SENTIMENT ANALYSIS OF FACEBOOK COMMENTS USING VARIOUS MACHINE LEARNING TECHNIQUES

Dr. Luis Santiago García Merino[1], Dra. Giuliana Vilma Millones Orrego de Gástelo[2], Dr. Wilberto Fernando Rubio Cabrera[3], Dra. Nancy Aida Carruitero Ávila[4], Dr. Juan De La Cruz Lozado[5]

[1]Universidad Católica Los Ángeles de Chimbote, Instituto de Investigación, Innovación, Ciencia y Tecnología

[2]Universidad Nacional Pedro Ruiz Gallo

[3]Universidad Católica Los Ángeles de Chimbote

[4]Universidad Privada Antenor Orrego

[5]Universidad César Vallejo

Abstract

A documentary review was carried out on the production and publication of research papers related to the study of the variable sentiment analysis, machine learning, social networks, facebook. 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 274 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 111 publications was the country with the highest scientific production registered in the name of authors affiliated with institutions in that country. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material referring to the study of the variable sentiment analysis, machine learning, social networks, facebook was Computer Science with 219 published documents, and the Type of Publication most used during the period indicated above were Conference Articles with 52% of the total scientific production.

Keywords: Sentiment Analysis, Machine Learning, Social Media, Facebook.

1. Introduction

At present, the use of digital platforms has gained significant importance within society as a tool for communication against events of different nature, especially in the prevailing socioeconomic environment, which originates the need to analyze, study and delimit the opinions thrown by the users assigned to them. It is for this reason that the creation of a series of applications that process data on a large scale, allows us to establish an automated analysis of feelings and the scaling of the meaning of the opinions that are thrown in real time of any dye, as the case may be. (Arcila-Calderón, Barbosa-Caro, & Cabezuelo-Lorenzo, 2016)

These new technological efforts have found their interest, in areas of knowledge such as Social Sciences, as such, sociology research centers and other public institutions usually use these techniques to frame processes of great gear such as politics, in turn the exploration of social networks such as Facebook, are the constant object of these analyzes based on machine learning, since its use and application is of great importance among the young and adult population, as a field of study. (Mariño-Angoso, 2015)

The observance of trends through the use of algorithms, allow the analysis of feelings that is among other things the fundamental objective of this bibliometric review of academic character, to identify the scientific-technical advances in the different areas of knowledge in convergence with technological tools, artificial intelligence and large databases. (Arcila-Calderón, Barbosa-Caro, & Cabezuelo-Lorenzo, Técnicas big data: análisis de textos a gran escala para la investigación científica y periodística, 2016)

Sentiment analysis is used in the monitoring of Social Networks in real time, using computer means, which simplify and streamline processes. (Arcila-Calderón, Ortega-Mohedano, Jiménez-Amores, & Trullenque, 2017)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 Sentiment Analysis, Machine Learning, Social Media, Facebook, 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 Sentiment Analysis, Machine Learning, Social Networks, Facebook. during the period 2017-2022.

3. Methodology

This article is carried out through a research with mixed orientation 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 study Sentiment Analysis, Machine Learning, Social Networks, Facebook. 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 towards 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 274 publications were obtained from the choice of the following filters:

TITLE-ABS-KEY (sentiment AND analysis, AND machine AND learning, AND social AND media, AND facebook) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017))

- Published documents whose study variables are related to the study of the variables, Sentiment Analysis, Machine Learning, Social Networks, Facebook
- Limited to the years 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.
- Year of publication.
- 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
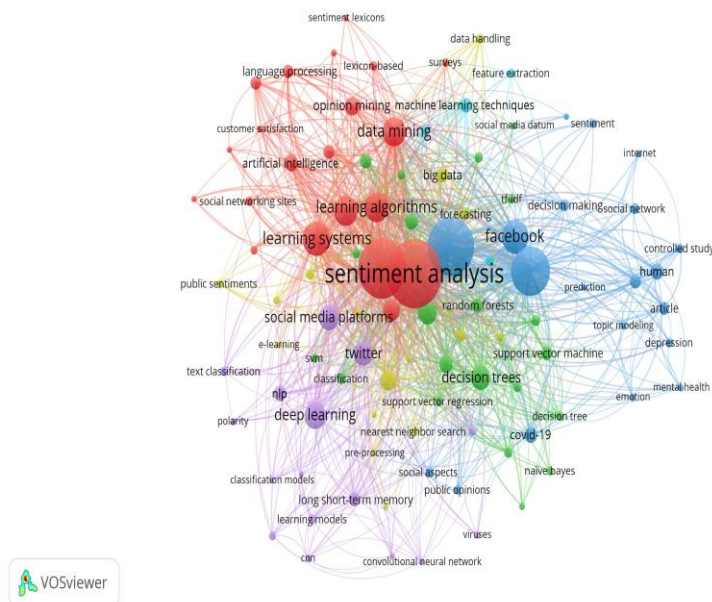
Source: Own elaboration (2023); based on data exported from Scopus.

Sentiment Analysis 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. Learning Systems, is also widely used as a variable of use of may frequency within the bibliometric review, in addition to high presence words such as Facebook, Social Network Platforms and Learning Algorithm, finding in any way the meaning of the analysis, since, the digital platforms of social nature are the objective of the techniques used for the recognition and emotional evaluation of the texts there consigned by Regular users of the applications.

In this order of ideas, it is important to specify in the same way that words such as Social Aspects, Big Data and Data Processing, do not escape the conglomerate of words that give meaning to the objective proposed in this review, as since, the ultimate purpose in the use of these computational tools is to configure theoretical scenarios of public opinion in its most social aspect, regarding various topics to indicate a trend that can be positive, negative or neutral, once the data of the same has been processed.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

Figure 3. Distribution of scientific production by year of publication.
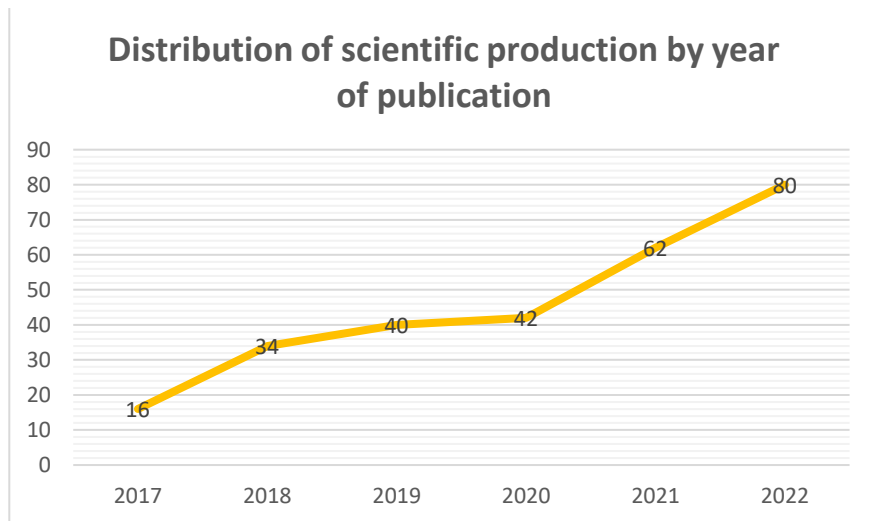
Source: Own elaboration (2023); based on data exported from Scopus

Among the main characteristics evidenced by the distribution of scientific production by year of publication, a level of number of publications registered in Scopus is notorious in the years 2022, reaching a total of 80 documents published in journals indexed in said platform. This can be explained thanks to articles such as the one entitled "Sentiment analysis of students' Facebook comments towards university ads", whose objective focused on the analysis of student sentiment

through the Facebook platform in the Moroccan Arabic language, about academic advertisements issued during the COVID-19 health emergency period, especially those related to teaching and rating media, comments that were evaluated by the tools; Naïve Bayesian (NB), Support Vector Machines (SVM) and Random Forests (RF) using k-fold cross-validation, resulting in the data processed according to (SVM) and (RF), are more accurate when categorizing and evaluating comments on the Social Network, as implied in good, bad, neutral and bipolar. (Kah & Zeroual, 2022)

On the other hand and in observance of Figure 3, we can infer that the scientific production in the study of the variables object of this analysis obtained a growth of importance having that in 2017 with only 16 productions indexed to Scopus Database, in the immediately following year it obtained 34 publications and so on in the years that comprise the reviewed period, obtaining in the validity of 2021 a figure of great relevance with 62 articles in this single year, which indicates the preeminence in the study of these variables over the years.

4.3 Distribution of scientific production by country of origin

Figure 4 shows how scientific production is distributed according to the country of origin of the institutions to which the authors are affiliated.

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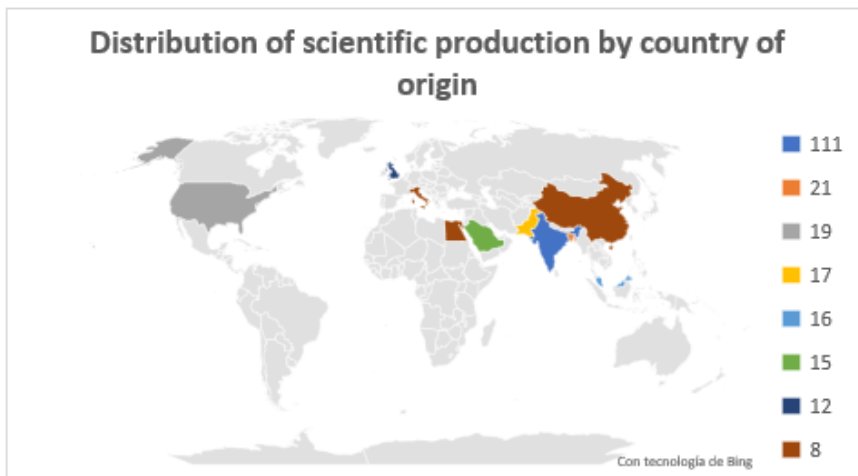
Source: Own elaboration (2023); based on data provided by Scopus.

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 111 publications in total. In second place, Bangladesh with 21 scientific papers, and the United States ranking third presenting to the scientific community, with a total of 19 papers, so it is important to highlight the

article by authors affiliated with institutions in the country India entitled "Sentiment analysis of COVID-19 tweets using deep learning and lexicon-based approaches", This study consisted of the analysis of feelings of users of Indian nationality, who use social networks such as Facebook, Twitter, among others, to know the trends against the Covid-19 pandemic and the different vaccination campaigns for its mitigation as a health emergency, for which the lexicon was a fundamental variable to establish the approach and thus achieve classify the intentionality of the tweets, through tools such as Vader and NRCLex, the use of a Neural Network with techniques such as Bi-LSTM and GRU was also required, achieving an accuracy of 92.70% and 91.24% in the COVID-19 dataset, in addition to classification of vaccination tweets with Bi-LSTM and GRU, for which favorable accuracy of more than 90% was achieved. This study and its knowledge are of important contribution as antecedent, social reference and internal health policies for the confrontation of future pandemics, the knowledge obtained from the different learning systems to throw indexes in the sentiment analysis of a population; At present it is vital as a foundation and basis for the development of regulations and strategies of any nature, as the case may be. (Ainapure, y otros, 2023)

On the other hand, authors affiliated with institutions from countries such as the United States, Pakistan and Malaysia, are of great contribution and contribution in the study of the variables, with a significant and profitable production, for future analysis.

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

Figure 5. Distribution of scientific production by area of knowledge.
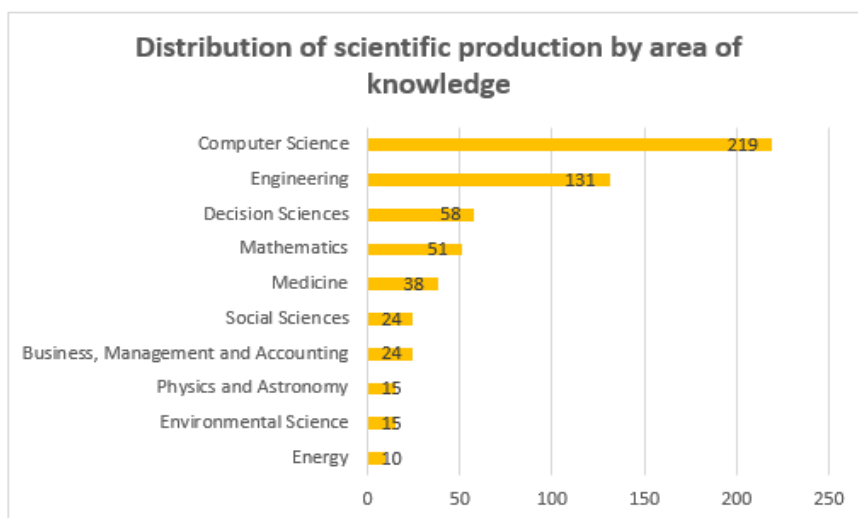
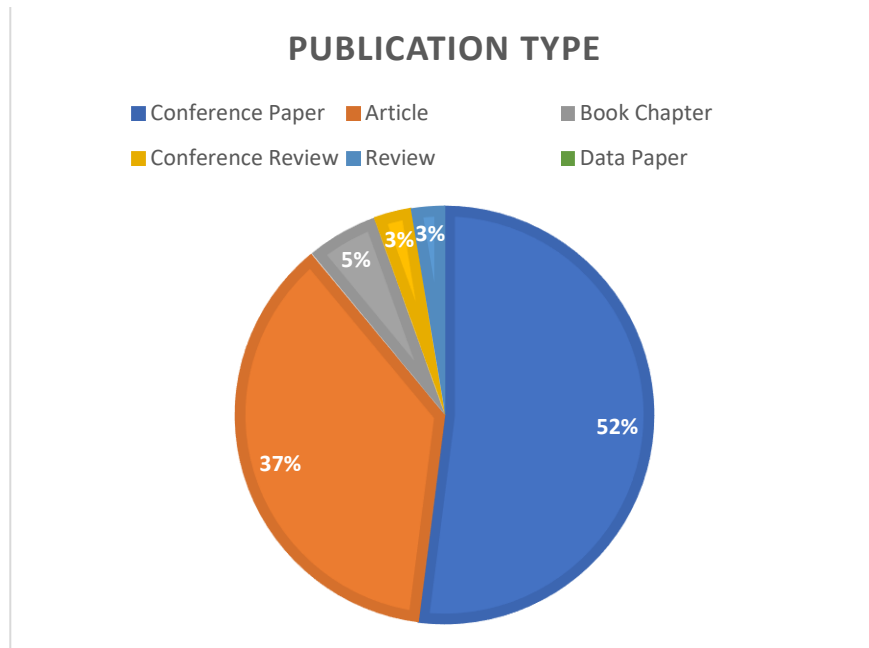Source: Own elaboration (2023); based on data provided by Scopus

Computer Science was the area of knowledge with the highest number of publications registered in Scopus with a total of 219 documents that have based their methodologies Sentiment Analysis, Learning Systems, Social Networks, Facebook. In second place, Engineer with 131 articles and Decision Sciences in third place with 58, it is undeniable that the overturn of the different areas of knowledge in the achievement of knowledge regarding these variables is undeniable, taking into account the massive use of digital platforms as means for the interpretation of feelings in the face of events that take place in the current event. It is important to highlight the article of great impact of the area of Computer Science that is called "A machine learning method for the prediction of the stock market using Twitter data in real time", whose purpose was established in the analysis of financial news and publications of this nature on platforms such as Twitter and Google Finance, In order to predict the behavior of the stock markets, taking into account that the above contribute to the growth of personal finances and large corporations that contribute to the large-scale economy of any territory, this prediction had its analysis in a certain time frame and was made through a proposed SSWN model expands the standard opinion lexicon called SentiWordNet (SWN) through the terms specifically related to the stock markets to train the extreme learning machine (ELM) and the recurrent neural network (RNN) for the prediction of the price of the shares, for which positive results were obtained and an accuracy value greater than 80%, establishing these mechanisms as optimal and of great importance to incorporate in the future other digital platforms that allow veracity in financial predictions and economy in general.(Albahli, y otros, 2022)

Areas of knowledge such as Mathematics, Social Sciences and Medicine, have made their contributions from the sphere of their study for the understanding, analysis and interpretation of the variables raised.

4.5 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 6. 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 Conference Articles with 52% of the total production identified for analysis, followed by Journal Articles with 37%. Book chapter, are part of this classification, representing 5% of the research papers published during the period 2017-2022 in journals indexed in Scopus. It is important to highlight the Conference Article entitled "Prediction of comments on Facebook photos: who publishes may be more important than what type of photo is published", whose objective was concentrated on the analysis of feelings of 227 Facebook users and their publications, with the aim of analyzing the popularity factors of the same, This required the resolution of a questionnaire and the assessment of a psychological profile, to determine the determining factors and the tendency of users when commenting or reacting to the publications of other users, for which it was found that it matters more who publishes than the content of the publication, However, the establishment of positive/negative feelings would be more truthful, with the use of some data processing application that would yield more precise figures that support this premise.(Marino, y otros, 2022)

The analysis of this study is important to understand the importance of the use of data tools that monitor and categorize through algorithms what is intended to be sought, to reach more concise knowledge.

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 Sentiment Analysis, Machine Learning, Social Networks, Facebook, with a total of 111 publications in the Scopus database. In the same way, it was established that the application of theories framed in the area of Computer Science were the most frequently used in the measurement of the impact generated by the analysis of feelings as frameworks to determine trends and patterns through Social Networks. The monitored analysis of the different expressions resulting from the users of digital platforms, especially Facebook, due to its great use today, are of vital importance for the instrumentation of models that processed lead us to a unique general consciousness, which finally becomes a special factor to identify a public opinion. The different technological tools, their use and implementation have ended up becoming key files of researchers, consultants and informants, for the construction of problem formulation that lead to the foundation of hypotheses that can be oriented in the different ways that are proposed as a final objective. Now, it is important to point out that, of the review carried out in this debit that, its execution generates a series of costs of a pecuniary nature that must be taken into account by whoever wants to enjoy the benefits of the use of these tools, taking into account that these not only facilitate the throwing of data in the face of a present event, but that these results can be combined in place and time, to obtain references and most importantly for the prediction of behaviors, which is totally advantageous in corporate, financial, political and even socio-cultural decision making.

In the end, automatic learning techniques, as tools for data processing, represent an advance in technological innovation and in the same scientific sense, for the foundation of knowledge, which contribute to the theoretical knowledge already acquired, strengthening with figures the premises already discovered and giving rise to innovative and transformative approaches that revolutionize what has already been discovered.

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