

Algorithm for Identification and Analysis of Targeted Advertising used in Trending Topics

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Abstract– Today, companies choose to display their advertising content on Web pages, using all the resources that technology offers, whether through eye-catching images, animated images, and even videos. The objective is to ensure that the information not only reaches the public but that their ideas travel to target audiences, to people who can potentially consume your products or services. Thus, at present, technology has revolutionized digital marketing, having as greatest exponents of effectiveness to Web pages and social networks, where the information traffic generated by users is analyzed, for example, through trending topics. A clear example that has been observed in 2020 and 2021 were the trends that have shaken the world, such as COVID-19, changing the way any business or organization works, apart from its impact on health. However, brands, apart from seeking empathy with consumers, designed their advertising campaigns to increase their sales. This paper presents an algorithm for the identification and analysis of advertising patterns directed by some brands that have sought to increase their sales successfully, having as a message the awareness of its consumers through displaying content in banners and advertisements, and thus achieve the attention of users.

Keywords- Advertising, Digital Marketing, Trending topics, Pandemic, Metaverse, NFTs, Web3.

I. INTRODUCTION

Over time, the Internet and Technology have had a great impact on the advertising world, markets, and business models. Before, advertising was only done according to traditional media. However, this scenario took a different turn with the Internet age. Likewise, this phenomenon stimulated an impact on advertising, where companies identified the usefulness and importance of using this mechanism as a tool to achieve greater reach with a target audience, that is, through targeted advertisement.

Thus, in the last two years, 2020 and 2021, trends have been seen that have shaken the world like never before. One of these trends, which has come to change any business or organization, in addition to its impact on health, was the arrival of the coronavirus (COVID-19) pandemic [1].

A highly contagious, dangerous, and complex disease to manage due to its asymptomatic onset and the complexity of early detection [2]. One of the actions that world leaders took was to stay at home to avoid, as much as possible, contact and, therefore, possible infections. This while we manage to obtain some vaccine or a way to cope with the situation. Nevertheless, faced with these desperate measures, coupled with the fall of the world economy, digital marketing did not stop, it had greater momentum, gaining widespread notoriety in actual society.

This notoriety of digital marketing is due, in part, to the measures taken by governments, who warned the general population to keep a reasonable distance, maximize hygiene measures and expose themselves as little as possible to contact with other people [3]. These measures evidently generated fear and uncertainty in the population, which generated, on the one hand, a constant media bombardment on the subject and, on the other, that large companies took advantage of the situation to boost their home delivery sales, for example, first necessity, cleaning, and disinfection items, face masks, home entertainment media, pet food, among others.

On the other side, while many businesses that depended on human contact had a huge drop in their economy, large companies, such as supermarkets, pharmacies, and even clothing brands took advantage of the uncertainty to launch promotions and new merchandise [4]; thus managing to flood the advertising media to reduce sedentary lifestyle and ensure maximum hygiene. Figure 1 contrasts the result of the arrival of the disease in combination with invasive digital marketing, which boosted the number of sales of different products related to the subject, representing large total profits.

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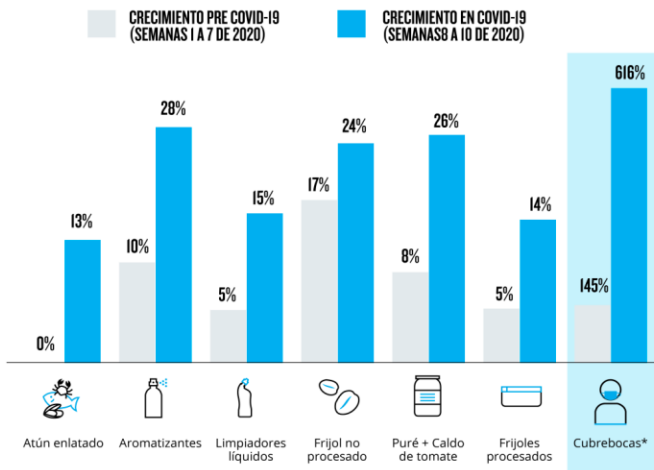


Figure 1. Sales indexes comparison before and during COVID-19. Source: [5]

An example of the implementation of new business models, and taking advantage of the circumstances, are the clothing companies, which almost immediately ventured into the production of face masks, which not only increased their profits but also left them well-positioned, in terms of acceptance, since they knew how to manage marketing strategically. This example, given the situation of COVID-19, is an extraordinary case, where some companies sought to take advantage of trends to be profitable and maintain acceptance profiles through potential consumers [6], given that in the business world, having a good image is vital and even more important than offering quality products.

Another example of taking advantage of current trends, which is not necessarily linked to the case of the 2020 pandemic, was Pride, also known as LGBT Pride Day, which is a day of the year chosen by the LGBT movement to affirm the feeling of personal pride, which is generated by publicly displaying sexual and gender identities and orientations traditionally marginalized and repressed. The purpose is to make your claims and your presence visible in society. Given this, companies such as Puma, Levis, C&A, Adidas, Swatch, and others, took advantage of the ideals and colors of the movement related to Pride, under the slogan “Love unites us now more than ever”, with a proposal of clothing pieces, colorful footwear, and accessories.

As is well known, some companies and digital marketing strategists have managed to integrate and position themselves successfully with the public. For this, these companies analyzed world or individual trends to sell more and make their image more notorious. These companies in turn, despite having suffered losses due to the confinement of the population, have in digital marketing a great support tool that has kept them afloat, showing that a good advertising strategy makes a difference, surpassing the competition.

This paper presents the identification and analysis of message patterns directed by some brands that have sought to

increase their sales successfully, given current trends, with the message of raising awareness towards their consumers. For this, the document is organized as follows, Section 2 presents the background on digital marketing, the need for it in companies, and gives some scopes on trending topics. Section 3 describes the method used as a proposed solution. Section 4 presents the tests and results obtained, based on application examples, and Section 5 summarizes some conclusions and future work.

II. BACKGROUND

In recent years, the technological explosion has come to change the way of doing business and humanity has learned how to adapt, coexist, and learn from them. These technological advances have shortened, more and more, the times of new developments and discoveries, based on the understanding of the present and thinking about the future. Precisely, a field of knowledge that is currently promoting new developments is Artificial Intelligence [7], where many companies are increasingly aware of its importance to incorporate this technology into their business models. This would allow obtaining relevant patterns from the data generated, as well as assistance in decision-making [8].

A. Digital marketing

Marketing has been one of the areas that has evolved with technology [9] and it has empowered companies to make sales grow, and, consequently, improve their positioning in the global market. On the other hand, neuromarketing is based on the part of consumer psychology, the colors that reflect the moods, the shapes, the way in which consumers find the presentation of the product more pleasant, the positions that men take and women when shopping alone, with friends or family, among other characteristics.

In business, digital marketing is creating new ways for companies to interact with consumers and give new forms of communication, which is driving higher revenues and better productivity. In this type of marketing, information technologies are included as part of advertising campaigns through various software applications [10], with which it is possible to measure the profits and behavior of Internet users, for example, the acceptance of advertisements and bounce rate.

B. Digital marketing needs

The expansion of Artificial Intelligence in business is reflected in the growing development of applications and services, ranging from natural language processing to image recognition. With the passage of time, this type of technology has achieved a better implementation capacity in the various activities of organizations. However, it has not yet been

possible to develop autonomy to manage all the processes that business requires [11].

Thus, performing the recognition and analysis of business processes is important to identify bottlenecks, deviations, and other types of problems. Therefore, new mechanisms need to be developed to obtain greater benefits. Among the actions that Artificial Intelligence could cover in business, the following stand out [12]: natural language processing, satisfaction analysis, optical character recognition, image and face recognition, the improvement of sales processes through machine learning, among others.

C. Trending topics

Trending topics are statistics collected by websites or social networks, mainly Twitter, Facebook, and Instagram [13], where the interests of users or the publications that generate the most controversy are analyzed. Thus, it is possible to know the demands and needs of users and at what times of the day, month, or year it is more feasible to persuade them to gain their attention.

At present, companies can take advantage of trending topics to their advantage, to make the audience know or promote their products, but the most important thing is to create a good reputation to generate trust and rapprochement with consumers. Figure 2 shows a diagram of a semantic network of marketing-oriented to trending topics, which is focused on the experience of companies towards current consumers.

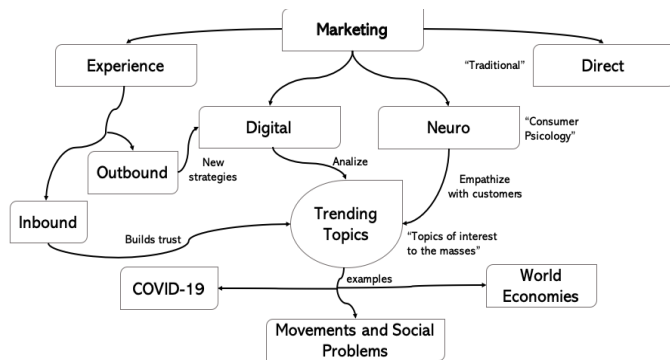


Figure 2. Semantic network of marketing-oriented to trending topics. Source: [14].

In the semantic network, we have the 2020 antagonist, the coronavirus. For which, companies such as Adidas or Levi's have launched face masks for sale. Other companies such as Walmart or Liverpool have strengthened, like most companies in the world, electronic commerce, but these highlight the part of "stay-at-home" or "take-care-of-our-customers", which, in turn, if people keep healthy after this event or some others, they will continue to return to their stores, being part of the consumption cycle.

Regarding the node of pride or "Pride", Adidas was once again the protagonist, who launched a collection of clothing and footwear symbolizing such a movement. In addition, this company has known how to interact with the needs of users, manufacturing products of recycled origin, thus taking care of the environment, which is also a topic of discussion in recent years. On the other hand, the fall of the world economy and of the countries themselves is another issue that has now become a trend.

The confinement by COVID-19 had as a consequence the decrease and in some countries, the slowdown of production, being a fundamental part of the Gross Domestic Product of each country [15]. Therefore, measures and agreements have been taken between the government, banks, and companies to generate actions that resume production or encourage investment.

D. New technologies

At present, web technology is a discipline that is constantly evolving and growing, which since its inception has undergone changes due to the revolution and creation of new services [15]. Today, the Web is classified into three stages [16] [17]: i) the first focuses on the invention of the Web, protocols, and Web browsers; ii) the second is defined by the increase in social networks, mobile applications, and cloud computing; and iii) the last one, which is the coming stage, promises a greater revolution than the previous ones, decentralizing all the content of the Web, creating unique profiles, giving a greater rise to cryptocurrencies and integrating NFTs (non-fungible tokens), and the Metaverse (concept denoting the next generation of the Internet).

Nowadays, the triad between NFTs, the Web3 ecosystem, and the Metaverse, which are technologies that share characteristics in common, have allowed an important synergy for the takeoff of Web 3.0, which have a wide potential that demands a large of technical concepts, such as distributed systems, economics, finance, organizations, entrepreneurship, marketing, cryptocurrencies, cryptography, art, intellectual property, networks, security, rendering, virtual reality, augmented reality, decentralized programming, among others. For this reason, mobile applications, cloud computing, artificial intelligence, the Internet of things, and smart devices have demonstrated essential solution capabilities in different areas, successfully adapting, due to their capabilities, to actual society.

In this sense, by combining these technologies, commercial and financial activities, Web browsing, the acquisition and demand for new services, and the creation of new business models can be improved. For example, companies like Gucci [18], Zara [19], Polo Ralph Lauren [20] have jumped on the NFT trend, creating their non-fungible

tokens to be used on avatars from different Metaverses (Figure 3). Thus, new sales paths are sought, for example, transferring an advertisement from a platform to a three-dimensional digital universe, within a video game or social network, or even when interacting with its users.



Figure 3. Integration of avatars in the Metaverse. Source: [21].

In order to automate transactions, NFTs promise great potential, and it is expected that memberships, promotional codes, tickets, will be encrypted digital keys, all thanks to decentralized application platforms, such as Ethereum, which is the pioneer in digital contracts [22]. Another important feature is the possibility of creating unique users on the Web, giving the possibility of accessing Websites through the digital signature of NFTs.

III. METHOD

The proposal is to analyze, through an algorithm, the trending topics based on the information content that is generated on Web pages, social networks, and online discussion forums. The purpose is to know periodically what people think and opine about social movements, as well as to know where the attention of the masses is directed. From which, in response, brands and corporations establish their advertising and image strategies. The proposed algorithm uses the URL of the Web page, study object, that is, of which we want to know its advertising content. For this, the algorithm bases its operation on five stages:

- First, the URL is entered by the user, which is processed to obtain the language of the website via the BeautifulSoup library of Python. At the same time, through Selenium [23], the site is accessed through the Web browser, sliding the cursor automatically, in order to divide its content. On each swipe iteration, it gets a screenshot with a certain nomenclature.
- Closing the test web browser locates the screenshot files, previously stored in a defined folder.
- For each screenshot, the text contained in it is extracted through optical character recognition (OCR). The Python pytesseract library is used for this. Subsequently, the text is divided word by word, for further analysis.

- For the analysis of the text, stored in the form of regular expressions in plain text files, with CSV format, the algorithm is executed to identify keywords related to Trending Topics, current trends, social movements, and COVID-19.
- This word identification is based on the matches (intersection) of the text stored in the CSV files and the list of keywords. Thus, based on this intersection, the summary of the identified words is displayed.

For the storage of the information, a database was elaborated, with current trends topics, based on the vocabulary used in digital marketing, which could also be scaled to particular topics, managing them by geographic regions. In addition, the words that appear before and after the keyword found were included in the database, thus allowing us to know how companies are treating the issue and how they are taking advantage of it. Undoubtedly, this can be useful to develop our own marketing strategies, following the successes of others and avoiding campaigns of little success or failure.

IV. TESTS AND RESULTS

As a first case, the treatment of some companies around the issue of the pandemic COVID-19 was analyzed. For example, among the strategies used by supermarkets was to promote the rules of social distancing and sanitation. Thus supporting the indications provided by governments in order to make people understand that they care about the situation and the health of their consumers.

As an example, the algorithm was tested on the official website of Chedraui Mexico. It was observed that the commercial store informs the community that they follow the sanitation measures and that the customer and their well-being are always the priority. A popular strategy that has proven to be very successful in terms of gaining popularity, as well as providing a feeling of confidence in consumers. Figure 4 shows part of the website of the business in question with information related to COVID-19.



Figure 4. Semantic network diagram of marketing-oriented to trending topics.

Figure 5 shows the result, after the execution of the algorithm, where the words related to the COVID-19 trending was the famous #QuédateEnCasa (#stayAtHome). It is also shown that the expressions that accompany the keyword located in the database, was that they care about the

well-being of their customers, which perfectly illustrates the intentions of the company, which is to promote trust in consumers and help with the task of social distancing.

```

Las repeticiones del algoritmo son:
1)COVID -->{'#QuédateEnCasa'}
2)SOCIAL -->set()

Expresiones del tema:

ANTES palabra clave:
Pr
raced
SOC
ntact
#QuédateEnCasa

DESPUES palabra clave:
#QuédateEnCasa
Preocupados
por
el
bienestar
    
```

Figure 5. Semantic network diagram of marketing-oriented to trending topics.

Another test was carried out with the website of the German brand Adidas, which, on its official Adidas Mexico page, has a specialized tab to see the services related to the COVID-19 issue. This also contrasts the use of the situation to launch personal hygiene and protection products such as face covers. Figure 6 shows a fragment of the Adidas Mexico website with information related to COVID-19.



Figure 6. Fragment of Adidas Mexico website with information related to COVID-19.

When executing the algorithm, it was observed that the words used as context for the key “COVID-19” were “See more about our times and services”, which is inferred that the market strategy is aimed at economic exploitation based on the situation that we live in today by disease. Figure 7 shows the results obtained from the official Adidas Mexico website. Undoubtedly, the intention of Adidas is the sale of face covers, which confirms its market strategy in the face of the need for the product. Figure 8 shows advertising related to the sale of face covers.

```

Las repeticiones del algoritmo son:
1)COVID -->{'COVID-19'}
2)SOCIAL -->set()

Expresiones del tema:

ANTES palabra clave:
MARCAS
COLECCIONES
BUSCAR
QA
COVID-19

DESPUES palabra clave:
COVID-19
|
VER
MAS
SOBRE
NUESTROS
TIEMPOS
Y
SERVICIOS.
ANOVE
    
```

Figure 7. Screen with the results obtained from the Adidas Mexico website.



Figure 8. Adidas Mexico advertising about the sale of face covers.

Leaving aside the issue of the COVID-19 pandemic, another trend was Pride 2020, where, as in the previous case, different companies saw it as a field of opportunity to guide digital marketing for the sale of their products, as was the case of Calvin Klein (Figure 9). When applying the algorithm, it was observed (Figure 10) that the sale of items related to Pride includes other words before and after with the intention of capturing people's attention and thus achieving a successful sale. It was also observed that in a short time some products were sold out.

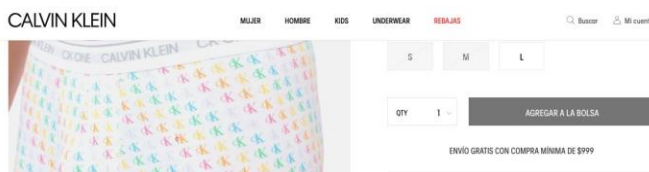


Figure 9. Calvin Klein Mexico website with information on the sale of Pride 2020 items.

```

Las repeticiones del algoritmo son:
1) COVID -->set()
2) SOCIAL -->{'PRIDE'}

Expresiones del tema:

ANTES palabra clave:
BIKINI
CLASICO
-
THE
PRIDE

DESPUES palabra clave:
PRIDE
EDIT
$369.00
AY
1
PEL
AC
UU
VEO
ENVIO

```

Figure 10. Screen with the results obtained from the Calvin Klein Mexico website.

Based on the above, for every trending topic, there are different ways of reaching the public and each with different intentions. The important thing is to observe the reaction that is generated in the public and specifically in potential consumers, in order to design a better marketing strategy. In this sense, through this type of mechanism, such as the algorithm used, trends, and experiences of other brands with successful advertising campaigns can be identified.

III. CONCLUSIONS AND FUTURE WORK

The usefulness of the algorithm was shown to deal with trending topics and analyze the behavior of the masses in the face of social trends. The purpose is to analyze the market competitors and have a support tool to learn from other advertising movements, both the successful ones and also those that did not transcend, since the idea is to seek feedback based on the mistakes of others or even of their own. Thus, so as not to fail in new marketing strategies.

This work as a tool for the identification of digital advertising can be useful for companies, as a starting point to identify strategies that follow the competition, see the acceptance rate that they manage to achieve, and, therefore, as support to model a counterattack strategy of the changing global market.

On the other side, analyzing social ideals and collective movements can be complex, as they tend to be delicate. However, these are risks that companies take in order to have a good image and reputation, which in turn becomes an increase in their sales or services since it is intended that consumers become the best promoters of the brand by feeling satisfied with the product or service in question.

In this sense, current technology has broken the communication barrier between brands and consumers. Before surveys or censuses were carried out to the general population to find out their opinion, now the interaction is closer to solve the needs of customers, listen to them at all times and improve products or services according to market demand.

Without a doubt, a good market strategy brings with it public acceptance, support, and economic benefits for companies. Therefore, it is important to constantly analyze current trends, the economy, collective ideals, and other related issues, in order to make the most of these situations no matter how complex they are, that is, where some find problems, others they look for solutions.

Part of those solutions is the adoption of new technologies such as Web3, the Metaverse, and NFTs, through which new ways to advertise, acquire and retain customers can be created. In addition, the care of the privacy of the information of the users in the network must be guaranteed.

As far as future work is concerned, it is intended to add to the algorithm a tool for monitoring and comparing advertising movements of companies, in order to identify successful campaigns based on the sales index, the presence on the Web, and their approach and empathy with users.

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