gap in understanding the complete hierarchy of effects, from capturing attention to influencing purchase decisions. This study aims to provide both valuable academic insights and practical recommendations for retail managers regarding the optimal placement of a Humanoid Service Robot (HSR) in a store to attract and convert shoppers.

1. Research Objectives and Methodology:

The main objective of this study is to determine the most effective placement of an HSR to attract and convert shoppers. To achieve this, we utilize 'the POS Conversion Funnel' framework to systematically evaluate the impact of HSR placement on sequential stages of customer conversion, encompassing stopping power, engagement, attraction, and selling power. We hypothesize that placing the HSR at the store entrance outside will excel in stopping power, drawing more attention due to higher visibility. Conversely, we anticipate that the HSR placed inside the store will be more successful in engaging and persuading potential shoppers to buy. A field experiment was conducted at a Belgian chocolate store in Brussels Airport, involving the placement of the HSR outside the entrance (HSRoutside) or inside the store behind the entrance (HSRinside). Passers-by were invited to participate in a store-related quiz on the robot's tablet, and their interactions were observed through four surveillance cameras over two days per condition, totaling 28 hours and involving 67,580 total passers-by (HSRoutside = 36,063; HSRinside = 31,517).

The methodological approach used mixes bibliometric, content analysis, and social network techniques. In this study, a state-of-the-art research was conducted through the SCOPUS and Web of Science databases. For the publication time span, the time from 1999 to 2019 was considered with the intent to understand how the level of attention towards the topic has changed before and after the introduction of Industry 4.0. The research methodology chosen for this study was a systematic literature review [25]. The main phases of the study were as follows:

Phase 1: Research and Classification. The present phase was divided into three steps:

- Step 1: Identification;
- Step 2: Screening; and
- Step 3: Inclusion.

In phase 1, bibliometric data was collected (step 1). Then, a screening of the overall result was carried out to identify which documents can be taken into consideration, in line with the research areas deemed interesting and relevant (step 2). At the end of this step, the last step (step 3) aimed to select the documents to be analyzed in detail.

Phase 2: Analysis. Once phase 1 was completed, the next phase was phase 2, which was the analysis of the results. The approach used for the bibliometric analysis included:

- The use of indicators for the parameters studied; and
- SNA (social network analysis) for the keywords.

The indicators chosen to perform the analysis were total papers (TPs), which is the total number of publications, and total citations (TCs), which is the total number of citations.

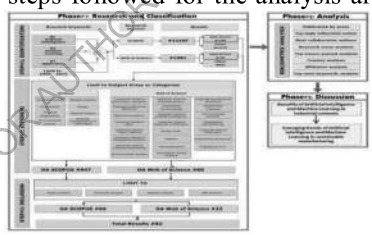
SNA finds application in various social sciences, and has lately been employed in the study of various phenomena, such as international trade, information dissemination, the study of institutions, and the functioning of organizations. The analysis of the use of the term SNA in the scientific literature has undergone exponential growth in the use of this mode of computable representation of complex and interdependent phenomena. For the purpose of the study, UCINET, NetDraw software was used, which was expressly designed for the creation and graphic processing of networks, and was used to represent the keywords in the network, and Excel for data input.

The software UCINET, NetDraw returned a sociometric network that describes the relationships between the classes, that is, data entered as input.

Furthermore, NVivo 12 software, the leading program for computer-assisted qualitative analysis (CAQDAS), was used to analyze keywords of all documents. In this specific case, it was used to identify the possible links between the keywords of the various documents examined, developing conceptual schemes from which to make interpretative hypotheses.

Phase 3: Discussion. At the end of the second phase, a third and final one followed, where the results were discussed, and conclusions were drawn.

In 1, the main phases and steps followed for the analysis are shown



2. Results:

3.1 Phase 1: Research and Classification

The first phase consisted of the search for documents, which included the activities of collecting the material belonging to the academic universe. This first phase was divided into three steps as follows.

3.1.1. Identification (Step 1)

For a comprehensive survey of the phenomenon, an investigation on the Scopus (SCP) and Web of Science (WoS) databases was carried out using Boolean operators. We began by making a search query on the Scopus and WoS databases with the general keywords “artificial intelligence” AND “machine learning” AND “application”, as shown in **Table 1**.

Table 1. Keywords and time period.

In order to maintain the consistency of the results, the same keywords were used in

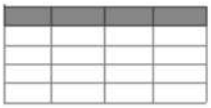
both databases and a time horizon of 20 years was chosen, from 1999 to 2019.

The choice of keywords for performing the survey was based on the awareness that AI and ML can be an important tool in the effort to adopt responsible business practices in the context of smart production. In this regard, it is worthy to note that with the increasingly urgent discussions of climate change, it seemed appropriate to focus our research on the topic of sustainability. Thus, the selection of papers also considered applications on sustainability.

The search returned in total 13,512 documents.

The results extracted by Scopus are numerically superior to Web of Science (WoS): 12,445 for the first and only 1081 for the second one (**Table 2**).

Table 2. Total results of research on Scopus and WoS.



The result is not entirely unexpected, and the reason is to be found in the fact that Scopus, being an Elsevier product, collects data from all the other databases, in particular Science Direct and those queried by the Scirus search engine, while Web of Science (WoS) collects fewer documents.

From the documents extracted in Scopus, it was found that most of them are conference papers (57.28%) and, subsequently, chapters (33.85%).

On the contrary, the research on Web of Science (WoS) underlines that most of the documents are chapters (46.12%) and, subsequently, proceedings papers (42.86%).

All the document types are filled in **Table 3**.

Table 3. Distribution of document types in Scopus and Web of Science.

AI began working in the 1940s and researchers showed strong expectations until the 1970s when they began to encounter serious difficulties and investments were greatly reduced.

Since then, a long period began, known as the "AI winter" [**26**]: Despite some great successes, such as IBM's Deep Blue system, which in the late 1990s defeated the then chess world champion Garri Kasparov, the study of solutions for AI has only come back for a few years. The push for a new technological development has been given by the I4.0, which considered AI as one of the primary key enabling technologies (KETs).

From this period onwards, the literature has been enriched with documents, as shown in Growth is apparent after 2011 when new technologies began to be implemented more frequently. In fact, the Industry 4.0 term first appeared at Hannover Messe in 2011 when Professor Wolfgang Wahlster, Director and CEO of the German Research Center for Artificial Intelligence, addressed the opening ceremony audience.

In fact, this research indicates that over the time period considered (1999–2019), the number of published chapters remains almost constant until 2013, from which it undergoes an increase.

Subsequently, the increase in the adoption of these ones has led researchers to keep pace with the growth of I4.0

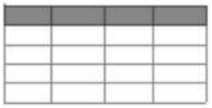
3.1.2. Screening (Step 2)

Trying to give an overview of the topics and areas interface, in the screening phase,

an analysis of documents characterized by free access was chosen, excluding those that have restrictions, and to restrict the field to the thematic areas of scientific interest.

With this in mind, the number of open access items has been drastically reduced (1288 results for Scopus and 149 for WoS) and, also applying the filter related to the thematic areas (**Table 4**), it determined a further reduction: 947 for Scopus and 60 for WoS.

Table 4. Subject area filter on Scopus and WoS.



Note how the number of filters applied is different. The databases, in fact, offer the same search options, but, in the specific case of the thematic areas, the latter are more numerous and structured on Web of Science (WoS) compared to Scopus.

3.1.3. Inclusion (Step 3)

At the end of the screening process, the inclusion step was started, which consisted in the selection of documents, which was extracted from the last passage, destined to be included in the sample on which bibliometric analysis was performed. In this review step, for the purposes of eligibility, we examined the complete text of each document independently. For each chapter, we examined whether there was interest from the academic world, and if it contained case studies or real applications, proposals for new AI and ML algorithms, or possible future scenarios.

Therefore, the final sample to be analyzed consisted of 60 documents for Scopus and 22 for WoS.

3.2. Phase 2: Analysis

This section presents and discusses the findings of this review.

First, an overview of the selected studies is presented. Second, the review findings according to the research criteria, one by one in the separate subsections, are reported.

3.2.1. Top Highly Influential Analysis

This section lists the most highly cited documents in WoS and Scopus. The list is structured by research source, date, title, authors, source title, and top citation (TP) in WoS or Scopus, according to the research source, it is possible underline that the document by Larrañaga, Calvo, Santana et al. in 2006 has the highest citation count of 298. This chapter reviews machine learning methods for bioinformatics and it presents modelling methods. Moreover, the document year is 2006, so before I4.0 was introduced. Therefore, having more years than today has an advantage in terms of diffusion. This means that it is one of the most influential documents in the academic world, as it proposes some of the most useful techniques for modelling, giving the document the opportunity to become a pioneer in the computer science research area.

Obviously, all documents before I4.0, in general, have more citations than the most recent documents. However, it is significant to note that even recent documents have a very high number of citations compared to the year of publication. This denotes the interest in the topic from the scientific community.

The citation analysis revealed that the first chapter that we can identify among the most cited in the I4.0 period dates to 2016. The work, published by Krawczyk [**29**], proposes application models to further develop the field of unbalanced learning, to focus on computationally effective, adaptive, and real-time methods, and provides a discussion and suggestions on the lines of future research in the application subject of the study. It received 119 citations. Moreover, an chapter published by Wuest, Weimer, Irgens et al.

[**30**] received much attention among the scientific community. It contributes by presenting an overview of the available machine learning techniques.

Finally, the citation analysis pointed out that the average number of citations of all documents is 16.58. This value is expected to increase rapidly considering the interest in the issues of ML and AI.

3.2.2. Publications by Years

Consistent with what is defined in **Section 3.1.1**., the study shows that the number of items included in the analysis is definitely low for the entire period before I4.0 and then suddenly increases, starting in 2012. The data shown in **3** also show two holes in the 2001–2008 and 2008–2011 intervals. This means that the technological applications were limited before it became an enabling technology of I4.0 in all respects, only to have a peak of technological implementation, as was foreseeable.

With reference to 2019, the refers to the first months of the year, so it is plausible that during the year, there will be a further increase in the documents in the literature. Furthermore, an increase is expected in the coming years, in parallel with the growth of I4.0

3.2.3. Most Collaborative Authors

The analysis highlighted that most of publications have more than one author. From this point of view, it is possible to identify the number of authors for each document. As

3.2.4. Research Areas Analysis

The total research area analysis collected from the 82 papers was 164 because each paper can be considered as more than one research area analysis. Given the small number of documents identified in the period before I4.0, the ranking refers mostly to the current industrial revolution. Also, in this case, the result is consistent with the introduction of paradigm 4.0, which has intensified research and the adoption of technology.

The first thematic areas and disciplines that are at the top of the ranking are computer science, engineering and biochemistry, genetics, and molecular Biology, respectively, with 29%, 23%, and 6% of publications. Furthermore, the other disciplines identified for which applicative findings are found are considered transversal to the first three disciplines and this is a consequence of I4.0. In terms of the percentage contribution, the first three areas cover about 60% of the papers considered.

Considering the top 20 research areas, given the frequency of the research areas' distribution, **5** shows a higher level of concentration in the disciplines indicated above.

In fact, in terms of the percentage contribution, the first five areas cover about 70% of the papers considered. Regardless, by only counting research areas found once, there is a total of 27.

This means two things:

- The large number of fields in which this kind of research is involved; and
- Most papers have a transversal approach, that is, the object of each research crosses more than one field of application, thus involving more research areas.

This confirms the wide interest in these subjects from several fields.

3.2.5. Top Source Journals Analysis

In this section, the top 20 sources or journals that were published most frequently were extracted.

A journal is a time-bound publication with the objective of promoting and monitoring the progress of the discipline it represents.

In this specific case, the total source journals detected from the documents is 74, but, considering the top 20, given the frequency of the source journals' distribution, only the first 13 sources have more than one paper published, with a total percentage contribution

of 43% of the total.

After analyzing the sources separately, the results obtained in the two databases were found to not be the same. In WoS, the top source journal was IEEE Access with two publications while in Scopus, the top source journals are Procedia Computer Science, Matec Web of Conferences, and Machine Learning with four publications, which contribute 5% of the total.

Aggregating the data collected from the two databases, the ranking moves to that obtained by Scopus, making sure that IEEE Access is no longer first in the standings, but only eighth, and that the former are precisely those of Scopus: Procedia Computer Science, Matec Web Of Conferences, and Machine Learning, with the same number of publications. Next, the 10 source journals have a 3% publication contribution while the rest have a one-to-one relationship (1%) with the corresponding source journal.

The low level of concentration of the sources suggests that there is a great deal of interest in these topics from several scientific journals. As a matter of fact, it is foreseeable that specialized sector sources (AI Magazine and Machine Learning) are among the first 13; however, it is interesting to note that other sources are involved, such as Sustainability Switzerland or BMC Bioinformatics and Nuclear Engineering and Design.

3.2.6. Country Analysis

The results that emerged through research on the two databases are consistent with each other. In both cases, in fact, the countries that give the greatest contribution to the research are China and the United States (8). The result is obvious since in China and the United States, more than 1.3 billion and 0.3 millions of people live, respectively, and so there are more researchers than in the single European nations. Focusing on Europe, Germany published more papers than any other European country. This is not a random result: I4.0 was born in Germany, so this outcome was expected. However, the following observation cannot be ignored from this data: The USA and China carry the first two places in the list while it is not the same for European countries. Europe, despite its talents and resources, has lost ground. Presenting its report on artificial intelligence, the French deputy and mathematician Cédric Villani declared that, “Europe must be able to compete with China and the United States while protecting its citizens and pointing the way to go on ethical issues”. If we are not careful, the 21st century rules will not be defined in Brussels, but in Shanghai. Artificial intelligence is also a land marked by intense geopolitical rivalry that could redefine global power relations.Even so, regarding Europe, it is worthy to also note that since 2017, France, Germany, and Italy have intensified their trilateral cooperation to promote digitizing the manufacturing industry. In this regard, in the near future, we expect a significant evolution of smart production initiatives and therefore an increase in scientific research.Affiliation AnalysisThe total number of affiliation detected from the 82 papers is 153. Also, in this case, considering the top 20, the frequency of the affiliation distribution shows that most papers have a one-to-one relationship with the corresponding affiliation. Only the first four affiliations have three papers (2% of the contribution) and the second four have two papers (1.3% of the contribution). This result gives us information about the wide interest on this subject from several universities and research centers all over the world. Then, the affiliation analysis confirms the result of the country analysis (**8**). In fact, if we try to sum the first eight affiliations by their own country, the outcome is:

- Nine papers from China;
- Six papers from Germany; and
- Five papers from the USA.

In September 2018, the most important event on artificial intelligence was held in

Shanghai. China is very determined to focus on future technologies.

For some months, China has become the world's leading power in terms of scientific publications. Late in the 20th century technologies, China chose to do what the English-speaking people call a "frog jump" and focus on 21st century technologies.

China, with its 800 million Internet users and without any privacy protection policy, has access to more personal data than the United States and Europe.

3.2.8. Top Keywords Analysis

Through NVivo 12, the top 20 keywords were extracted directly, which are those that always appear in association with each document.

Starting from this classification, the graphic representation, a word cloud shape, of the keywords (**9**) was extracted. It can be noted that the most used term is precisely "machine", "learning", and "intelligence", which the software represents with greater characters than all the other terms.

3. Conclusion:

This study offers valuable insights into the effectiveness of different HSR placement strategies, according to the POS Conversion Funnel. Harbourside demonstrated superior stopping power, effectively drawing attention and initiating interactions. Conversely, Springside excelled in engagement, store interest, and ultimately led to more purchases. The overall sales impact appeared strongest in the outside placement condition, possibly due to the larger initial audience. These findings emphasize the importance of considering each step of the POS Conversion Funnel when deciding on optimal HSR placement. They hold relevance for both academia and retailers aiming to enhance customer experiences through HSR implementation, considering specific conversion challenges.

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