PUBLIC PERCEPTION OF LAW ENFORCEMENT: AN ANALYSIS OF TWITTER USER ENGAGEMENT WITH THE DALLAS POLICE DEPARTMENT

Tereza Raquel Merlo[1];
Nayana Madali Pampapura[2];
Jason Merlo[3];

Abstract: This research paper focuses on evaluating user responses and behaviors on Twitter presenting an analysis of tweets mentioning the Dallas Police Department. Data analysis is performed to investigate tweet frequency and patterns related to the law enforcement agency. Additionally, sentiment analysis and topic modeling techniques are employed to gain deeper insights into the content and context of user tweets. The research findings reveal that users tend to increase their tweeting activity whenever there is an incident involving the agency. Moreover, the results indicate that users generally express a neutral sentiment towards the law enforcement agency, with their tweets largely reflecting personal opinions. Overall, this study provides valuable insights into user behavior and sentiments concerning the Dallas Police Department, demonstrating the significant role of social media platforms in shaping public perceptions and online interactions with the agency.

Keywords: social media; sentiment analysis; law enforcement; user behavior; data visualization.

PERCEPÇÃO PÚBLICA DA APLICAÇÃO DA LEI: UMA ANÁLISE DO ENGAJAMENTO DO USUÁRIO DO TWITTER COM O DEPARTAMENTO DE POLÍCIA DE DALLAS

Resumo: Este artigo de pesquisa concentra-se em avaliar as respostas e comportamentos dos usuários no Twitter, apresentando uma análise de tweets que mencionam o Departamento de Polícia de Dallas. A análise de dados é realizada para investigar a frequência e padrões de tweets relacionados à agência de aplicação da lei. Além disso, técnicas de análise de sentimento e modelagem de tópicos são empregadas para obter insights mais profundos sobre o conteúdo e contexto dos tweets dos usuários. As descobertas da pesquisa revelam que os usuários tendem a aumentar sua atividade de tweets sempre que há um incidente envolvendo a agência. Além disso, os resultados indicam que os usuários geralmente expressam um sentimento neutro em relação à agência de aplicação da lei, com seus tweets refletindo principalmente opiniões pessoais. No geral, este estudo fornece insights valiosos sobre o comportamento e os sentimentos dos usuários em relação ao Departamento de Polícia de Dallas, demonstrando o papel significativo das plataformas de mídia social na formação das percepções públicas e interações online com a agência.

1 College of Information, LIS – University of North Texas (UNT) Denton – United States. ORCID: https://orcid.org/0000-0002-2042-5415. e-mail: tereza.merlo@unt.edu

2 College of Information, LIS – University of North Texas (UNT) Denton – United States. ORCID: https://orcid.org/0000-0002-7707-1304. e-mail: nayanapampapuramadali@my.unt.edu

3 Texas Department of Public Safety (DPS) Austin – United States. ORCID: https://orcid.org/0009-0007-4281-7755. e-mail: jasonmerlo@hotmail.com

Palavras-chave: mídias sociais; análise de sentimentos; aplicação da lei; comportamento do usuário; Visualização de dados.

PERCEPCIÓN PÚBLICA DE LA APLICACIÓN DE LA LEY: UN ANÁLISIS DE LA COMPROMISO DE LOS USUARIOS DE TWITTER CON EL DEPARTAMENTO DE POLICÍA DE DALLAS

Resumen: Este artículo de investigación se enfoca en evaluar las respuestas y comportamientos de los usuarios en Twitter, presentando un análisis de tweets que mencionan el Departamento de Policía de Dallas. Se realiza un análisis de datos para investigar la frecuencia y patrones de los tweets relacionados con la agencia de cumplimiento de la ley. Además, se emplean técnicas de análisis de sentimiento y modelado de temas para obtener una comprensión más profunda del contenido y contexto de los tweets de los usuarios. Los resultados de la investigación revelan que los usuarios tienden a aumentar su actividad de tweets cada vez que hay un incidente relacionado con la agencia. Además, los resultados indican que los usuarios generalmente expresan un sentimiento neutral hacia la agencia de cumplimiento de la ley, siendo sus tweets en su mayoría reflejo de opiniones personales. En general, este estudio proporciona información valiosa sobre el comportamiento y los sentimientos de los usuarios con respecto al Departamento de Policía de Dallas, demostrando el papel significativo de las plataformas de redes sociales en la formación de percepciones públicas e interacciones en línea con la agencia.

Palabras clave: redes sociales; análisis de los sentimientos; cumplimiento de la ley; comportamiento del usuario; Visualización de datos.

1 INTRODUCTION

Social media platforms are tools that enable individuals to actively create, share, and exchange various types of content, thoughts, interests, and information within virtual communities and networks. Social media use and popularity has significantly expanded over the past couple of decades (Abi-Jaoude Naylor, & Pignatiello, 2020). As reported by Pew Research Center in 2021, 72% of the U.S. public use some kind of social media, with usage being higher among young adults (ages 18-29) than among older people (Social Media Fact Sheet, 2021; Ortiz-Ospina, 2019). According to the latest reports, as of 2023 the U.S. has around 302.35 million social media users which is approximately 90% of the total US population (Ruby, 2023). Per reports, in 2023 Facebook, YouTube, and Instagram are the top three social media platforms (Iskiev, 2023; Ruby, 2023).

Social media often serves as a platform or channel for communication, aiding in forming relationships between people from diverse backgrounds (Kapoor et al., 2018). People mostly rely on social media to share their opinion, exchange their views, and share news/information

(Vrontis et al., 2021). Because of its capacity to facilitate interaction with others, social media has a large impact on people's lives. While social media has improved people's lives in certain ways it also has its disadvantages, as some individuals engage in undesirable social media behavior such as committing crimes, spreading false information, and fabricating news. Social media serves various purposes, one of those being for users to voice their thoughts and opinions. Social media users actively participate/engage in conversations that are of public interest and express their opinions (Barisione et al., 2019; Yang & Su, 2020).

Many law enforcement agencies understand the importance of social media and its use for various purposes. Law enforcement use of social media can include gathering intelligence, investigating leads, identifying suspects, engaging with the public, etc. Almost all law enforcement agencies in the U.S. have social media accounts across the various available platforms. These pages are used to post useful information as well as to make important announcements. Many social media users follow these pages to stay informed and actively participate by responding to the posts made by law enforcement.

Although law enforcement uses social media in many ways, there is not much research related to the social media users' sentiments and responses towards law enforcement agencies or understanding the social media user behavior. This study attempts to bridge this gap by analyzing public response, behavior, and sentiment toward law enforcement. This study is guided by the question “What is the behavior and sentiment of social media users towards law enforcement?”.

2 THEORETICAL FRAMEWORK

Over the last decade, social media channels have become a popular source of communication among members of communities across the globe. Law enforcement agencies worldwide are increasingly leveraging the power of social media to communicate directly and in a timely manner with the communities their serve, whether seeking support in crime solving, crisis mediation, crime prevention, or the overall increase in community engagement. Akar and Mardikyan (2014) conducted a study on the proliferation of technology and the increasing use of the internet defending that those are some of the factors that have contributed to the expansion of social media use by citizens. Law enforcement is using social media to go beyond simple communication, they seek to build relationships. Crump (2012) examined social media and public engagement as used to increase public trust and confidence in the ability of the police to reduce/resolve crime, highlighting the importance of the engagement of social media users and the discussion around local policing.

Akkaya et al. (2019) focused on the use of social media as a strategy in the investigation of a 2016 shooting in Munich. The authors argue that the use of social media, specifically Twitter, played a crucial role in crisis mitigation and public perceptions and the level of interaction online thereafter. The authors demonstrated a successful case of law enforcement using social media in an emergency situation with a documented growth in the degree of community engagement and followers with a positive message and trust in the agency.

Previous studies have investigated police adoption of social media to evaluate citizens' engagement, information sharing, crime prevention, etc. Fernandez, Dickinson and Alani (2017) investigated how social media is being used by law enforcement to communicate with the community about crimes, missing persons, and citizen engagement. Their work concludes that there are effective strategies and specific topics that are more likely to drive a higher level of interaction and increase the probability of attracting citizens' attention to postings. Fernandez et al. (2015) defend that social media is now commonly used to help communicate policing messages to the general public, helping communicate important and timely messages to a wider demographic, enabling greater engagement.

These works focus on improving the understanding of the use of social media by law enforcement agencies with relevant results. There are still gaps in knowledge on how users' responses and behaviors are related to the users' engagement in social media and the success of law enforcement in the goal of serving and protecting, as well as designing policies that are transparent and aligned with the communities' needs and trust.

3 METHODOLOGY

3.1 DATA COLLECTION

In this paper, we conduct a study to analyze public reactions toward law enforcement agencies on social media, specifically focusing on data collected related to the Dallas Police Department (DPD) on Twitter. Established in 1881, DPD is the primary law enforcement agency serving the city of Dallas, Texas (Dallas Police Department, 2023). It is one of the largest law enforcement agencies in the United States and is divided into seven operations divisions based on the geographical subdivisions of Dallas City (List of largest local police departments in the United States, 2023; Dallas Police Department, 2023).

Twitter is one of the most widely used social media platforms. Twitter is a real time network and functions as a communication medium and facilitates connections between friends, family, coworkers, etc. by sharing information via "tweets" (Waters & Jamal, 2011). On Twitter, users can post tweets consisting of text, photos, videos, or links, with a limit of 280

characters. Users can also reply, comment, retweet, or quote other users' tweets to express their opinions or share information. Twitter was chosen as the platform for data collection for several reasons. First, Twitter provides multiple Application Programming Interfaces (APIs) that facilitate the extraction of different data, such as the tweet content, user IDs, user geographical location details, etc. Second, Twitter is one of the widely used social media platforms (Akar & Mardikyan, 2014). Finally, DPD actively uses Twitter to share information and communicate with the public.

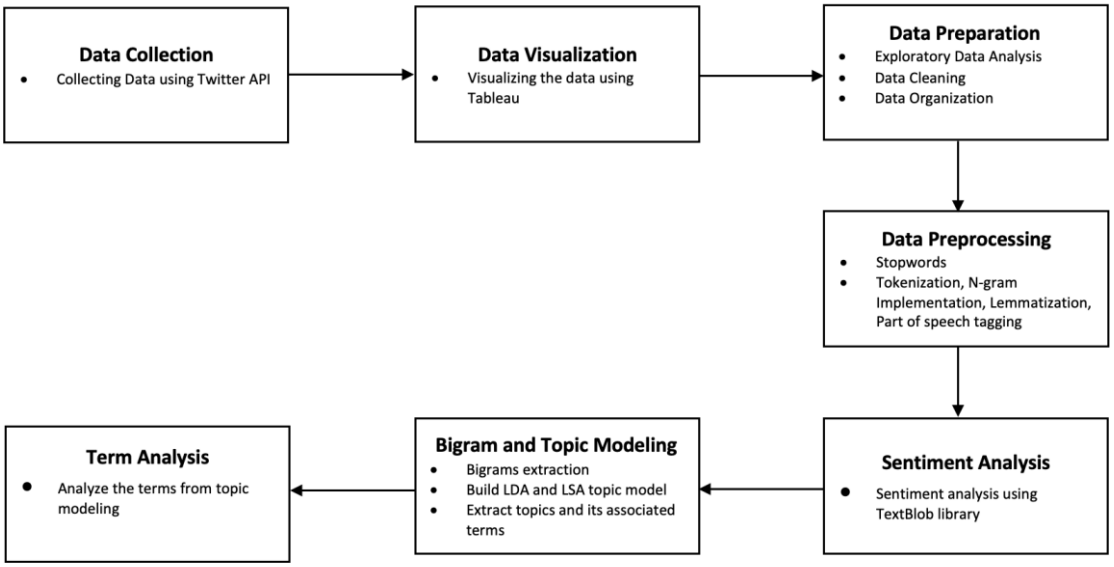
The official Twitter page of the DPD (@DallasPD) was created in 2009 and has amassed approximately 370,000 followers. For this paper, we collected data from the inception of DPD's Twitter account until June 20th, 2023. We used the Twitter API to extract all tweets that mentioned the DPD username. In total, we retrieved 310,767 tweets from Twitter for analysis. To collect the data, we developed a Python code that utilized the Twitter API. The extracted data included information such as tweet ID, tweet content, date and time of creation, number of retweets, mentions, comments, and other relevant details. This comprehensive dataset provided the foundation for our study on public sentiment and reactions towards DPD on social media.

3.2 RESEARCH DESIGN

To gain a deeper understanding of the collected data, we performed data visualization using Tableau software. The extracted dataset was imported into Tableau, allowing us to create visualizations that provided valuable insights into the tweet trends related to the Dallas Police Department. Tableau is a powerful data visualization tool that enables users to visually explore and analyze data in an intuitive and interactive manner. By utilizing Tableau, we were able to generate visual representations of the data, making it easier to identify patterns, trends, and correlations within the tweets associated with the Dallas Police Department.

Python programming language was utilized to perform various tasks including exploratory data analysis (EDA), data preprocessing, sentiment analysis, bigram analysis, and topic modeling. Python is a versatile programming language that prioritizes code readability. It follows an object-oriented approach, where objects store both data (fields) and code (procedures/methods). Python is an open-source language that is freely available. The Anaconda software was employed for writing and running Python programs.

Figure 1 - Research Design



Source: The authors (2023)

Exploratory data analysis (EDA) is a data analysis approach that utilizes different techniques to gain insights into a dataset, identify significant variables, and detect outliers and anomalies. In this study, EDA was conducted to comprehend the dataset, identify potential null values in the columns, and eliminate irrelevant text. Moreover, EDA was employed to analyze the dataset and summarize its key characteristics using visual methods. Subsequently, the data was cleaned to eliminate unnecessary text, symbols, and links. Additionally, the data was organized to facilitate further analysis.

Once the data preparation phase was completed, the data underwent preprocessing before conducting sentiment analysis and topic modeling. Multiple methodologies were employed for data preprocessing:

1. Defining and implementing stop words: Stop words are commonly used English words that carry little semantic meaning in a sentence. In this step, stop words were defined and then implemented using Python. Words such as "me," "we," and "will" were removed from the analyzed data/text after implementing the stop words. The Natural Language Toolkit (NLTK) Python library was utilized to define and implement the stop words.
2. Tokenization: Tokenization is a technique used to split words within sentences into individual units called "tokens." Each token represents a word. During this process, tokens are converted to lowercase, and any letter accents and punctuation marks are removed. Additionally, shorter tokens are disregarded. Tokenization can be classified

into word tokenization, character tokenization, and subword (n-grams) tokenization. In this research, both word and subword tokenization were employed.

3. N-gram implementation: This method involves extracting sequences of "n" words that frequently occur in the corpus. While tokenization focuses on individual words, N-gram implementation considers sequences of words. In this research, specifically bigrams (two words in sequence) were extracted and utilized. Gensim's phrases model was employed to construct and implement the bigrams.

4. Lemmatization: Lemmatization aims to remove inflectional endings from tokens and return the base or dictionary form of the word. It helps to reduce words to their canonical or normalized form. For instance, lemmatizing the word "using" would transform it into "use," which represents the base form of the word.

5. Part of speech tagging: During this step, each token/word is labeled with a part of speech tag, indicating whether it is a noun, adjective, adverb, etc. In this research, after performing part of speech tagging, only tokens/words with specific parts of speech tags such as noun, adjective, verb, and adverb were retained, while other tags were discarded. After preprocessing the data, a word dictionary and a corpus were constructed based on the preprocessed data. The word dictionary contained all the unique words found in the preprocessed data, while the corpus provided information about word frequencies.

Subsequently, sentiment analysis was performed on the data, specifically focusing on the tweet content. Sentiment analysis involves computationally studying people's emotions towards a particular entity, in this case, the tweet data. The Python library "TextBlob" was utilized to process the data and conduct sentiment analysis. TextBlob employs the Natural Language Toolkit (NLTK) to analyze text and assign sentiment to it. Sentiment in TextBlob is defined by the semantic orientation and intensity of each word within a sentence. The analysis conducted by TextBlob returns two values: polarity and subjectivity. The polarity value indicates the sentiment of the text, ranging from -1 (negative sentiment) to 1 (positive sentiment), with 0 representing neutral sentiment. Additionally, TextBlob provides the subjectivity of the text, which lies between 0 and 1. Subjectivity quantifies the degree of opinion present in the text, with higher values indicating a greater presence of subjective content rather than purely factual information.

Bigrams were extracted and analyzed following the sentiment analysis. Bigrams refer to two frequently occurring words in the corpus. Extracting bigrams helps in understanding which words occur together frequently along with their frequency. Bigrams aid in identifying the relationships among the words. Further, topic modeling techniques were employed to create

two topic models. Topic modeling is a statistical method used to identify abstract "topics" that appear in a collection of documents or text. It is a text-mining tool that aims to uncover underlying semantic structures within a body of text. Topics generated by topic modeling techniques are clusters of related words. This process captures the statistical patterns of words in each text, allowing the identification and determination of the frequency of relevant topics. A text can contain one or more topics, and each topic can include multiple terms associated with it. The following topic modeling techniques were utilized in this research:

1. Latent Dirichlet Allocation (LDA): LDA assumes that documents are produced from a mixture of topics, and these topics generate words based on their probability distribution. Using a dataset of documents, LDA retroactively infers the topics that would likely generate those documents. In this research, an LDA model was constructed using the "Mallet" package, which is a Java-based tool for statistical natural language processing, document classification, clustering, topic modeling, and other machine learning applications for text.
2. Latent Semantic Analysis (LSA): LSA aims to reduce dimensions for classification purposes. It assumes that words with similar meanings tend to occur in similar pieces of text (the distributional hypothesis). LSA involves constructing a matrix that contains word counts per document from a large text corpus. The matrix is then subjected to singular value decomposition (SVD), a mathematical technique that reduces the number of rows while preserving the similarity structure among columns. Documents are compared by calculating the cosine of the angle between two vectors formed by any two columns, representing their similarity. Values close to 1 indicate highly similar documents, while values close to 0 represent dissimilar documents. In this research, an LSA model was developed using the "Gensim" library and the "LsiModel" function.

4 RESULTS

4.1 DATA VISUALIZATION

The dataset comprised a total of 310,767 tweets that mentioned "@DallasPD". In Tableau, a bar chart (Figure 2) was created to analyze the distribution of tweets mentioning "@DallasPD" per year. From the chart, it is evident that the year 2016 witnessed the highest number of tweets mentioning "@DallasPD", totaling 81,083 tweets. Following 2016, the second-highest count of tweets occurred in 2020, with a total of 43,880 tweets mentioning " @DallasPD".

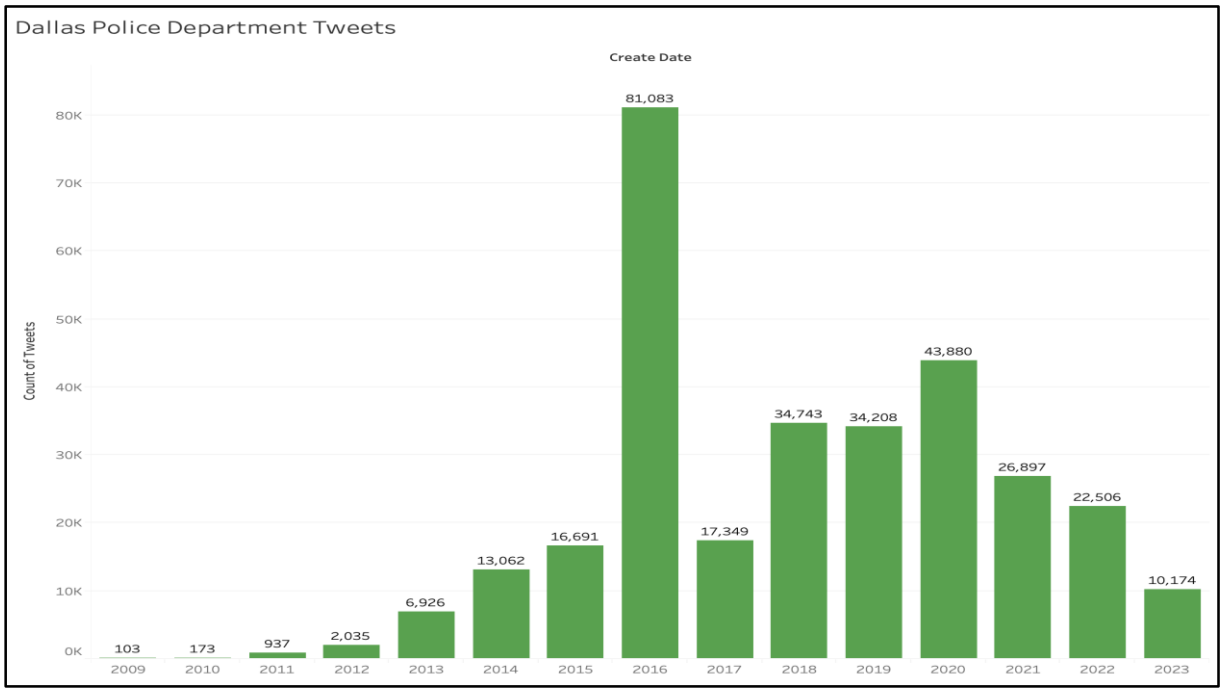


Figure 2 - Bar plot that displays the number of tweets per year

To investigate the reason behind the highest number of tweets in 2016, all the tweets generated in 2016 were filtered out. Subsequently, a bar plot (Figure 3) was created to visualize the monthly distribution of tweets for the year 2016. The analysis revealed that July 2016 had the most significant number of tweets, totaling 62,348 mentions of "@DallasPD". This observation provides valuable insight into the specific month that contributed heavily to the overall high tweet count in the year 2016.

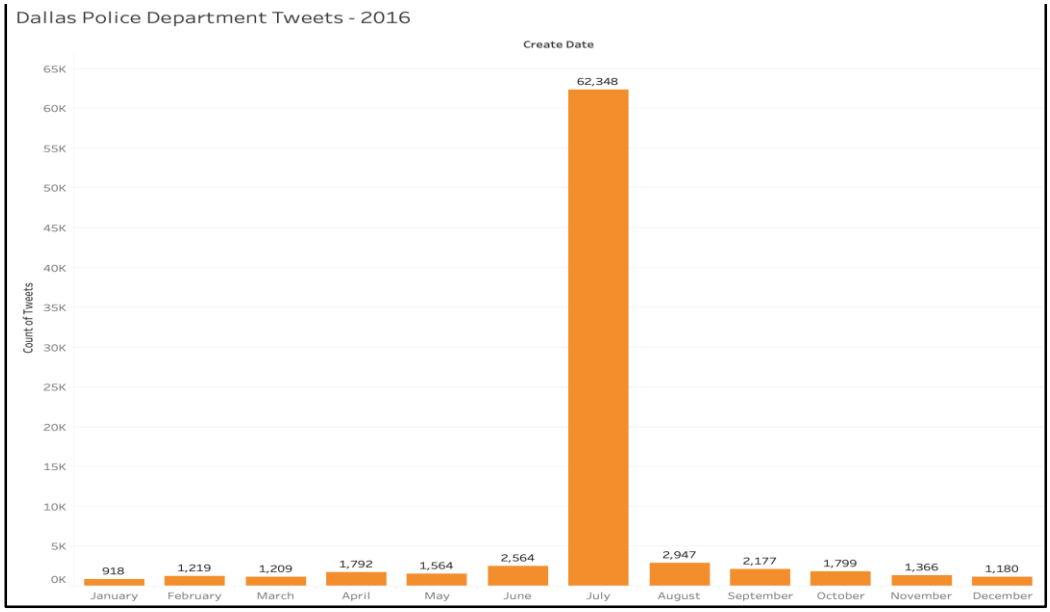


Figure 3 - Bar plot that displays monthly distribution of tweets in the year 2016

To further investigate the reason behind the highest number of tweets in July 2016, the tweets generated specifically during that month was filtered and daily distribution of tweets (Figure 4) was plotted for July 2016. From the chart, it was discovered that the 8th of July had the highest tweet count, with 43,360 mentions of "@DallasPD".

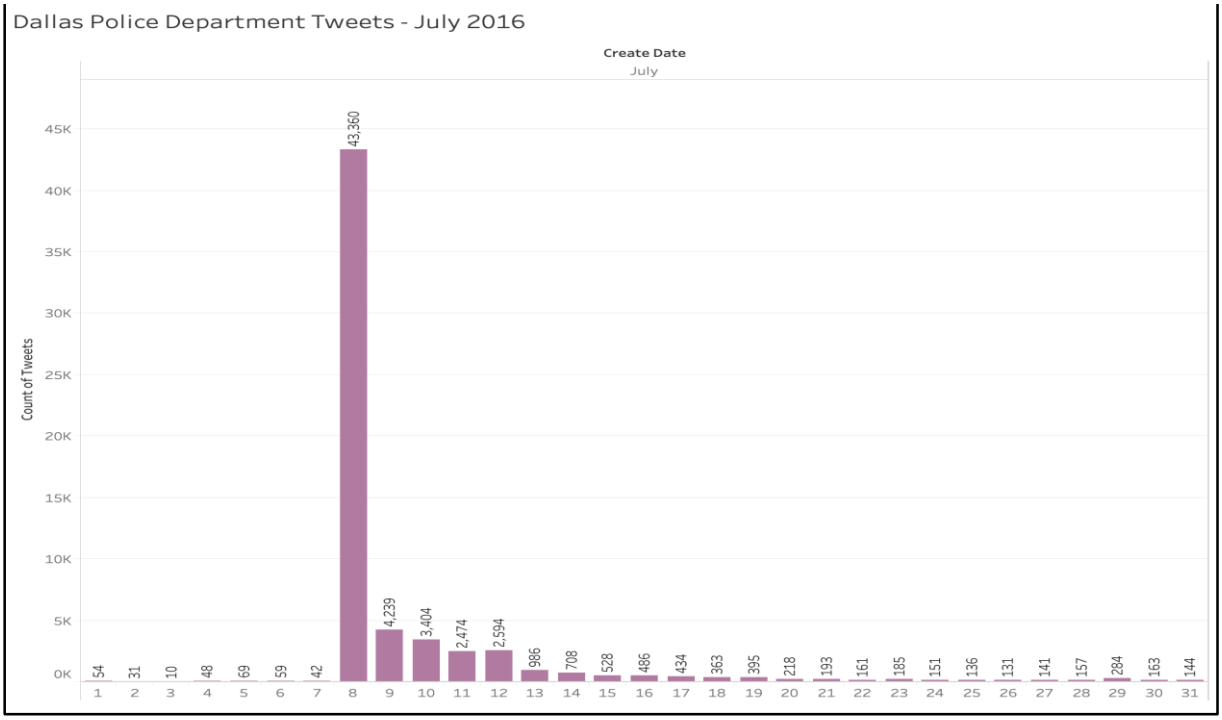


Figure 4 - Bar plot that displays the daily distribution of tweets in July 2016

To better understand the significance of this particular date, a carefully analyze of the content of the tweets from July 8th was performed, which evidenced that the reason for the surge in tweets on that day was directly related to a tragic event that occurred on July 7th, 2016. On that evening, five Dallas police officers were fatally shot during a protest against the police killings of two black men, Alton Sterling and Philando Castile. The perpetrator of the shooting was identified as Micah Xavier Johnson, and the motive behind his actions was anger over the police shootings of black men.

The shooting incident and its aftermath garnered widespread attention and sparked a significant outpouring of public response and discussions on social media, particularly on Twitter. This explains the exceptionally high number of tweets mentioning "@DallasPD" on July 8th, 2016, as people were sharing their thoughts, reactions, and emotions regarding the tragic event and its impact on the Dallas community and beyond.

4.2 SENTIMENT ANALYSIS

Following the completion of the data visualization and data cleaning and preprocessing a sentiment analysis was performed on all the retrieved tweets. The sentiment analysis provided two key scores for each tweet: 1) the subjectivity score, which indicates whether the tweet is based on personal opinion or factual information, and 2) the polarity score, which indicates the sentiment expressed in the tweet.

The results of the sentiment analysis showed that 56.93% (176,908 tweets) of the tweets related to the Dallas Police Department were subjective in nature, meaning they were based on personal opinions rather than objective facts. In contrast, 43.07% (133,859 tweets) of the tweets were objective and fact-based.

Further analyzing the sentiment of the tweets, the sentiment analysis revealed that 47% (146,047 tweets) of the tweets were neutral, expressing neither positive nor negative sentiment. Positive tweets accounted for 32.69% (101,577 tweets), and negative tweets constituted 20.32% (63,143 tweets) of the total tweets.

To provide a visual representation of the subjectivity and polarity scores, we created a pie chart (Figure 5). The chart illustrates the distribution of subjective and objective tweets, as well as the proportion of neutral, positive, and negative sentiments expressed in the tweets related to the Dallas Police Department.

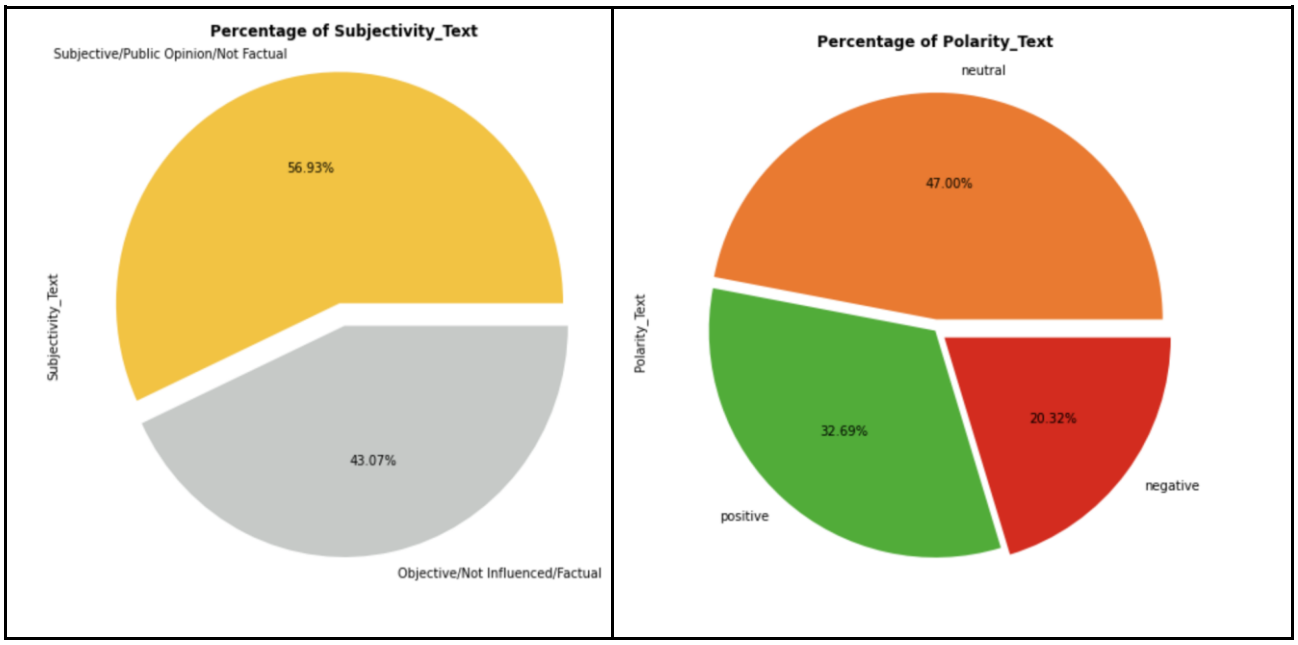


Figure 5 - Subjectivity and Polarity Scores Pie Chart

4.3 BIGRAM ANALYSIS

Pursuing a deeper insights into the relationships among words, a bigram analysis was performed. This analysis allowed us to identify commonly occurring word pairs within the

dataset. We extracted the top 30 frequently occurring bigrams and visualized them as a network diagram (Figure 6). From Figure 6, it became evident that the handle of the Dallas Police Department, "@DallasPD," was one of the most frequently mentioned words, and it was commonly associated with terms like "@chiefhalldpd" and "@dpdchiefgarcia." This indicates that in many tweets, users referred to "@DallasPD" together with the Twitter handles of Chief Hall and Chief Garcia, suggesting a close association between them. Furthermore, it is noteworthy that "@DallasPD" was frequently mentioned alongside "fortworthpd," indicating that there were interactions or discussions between the Dallas Police Department and the Fort Worth County Police Department on Twitter. Overall, the bigram analysis provided valuable insights into the co-occurrence patterns of words in the dataset, shedding light on specific associations and mentions within the tweets related to the Dallas Police Department.

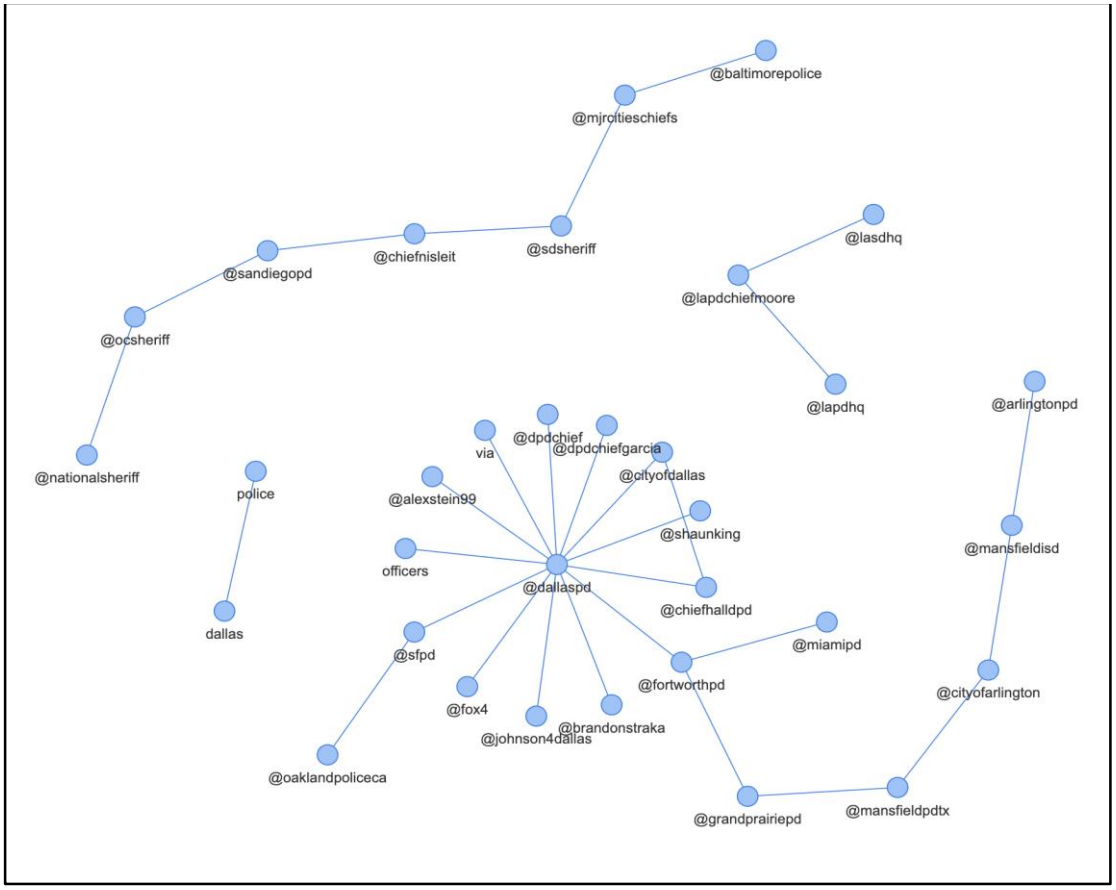


Figure 6 - Bigram Network Diagram

4.4 TOPIC MODELING ANALYSIS

4.4.1 LATENT DIRICHLET ALLOCATION (LDA)

The dataset underwent topic extraction using the Gensim library, resulting in a total of 75 topics. Each topic was associated with 10 specific terms, allowing for interpretation based on these terms. For instance, topic 2 included words such as "time," "long," "response,"

"difficult," "move," "quick," and "wait." From these terms, we can infer that the Dallas Police Department (DPD) might take a considerable amount of time to respond, and it could be challenging to move quickly in certain situations.

Table 1 presents the first 10 topics extracted from the Latent Dirichlet Allocation (LDA) analysis, offering insights into the recurring themes and subjects found within the dataset. The interpretation of each topic can provide valuable information about the prevalent discussions and concerns surrounding the Dallas Police Department on Twitter.

Table 1 - LDA Topics

Topic	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6	Term 7	Term 8	Term 9	Term 10
Topic 1	thing	wrong	agree	talk	completely	folk	realize	totally	party	understand
Topic 2	time	long	response	week	difficult	spend	move	quick	wait	reporter
Topic 3	live	watch	conference	video	update	deep	press	start	begin	retweet
Topic 4	dog	throw	water	head	leave	cool	animal	poor	horse	eat
Topic 5	cop	bad	kill	blame	reason	killer	hell	coffee	prison	horrible
Topic 6	public	safety	face	cover	late	place	hand	covid	important	news
Topic 7	drug	deal	witness	case	trial	dealer	testify	cash	sell	gang
Topic 8	gun	carry	open	weapon	legal	state	control	rifle	illegal	firearm
Topic 9	pay	money	judge	attention	sign	fraud	give	attorney	tax	dollar
Topic 10	hour	wait	drive	sound	leave	back	set	buy	weed	dude

4.4.2 LATENT SEMANTIC ANALYSIS (LSA)

A total of 75 topics were extracted for the Dallas Police Department (DPD) using latent semantic analysis. Similar to LDA, each topic in LSA was represented by 10 associated terms, enabling interpretation based on these terms. For instance, consider topic 3, which included words such as "make," "man," "see," "murder," "suspect," "black," and so on. From these terms,

it can be inferred that this topic revolves around a potential scenario where a black man is suspected in a murder.

Table 2 presents the first 10 topics extracted using LSA, offering insights into the recurring themes and subjects found within the dataset related to the DPD. By analyzing the associated terms for each topic, we can gain a deeper understanding of the prevalent discussions and topics of interest concerning the Dallas Police Department on Twitter.

Table 2 - LSA Topics

Topic	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6	Term 7	Term 8	Term 9	Term 10
Topic 1	know	see	need	take	family	thank	help	man	make	shoot
Topic 2	see	take	need	make	help	man	know	suspect	black	say
Topic 3	make	take	man	see	good	murder	know	suspect	thank	black
Topic 4	need	take	make	help	good	know	suspect	shoot	find	thank
Topic 5	shoot	man	suspect	make	say	family	officer	take	black	need
Topic 6	good	make	work	great	job	shoot	see	cop	thank	take
Topic 7	kill	suspect	would	help	cop	man	need	people	shoot	find
Topic 8	help	kill	suspect	shoot	need	would	man	find	call	murder
Topic 9	would	kill	good	make	know	man	think	see	suspect	take
Topic 10	good	great	work	safe	kill	keep	time	would	thank	suspect

5 DISCUSSION

The analysis of both user sentiments and the content of tweets provides valuable insights into user perceptions and behaviors towards law enforcement agencies. Figures 2 and 3 clearly indicate a significant increase in tweets mentioning "@DallasPD" in July 2016. Further investigation revealed that this surge was due to a tragic shooting event involving police officers. This finding suggests that users tend to tweet more about a law enforcement agency when there is a notable incident involving that agency. The sentiment analysis revealed most tweets expressed personal opinions rather than being fact-based. Moreover, most users displayed a neutral sentiment towards law enforcement agencies in their tweets.

Figure 6, the network diagram of bigrams, highlighted a frequent association of "@DallasPD" with the chief of the law enforcement agency. This suggests that users often mentioned the chief in their tweets to capture their attention. Additionally, the network diagram indicated that many tweets linked "@DallasPD" with "@fortworthpd," possibly to bring incidents or relevant information related to Fort Worth Police Department to the attention of Dallas Police Department, or vice versa. Topic modeling through both LDA and LSA enabled the identification of various topics and their associated terms. For instance, one topic from LDA implied that the Dallas Police Department might experience challenges in responding quickly, while another topic from LSA suggested a scenario involving a suspected black man in a murder. In conclusion, the comprehensive analysis of user sentiments, tweet content, bigrams, and topics provides a nuanced understanding of user perceptions, behaviors, and interactions related to the Dallas Police Department on Twitter. Such insights are valuable for law enforcement agencies to gauge public sentiment and engage with the community effectively.

6 LIMITATION AND FUTURE RESEARCH

This study's findings may not be representative of all social media users' behavior and attitudes, as it focused on a specific law enforcement agency and utilized data from Twitter only. To gain a more comprehensive understanding of user behavior, future research could expand the scope to include multiple law enforcement agencies, and perhaps multiples social media platforms. This broader approach would allow for a more generalized analysis of user behavior across different law enforcement organizations, and the possibility of a meaningful comparative study between agencies and communities responses, engagement, and sentiments.

Moreover, exploring data from various social media platforms such as Facebook, LinkedIn, and others would be beneficial for future research. Analyzing user behavior across different social media platforms could reveal differences in how individuals engage and express their attitudes towards law enforcement agencies. Additionally, comparing user behavior among various social media platforms could provide valuable insights into the nuances of each platform's impact on public perception and interactions with law enforcement. In conclusion, future studies that encompass a wider range of law enforcement agencies and incorporate data from diverse social media platforms will contribute to a more comprehensive understanding of user behavior and attitudes towards law enforcement on social media.

7 CONCLUSION

This study provides valuable insights into user behavior and sentiments toward law enforcement agencies on social media. By analyzing the tweeting patterns of users, it becomes evident that social media users tend to mention law enforcement agencies primarily in response to relevant events or incidents. Moreover, the study highlights that users' tweets are driven by their personal opinions, with a majority expressing a neutral sentiment towards law enforcement agencies. The utilization of bigram and topic modeling techniques allows for a deeper understanding of the content and themes prevalent in users' tweets. By acknowledging the public's expression of opinions through social media, law enforcement agencies can gain insight into their constituents' needs and concerns. This knowledge can be instrumental in improving the agency's services and public relations. (Fernandez, et al., 2017).

Law enforcement agencies can leverage the findings from this study to enhance their presence and image on social media platforms. By actively analyzing tweets and their content, agencies can proactively address concerns and engage with the public in a more informed manner. Understanding user sentiments and behaviors will enable law enforcement agencies to adapt their communication strategies and effectively respond to emerging issues or events. In conclusion, this study emphasizes the significance of considering social media as a platform for public expression and opinion. By leveraging the insights gained, law enforcement agencies can work towards improving their interactions with the public and, consequently, their overall image and service provision. Therefore, by leveraging social media, law enforcement can enhance their crime-solving efforts and strengthen their connection with the communities they serve. This research work aims to explore the advantages of social media utilization in law enforcement and help communities to stay better informed, and enhance trust in law enforcement agencies.

REFERENCES

Abi-Jaoude, E., Naylor, K. T., & Pignatiello, A. (2020). Smartphones, social media use and youth mental health. *Canadian Medical Association Journal (CMAJ), 192*(6), E136-E141.

Akar, E., & Mardikyan, S. (2014). Analyzing factors affecting users' behavior intention to use social media: Twitter case. *International journal of business and social science, 5*(11), 85-95.

Barisione, M., Michailidou, A., & Airoldi, M. (2019). Understanding a digital movement of opinion: The case of #RefugeesWelcome. *Information, Communication & Society, 22*(8), 1145-1164.

Akkaya, Cigdem; Fedorowicz, Jane; and Krcmar, Helmut, (2019). Successful practices for using social media by police departments: a case study o the Munich police. In

Proceedings of the 27th *European Conference on Information Systems* (ECIS), Stockholm & Uppsala, Sweden, June 8-14, 2019. ISBN 978-1-7336325-0-8

Crump, J. (2012). What are the police doing on Twitter? Social media, the police and the public. *Policy & internet*, *3*(4), 1-27.

Dallas Police Department. Wikipedia. (2023, July 7). Retrieved July 7, 2023, from: https://en.wikipedia.org/wiki/Dallas_Police_Department

Fernandez, M., Dickinson, T., Alani, H. (2017). An Analysis of UK Policing Engagement via Social Media. In: Ciampaglia, G., Mashhadi, A., Yasseri, T. (eds) *Social Informatics*. *SocInfo*, 2017. V.10539. 298-304. Springer, Cham.

Iskiev, M. (2023, April 10). The Fastest Growing Social Media Platforms of 2023. New Data. HubSpot. https://blog.hubspot.com/marketing/fastest-growing-social-media-platforms#article

Kapoor, K. K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2018). Advances in social media research: Past, present and future. *Information Systems Frontiers*, *20*(3), 531-558.

List of largest local police departments in the United States. In Wikipedia. Retrieved July 20, 2023, from https://en.wikipedia.org/wiki/List_of_largest_local_police_departments_in_the_United_States Wikipedia

Ortiz-Ospina, E., (2019). The rise of social media. Our World in Data. Retreived on August 15, 2023 from: https://ourworldindata.org/rise-of-social-media

Ruby, D. (2023, June 7). *Social Media Users In The World — (2023 Demographics).* Retrieved on August 10, 2023, from: https://www.demandsage.com/social-media-users/

Social Media Fact Sheet. (2021). *Pew Research Center: Internet, Science & Tech*. Retrieved on April 7, 2023 from: https://www.pewresearch.org/internet/fact-sheet/social-media/

Vrontis, D., Makrides, A., Christofi, M., & Thrassou, A. (2021). Social media influencer marketing: A systematic review, integrative framework and future research agenda. *International Journal of Consumer Studies*, *45*(4), 617-644.

Waters, R. D., & Jamal, J. Y. (2011). Tweet, tweet, tweet: A content analysis of nonprofit organizations' twitter updates. *Public Relations Review*, *37*(3), 321-324.

Yang, Y., & Su, Y. (2020). Public voice via social media: Role in cooperative governance during public health emergency. *International Journal of Environmental Research and Public Health*, *17*(18), 6840-6858.