A TWITTER INTERACTION ANALYSIS OF TITAN SUBMERSIBLE IMPLOSION

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Abstract

Purpose – This research aims to analyse the impact of extreme cultural tourism based on individuals' sentiments, recorded via social media platform (i.e. Twitter presently known as X). This study explores the thoughts and emotions of twitter users recorded after the *Titan Submersible* implosion.
Methodology/Design/Approach – On this front, 6159 tweets (from June 19, 2023, to July 30, 2023) were retrieved and analysed. We employed polarity analysis, emotion analysis, word cloud analysis and topic modeling.
Findings – Polarity analysis reveals that the inclination of discussion about the Titan Submersible implosion was predominantly negative. Emotion analysis also shows that most of the tweets reflect negative emotions and the users' emotions fluctuate daily. In the word cloud analysis, the word "missing" appeared in vast majority of the tweets. Topic modeling reveals the topics that are optimum for this research.
Originality of the research – This study highlights that social media users are sensitive to manmade disasters particularly associated with extreme cultural tourism. The findings alert the stakeholders not to compromise on the safety measures and draw the attention of government authorities to strictly enforce the safety norms to permit extreme cultural tourism in the future.
Keywords: Social media analytics; Titan Submersible; Sentiment analysis; Titanic; Shipwreck

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INTRODUCTION

Exploring deep sea shipwrecks was categorized as extreme cultural tourism. This includes exploring deep-sea shipwrecks, Antarctica, high-rise mountains, and space tourism. (Spennemann; 2007). In 1985, wrecks of the RMS *Titanic* were found at the bottom of the sea near Newfoundland (Canada) in the Atlantic Ocean (Ballard, 1985). "Technological advances allow greater access to places previously thought to be beyond reach, provoking a belief in the ability to accomplish anything" (Spennemann; 2007, p. 899). From 1986 onward, when the opportunities arose crewed mini submersibles made visit to see the wrecks of RMS *Titanic* (Ballard, 1986). Fearless pioneers first patrol the places that are previously not reachable, are followed by a daring few and later by the section of common population, who are wealthy enough to afford it (Spennemann; 2007). OceanGate's *Titan Submersible* made 13 dives successfully before its fatal dive. On the 18th of June 2023, during its dive to explore the wreck of the iconic RMS *Titani*c ship, *Titan* met with a catastrophic implosion, that took the precious lives of the five passengers onboard (Ax & Gorman, 2023). It was the first privately owned submersible, created and operated by OceanGate that claimed a maximum operational depth of 4,000 m (13,000 ft) (Dean, 2023).

This paper aims to understand the sentiments of twitter users related to this tragedy, based on tweets recorded in the twitter (presently known as X) platform. The results might offer some insights for tourism authorities about the public's sentiments on extreme cultural tourism and might be helpful to revise the rules and regulations related to extreme cultural tourism.

This study aims to answer the following research questions:

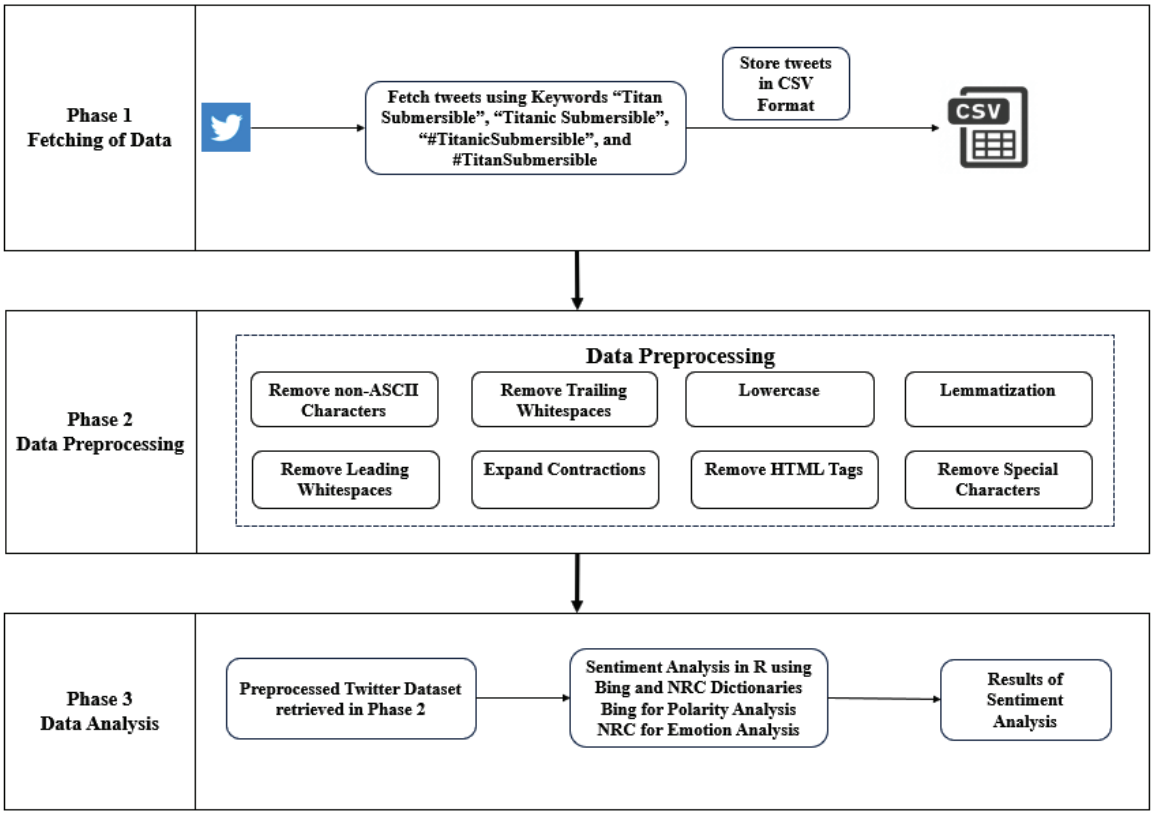
RQ1: How does the emotions of Twitter users change over time after hearing about Titan Submersible implosion?
RQ2: What are the key themes of discussions that evolved, based on the tweets recorded related to Titan Submersible?

This article further contains four sections. The first section explains the methodology followed in this research. The second section contains the results obtained through data analysis. The discussions are in the third section where the findings of the study have been explained and finally, the study is concluded in the fourth section.

1. METHODOLOGY

In this section, we discuss the methodology followed to analyse the tweets related to Titan submersible implosion. The methodology is composed of three phases. In the first phase, data was fetched from Twitter. After gathering the data the preprocessing was performed in the second phase. In the third phase, the data was analysed, and the results were presented.

Figure 1: **Research Methodology**



1.1. Data collection

A vast number of social media platforms are available where users share views, opinions, and sentiments towards daily events. However, it is important to choose a social media platform that provides quality data. Twitter (presently known as X) is one such platform that provides Application Programming Interface (API) to retrieve the data generated by its users (Singh et al., 2018). We chose twitter to identify and analyse the overall views and mood of the social media users towards the imploded *Titan Submersible*. The data was collected from June 19, 2023, to July 30, 2023, using the twitter API, as it helps in retrieving large amount of data in unstructured JavaScript Object Notation (JSON) format that can be easily converted to structured comma-separated values (CSV) format. The following keywords and hashtags were used to collect the data: "*Titanic Submersible*", "*Titan Submersible*", *"#TitanicSubmersible*", and "*TitanSubmersible*". A total of 6,159 tweets were retrieved.

1.2. Data preprocessing

In this phase, the noise from the data was removed and presented in the form of punctuation, numbers, special characters (such as hashtags - #, mentions - @, exclamation - ! and more), retweet (RT) tags, links, newline characters, non-ASCII characters, leading whitespaces, and trailing whitespaces (Singh et al., 2020b; Mehra et al., 2022). We used a standard, tm-package in R for data preprocessing, which helps in accomplishing the task of text mining with ease. Furthermore, a team of two researchers were appointed to manually remove the tweets that were not meaningful for this study. Thus 340 tweets were removed, and 5,819 tweets were used for the final analysis.

1.3. Data analysis

In the third phase, sentiment analysis was performed on the pre-processed dataset obtained in the second phase. Lexicon-based sentiment analysis was performed using Bing and NRC lexicons (Wickham et al, 2019). Bing dictionary was used for polarity analysis and NRC dictionary was used to perform emotion analysis. The sentiment value for each tweet was recorded based on the time that tweet was posted.

2. RESULTS

In this phase, sentiment analysis was performed using a tidy text package that provides access to several sentiment lexicons. We used Bing and National Research Council (NRC) lexicons in this study. Bing lexicons are divided into two parts that are, positive and negative, whereas the NRC dictionary contains lexicons for emotions anger, anticipation, disgust, fear, joy, sadness, surprise, and trust along with the polarity values that are negative and positive (Silge & Robinson, 2017). Polarity analysis is helpful to understand the inclination of discussions that are positive or negative. Emotion analysis helps us to segregate the tweets into identified emotions. Furthermore, we have presented the emotion analysis of the tweets, on a daily basis to better understand the changes in emotions in progression with the time. Figure 2, shows the results of the polarity analysis that reveals mixed results from the twitter audience, identifying tweets both as positive and negative. A total of 2387 tweets were identified as positive, and 3432 tweets were identified as negative.

Figure 2: **Polarity analysis of tweets**

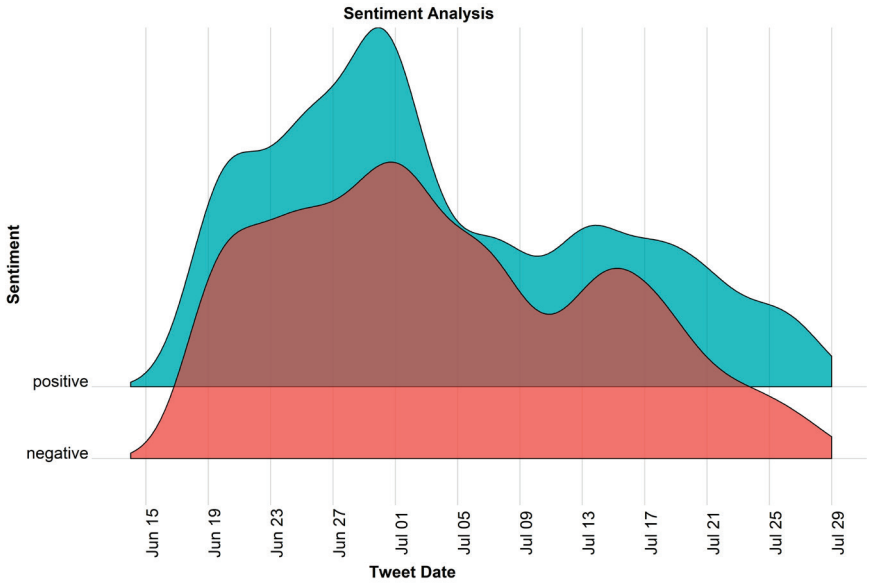


Figure 3 shows the results of emotion analysis, presenting mixed responses from the twitter audience daily. Twitter audiences mainly expressed negative emotions such as anger, disgust, fear, and sadness. While anticipation, trust, and surprise present the hopeful nature of twitter users. To our surprise, the emotion joy was also expressed in emotion analysis. As most of the tweets were negative, we also plotted a wordcloud of most common negative keywords (see Figure 4). The words such as missing, remains, tragic, disaster, tragic, killing, disaster, fatal, deadly, lost and many more have been used most frequently in tweets clearly indicating the concern of Twitter users about the incident.

Figure 3: **Emotion analysis of tweets**

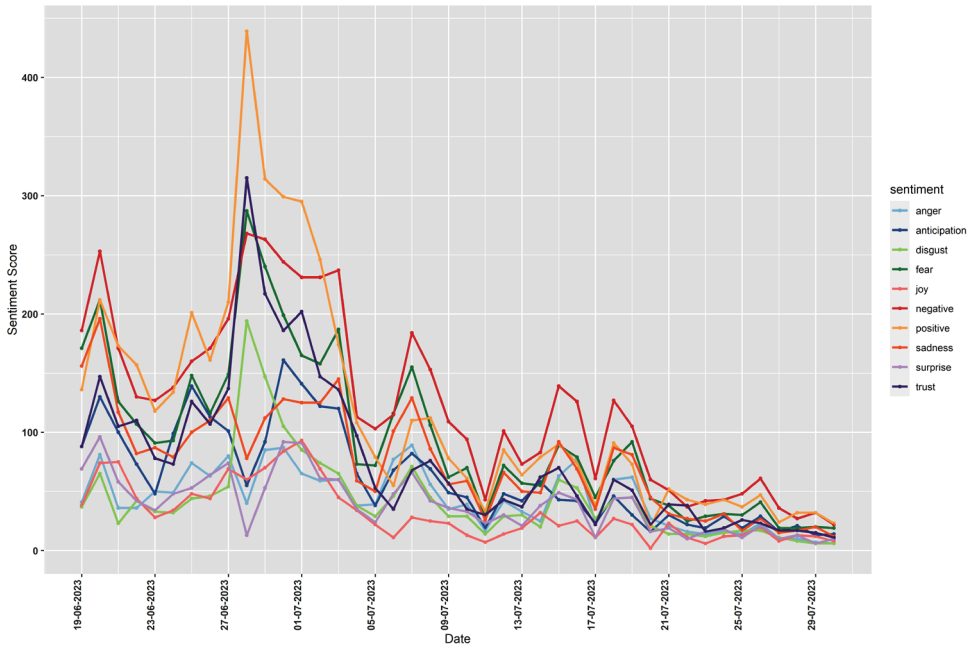


Figure 4: **Wordcloud of negative words in twitter dataset**

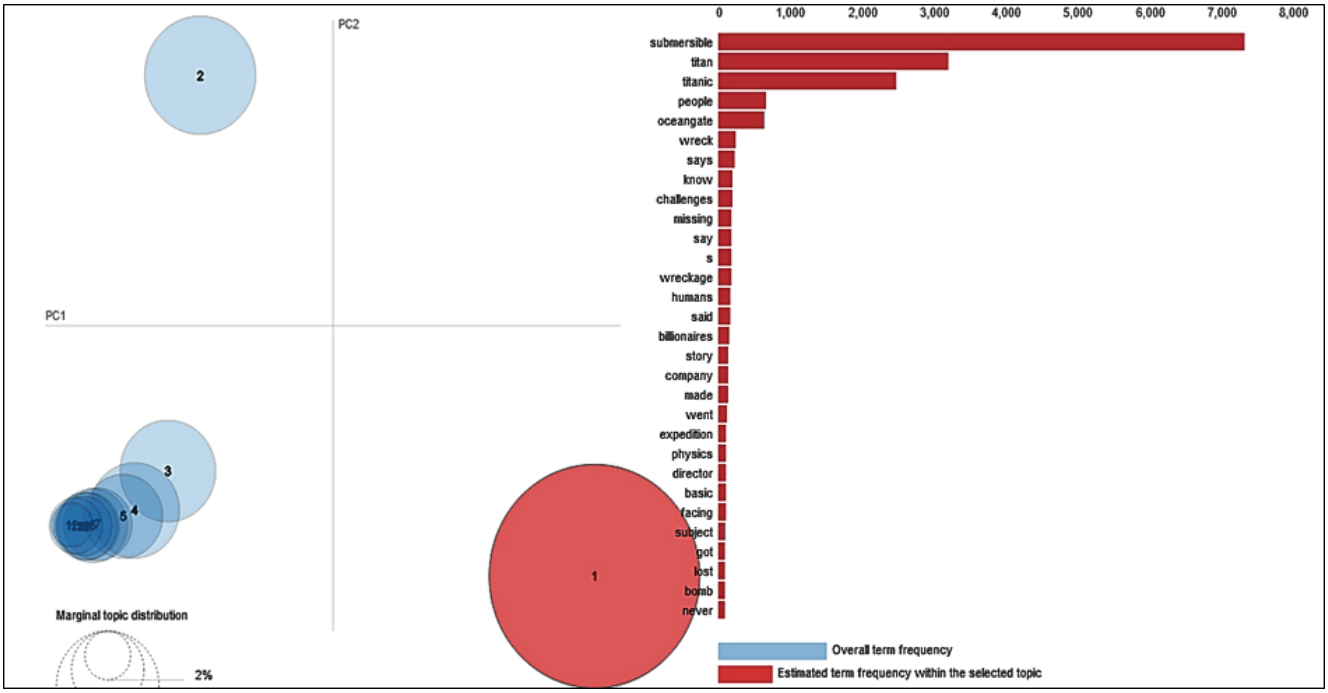
Topic modeling is a novel approach to unearthing underlying topics of discussions that have resulted in mixed reactions in polarity and emotion analysis. We used the Latent Dirichlet Allocation (LDA) technique to perform topic modeling (Singh et al., 2020a). The results of topic modeling are shown in Table 1, highlighting the prominent meaningful topics and the coherence value of each topic. Coherence refers to the degree of interrelation between words in a topic. It embodies the human intuition of what constitutes an excellent topic. A high coherence score indicates that the topic is coherent, lucid, and pertinent. Conversely, a low coherence score implies that the topic is ambiguous, noisy, or irrelevant. Topic 8 received the highest coherence value of 0.4660.

Topic 8 was the most prominent topic with 5783 tweets accounted for this cluster. The top 10 keywords of this cluster are *submersible, titanic, titan, people, see, time, wreck, says, video, news.* Topic 3 was the second largest topic with 19 tweets in the cluster, composed of keywords such as *oceangate, go, disaster, get, take, also, killed, said, show, billionaires.* As most of the tweets were clustered in Topic 8, we also plotted the intertopic distance map of all the topics as shown in Figure 5. Figure 5 also shows the top-30 keywords present in Topic 1. The keywords *Titanic* and *Submersible* are the most prominent keywords followed by *implosion*, *people*, and *tragedy*.

Table 1:**Most prominent topics of discussion from the retrieved tweets**

Topic No.	No. of tweets	Keywords	Coherence Value
0	6	tragedy, film, made, cofounder, company, ocean, many, climate change, director, james cameron	0.3002
1	1	breaking, sunken, underwater, moments, operations, based, diving, try, smart news, reported	0.3351
3	19	oceangate, go, disaster, get, take, also, killed, said, show, billionaires	0.4212
4	5	say, weeks, pressure, literally, basic, approach, called, impact, tour, death	0.4012
5	1	imploded, recreates, milliseconds, man, opinion, even, whole, knew, times	0.4289
7	3	know, happened, implode, new, seen, rush, exactly, rather, tell, emails	0.4557
8	5783	submersible, titanic, titan, people, see, time, wreck, says, video, news	0.4660
9	1	died, good, deep, maybe, collapsed, ride, reveals, mean, info, feel	0.4446

Figure 5: **Intertopic distance map results of LDA with top-30 keywords for topic 8**



3. DISCUSSION

A visit to the wreckage of *Titanic* became a havoc to the tourists when the *Titan Submersible* imploded on June 18, 2023. This news was spread across the world like wildfire and reactions were recorded in the social media platforms by the users. The study found mixed results in polarity analysis and emotion analysis. While most tweets were negative, to our surprise polarity analysis counted some of the tweets as positive. A lot of tweets such as "*Drone shows US headquarters of Titanic submersible operator", and "The submersible is named Titan***.**", were informative in nature. It might be the reason why some of the tweets turned out to be positive in sentiment analysis.

The results of emotion analysis provided valuable insights where tweets with negative emotions such as anger, disgust, fear, and sadness were present in the highest counts. The wordcloud of negative words (see Figure 4), highlights words such as missing, remains, tragic, disaster, tragic, killing, disaster, fatal, deadly, and lost which marks the concern shown by twitter users towards the implosion of *Titan Submersible*. Emotion analysis of tweets daily revealed that the count of negative tweets peaked most days, and there was a continuous variation of emotions among twitter users about this tragic incident. The presence of positive tweets reflects the optimistic mindset of twitter users who expected the safe return of tourists in the Titan submersible. Taub (2023) highlighted the lacunas that were overlooked during this expedition. As suggested by Li et al. (2023) social media data can be vital in identifying the root causes that led to this kind of disaster.

To better understand the possible reasons and topics that drove twitter discussions, topic modeling was performed using LDA technique. The results for topic modeling (Table 1) show that most of the tweets about the sunken submersible were classified as topic 8, which formed the largest cluster with 5783 tweets. Keywords such as submersible, titanic, titan, people, see, time, wreck, comprising topic 8 show that people were concerned about tourists in the submersible and showed keen interest in finding the lost/missing submersible.

CONCLUSION

This study examines the perspectives of social media users about *Titan Submersible* implosion. The study reveals that people are sensitive to the worldly incidents (such as *Titan Submersible* implosion) happening during this kind of expedition. They promptly expressed their emotions/opinions on social media platforms. Their opinion offers crucial insights into whether this sort of tourism/expedition must be promoted in the future. Negative sentiments recorded in polarity analysis reveal that Twitter users were extremely concerned and disappointed about *Titan Submersible* implosion. There were tweets recorded with valid references also. For instance, a tweet with the phrase *"an accident waiting to happen"*, cites an article published in The New Yorker. The article discusses the structural design flaws of the *Titan Submersible*, that were overlooked (Taub, 2023). Such flaws raise concern via tweets, about the robustness of the technology and machinery used in such kind of expedition. Moreover, twitter analysis also highlighted the callous approach of different stakeholders. On allowing this sort of tourism in the future, concerned stake holders must strictly follow the safety protocol and focus on the retrospective evaluation of machineries to meet quality standards, so that the health, safety, and well-being of the tourists, will never be jeopardized. As a note of caution,

the outcome of this study must be carefully generalized, as the data was collected for a short period of time (i.e. June 19, 2023, to July 30, 2023), and analysed with a very limited number of tweets (5819). To have an in-depth analysis of this sort of tourism, it is advised to conduct a qualitative study, involving different stake holders engaged in extreme cultural tourism.

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