Sentimental analysis of female entrepreneurs based on public tweets

Análisis sentimental sobre las emprendedoras basado en tweets públicos

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Abstract:

After the declaration of the COVID 19 pandemic, jobs and occupations had to return to normal, however many people lost their main source of resources, so the incorporation of women in different ventures has been a flag to get ahead with work for their families, so the objective of this work is to identify opinions about entrepreneurs, using the technique of sentimental analysis to classify unstructured information from public tweets using for data processing, the *Rstudio* software with the *retweet, word cloud* and *emo* libraries collecting the feelings that people have through the microblogging platform Twitter in the period from June 20 to July 10, 2022. The results show that 74.53% of users perceive positive and very positive feelings toward women entrepreneurs, so it can be concluded that the impact of the incorporation of women entrepreneurs, which although at this time is still uncertain is perceived as an important factor for the economic recovery.

Keywords:

Sentimental Analysis, Entrepreneurs, Twitter

Resumen:

Después de la declaración de la pandemia COVID 19, los empleos y ocupaciones, tenían que regresar a la normalidad, sin embargo a muchas personas, perdieron su principal fuente de recursos, por lo que la incorporación de las mujeres en diferentes emprendimientos ha sido una bandera para salir adelante con trabajo para sus familias, por lo que el objetivo de este trabajo es identificar las opiniones sobre las emprendedoras, utilizando la técnica de análisis sentimental para clasificar información no estructurada a partir de tweets públicos utilizando para el procesamiento de los datos, el software *Rstudio* con las librerías rtw*eet*, *Word cloud* y *emo* recopilando los sentimientos que tienen las personas mediante la plataforma de microblogging *Twitter* en el periodo del 20 de junio al 10 de julio del 2022.Los resultados muestran que el 74.53% de los usuarios perciben sentimiento positivo y muy positivo hacia las mujeres emprendedoras, por lo que se puede concluir que el impacto de la incorporación de las mujeres emprendedoras, que si bien en este momento se mantiene aún con incertidumbre se percibe como un factor importante para la recuperación económica.

Palabras Clave:

Análisis Sentimental, Emprendedoras, Twitter

Introduction

Mexico is recovering from the COVID-19 pandemic, the jobs and occupations must return to normal life, unfortunately during the pandemic people lost their jobs, and that is why women's incorporation in ventures has been a flag to get ahead for their families. According to the Organization for Economic Cooperation and Development [1] in Mexico 11.2% of women start ventures, Mexican women are, by definition, entrepreneurs and in the search to generate greater income for their families, some women

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make their skills a tool for generating value, contributing significantly to the country's economy. On the other hand, social networks help entrepreneurs to interact, publicize what they do, and market, therefore it is important to know the opinion and perceptions about some categories and in this case about #*emprendedoras*. We have focused on the social network Twitter to identify by using 140 characters, what Twitter users post on their profiles about #*emprendedoras*. Although Twitter users are mostly average viewers, not demanding, our research was able to make a good representation of the public perception of women entrepreneurs by extracting the opinion of a large group of people.

Literature Review
Sentimental Analysis

Sentiment analysis is a natural language processing (NLP) technique that identifies important patterns of information and features from a large text. Therefore, it is considered an important option for processing qualitative data, When you can analyze thoughts, attitudes, views, opinions, beliefs, comments, requests, questions, and preferences expressed by a consumer based on emotion rather than a reason in text form toward entities such as services, problems, individuals, products, events, topics, organizations, and their attributes [2], It is a powerful technique in Artificial intelligence that has important business applications.

Barbosa and Feng cited in Shobana et al (2018) have analyzed the sentimental classification on Twitter data. The test data of tweets are collected, they have taken some of the syntax features for analysis of tweets which contains symbols, retweet, emoticons, tags, link, punctuation and exclamation marks, and semicolons in the combination with structures for identifying the polarity of words [3].

It generates important findings to improve a person or company. When a person needed to decide, to buy a product usually asked for the opinions of friends and family and in this way the individual could have an accurate recommendation, however with the new era of the Internet (www), the use of social networks shows in real time the opinions of users. by using sentiment analysis techniques, these data sources can be used to fetch useful information such as prediction of election results, getting user's feedback about any software, analyzing the market reputation of the brand, and obtaining public opinion before launching a new product.

On the other hand, when an organization wanted to identify the opinions or feelings of the public about its products and services, it conducted opinion surveys and focus groups [4]. Therefore, sentiment analysis has many applications especially for the use of companies when obtaining feedback on products through which they can learn and improve for users. Thus, reviews on social networks help to analyze the review of the client and understand their feelings towards what they lived or had at the time of expressing themselves. [5].

Entrepreneurs

Women Entrepreneurship means an act of business ownership, creation, and control that empowers women economically and increases their economic strength as well as position in society. [6]   In 2020, women and youth were particularly hit, by social challenges. Mexico's medium-term growth prospects have weakened and growth over the past two decades has been low. Informality and financial exclusion have hindered women's productivity growth. female participation rates had been notable, in these two years.

According to the latest study by the National Institute of Statistics and Geography (INEGI).[7] In Mexico, women entrepreneurs own 36.6% of micro, small and medium enterprises, which shows that there are still very few women who are entrepreneurs. Another important fact is that according to the Mexican Association of Women Heads of Companies (AMMJE) [8], the companies that constitute Mexican entrepreneurs are mostly focused on consumption (62.3%) and, on average, hire fewer employees than men (1.7 employees vs 1.85 employees).

A report made by Score [9] indicate that women start businesses to get their family ahead, so between the age groups of 35-44 (23%) and 45-54 (23%) they started a business for family considerations and 26% of owners over 65 years old started a business out of necessity, being that only 28% of business owners under 34 years old started a business because they saw an opportunity in the market. Women entrepreneur of the 21st century is potentially motivated for change to improve the living conditions of their family, provide a sharing hand to their husband in income generation, provide quality education to their children, contribute positively by creating job opportunities, empowering other women, and bringing the society out of economic disparity and unemployment.[10]

On the other hand, the Laboratory of Analysis in Trade, Economy and Business (LACEN) of the UNAM, the Mexican Institute for Competitiveness (IMCO), the Tala

research agency, in conjunction with the National Institute of Statistics and Geography (INEGI) [11] shows that those women or mothers who due to the pandemic had to seek sustenance through technology promoted this form of trade, and now they have become one of the sales force with the largest presence in the digital world. That is why after these data, in this work we will try to understand what is thought of women entrepreneurs and how the #emprendedoras is glimpsed through the social network Twitter, to identify positive, negative, or neutral feelings.

Twitter

Twitter was created by a San Francisco-based start-up called Obvious and launched in October 2006. Users send messages limited to 140 characters, using a web interface. Users can indicate whether their messages are public or private, appearing in reverse chronological order in the "public timeline" on the Twitter.com homepage and the user's Twitter page, meaning that only those who are followers can see what is done, which means that only those who are followers can see the messages. According to Mathews, Bianchi, Perks, and Wickramasekera [12] Twitter is a social network that generates a large amount of data and messages that allow us to get in touch in real time with people of interest through text messages also called tweets, which can be segmented by geographical location or collected around a (#) hashtag.

According to Abd-Alrazaq, Alhuwail, Househ, Hamdi, and Shah. (2020) [13]; Social networks provide the opportunity to directly communicate information in real-time follow to the target audience. Twitter as a badge uses the # sign to have tweets that f the thread of the conversation.

That is why it is important to know the opinion and perceptions of entrepreneurs on social networks. why women's incorporation had deep economic and social impacts. Informal workers, Currently, social networks have a good penetration as is Twitter, with its main feature of 140 characters per "tweet", in addition to the hashtag (#) before a relevant keyword or phrase.

Twitter provides enriched information to increase public awareness and inform people about what they are thinking or what is happening, for this work the #emprendedoras, so that the perception towards this issue, shows the feeling it gives at the time of sending the tweet.

Millions of tweets are posted every second. It helps us know how the public is responding to a particular event. To get the sentiments of tweets, about #emprendedoras, by performing the basic sentiment analysis, using the RStudio

program you can understand if the feeling behind a piece of text is positive, negative, or neutral.

Materials And Methods

This research aims to analyze feelings about women entrepreneurs on the social network Twitter. Under the non-experimental, qualitative, grounded theory approach, using the sentimental analysis technique to classify unstructured information in structured data from a piece of text as positive (> 0), negative (< 0), or neutral (0) sentiment, tweets were collected from the public timeline of Twitter.com that have been obtained after connecting to the Twitter API, once the tweets are downloaded, the RStudio software is applied that works to divide the sample (n = 2,296 tweets) into negative, neutral, and positive feelings, which will give guidelines to propose marketing strategies.

For the data extraction, the connection was made to the Twitter API where a total of n = 2,296 tweets were downloaded from comments and interactions made by users about female entrepreneurs *(#emprendedoras)* We built with RStudio a database capable of retrieving the public tweets using Twitter API v1.1 [14] based on the male entrepreneur as chosen hashtag. The tweet content was displayed either as negative, neutral, positive or to be skipped if it was not an opinion. The basic steps of our data acquisitions are shown in Fig. 1.

Figure 1.
Basic data acquisions
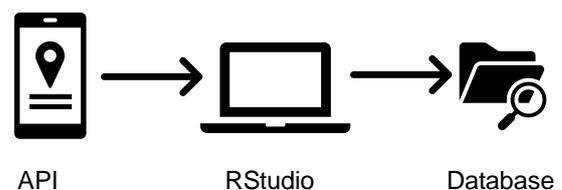
Note: The figure represents the process from API to Database

The data for the dataset was acquired between June 20 to July 10, 2022. The hashtags on which our data acquisition process was focused on female entrepreneurs., are shown in Table 1.

Table 1.
Extract tweets based on conditions for categorizing

[1] "Inicia tu negocio online desde la comodidad de la casa, un coworking o café y ¡Conviértete en tu propia jefa! 📲\n\nEl Negocio de la Asistencia Virtual para Emprendedoras \n\n¡Te invitamos a registrarte con 50%

de descuento!\n\nAprenda Fácil Online ☑\nhttps://t.co/9rJTfALiTx **https://t.co/RroBvX7ydb**"

[2] "Estoy harta de fingir que no quiero poner un negocio y ser parte de las 🐾emprendedoras🐾"

[3] "¿Y q pasó con el tema de las nenis y el Mercado de Sabores @AleCanedoP @DesaEcoPue? Este sábado hicimos un recorrido y la explanada lucía vacía, al igual que en marzo pasado, cuando la administración municipal aseguraba que había buena respuesta por parte de las emprendedoras https://t.co/tPvkwKcg3d"

[4] "Conversando con mujeres emprendedoras y con jóvenes del @ppcpy @esperanza_py\n\nTodos coinciden en lo que quieren para la ciudad y para el país, seguridad, servicios públicos de calidad, transporte público, educación y salud. Historias de nuestro país que se repiten.. **https://t.co/iGGecmQxcp**"

[5] "Este día, emprendedoras sonzacatences participaron del evento #MercaMujer, en el parque de Sonsonate, actividad impulsada por el ISDEMU.\nAl evento también asistió nuestro alcalde Marvin Sánchez.\n\n#MarcandoUnaNuevaHistoria\n#MarvinSánchezAlcalde **https://t.co/1HjgR7tMDZ**

[6] "Necesito amigas que les guste salir, darlo todo, que les guste viajar, con sueños, que sean emprendedoras, que les guste bailar, cantar, leales, que les puedas contar todo, que sean tu persona."

Note: The tweets were focused on female entrepreneurs

Results

Subsequently, the extracted and clean data were analyzed using the word cloud library, to understand what users are perceiving and found that entrepreneurs are cheerful, innovative, promote freedom of time, are active, and with a lot of endurance towards activities without rest, and it is shown in figure 2.

Figure 2.
Word Cloud for #emprendedoras

Note: The figure represents a sentimental analysis of female entrepreneurs.

Likewise, the data from the emojis, which were found in the tweets, were analyzed to understand the perception of the users in their conversations, since it was observed that not all the texts of the tweets are only texts; it is also possible to find emoticons that are telling us something, by installing, #devtools::install_github("Hadley/emo") in RStudio and the emo library, where users manifest through emojis that female entrepreneurs are strong and winning, support their families, we can visualize in figure 3

Figure 3.
Emoticons for #emprendedoras

Note: The figure represents the great, strong, and powerful female entrepreneurs

On the other hand, the total numbers of the #emprendendoras tweets were 2,296 which was divided by the sentiment for datasets listed in Table 2.

Table 2.
Number of the Twitter dataset

Sentiment <chr>	Data	Percentage <dbl>
Negative	513	22.34
Neutral	72	3.15

Positive	1,711	74.53
All	2,296	100

Note: The dataset represents the negative, neutral or positive feeling for #entrepreuneurs

Discussion

The opinions of Twitter users about female entrepreneurs are very important since they provide us with information, which is what they think about women entrepreneurs using big data technology and machine learning to approach the measurement of some emotional responses, whether positive, negative, or neutral.

Knowing these data allows the creation of new social marketing strategies, to boost entrepreneurs, we have seen that the pandemic empowered women to look for other ways to support their families, and with the information obtained, we can create campaigns to help the growth of women who seek to get ahead.

An interesting area of future work would also be profiling users based on their opinions as well as where they are and from what device they communicate, the moment in which they make the tweet has a lot to do with the opinions and feelings they generate.

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