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## 12. Fridays for Future Wants to Save the World – But What Do People Think about the Movement?

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**Abstract:** Fridays for Future is a movement initiated by Greta Thunberg designed to alert millions around the globe that we are amid a climate crisis by organising Friday protests. Led by Greta Thunberg, Fridays for Future has generated a lot of press in recent years: Greta has been listed among the World's 100 Most Powerful Women as well as being twice nominated for the Nobel Prize. Greta was also named Time Magazine Person of the Year 2019. While her cause may be noble, many criticize the Fridays for Future movement — others simply do not believe in its global warming message.

Twitter is a powerful electronic word-of-mouth (eWOM) platform, which, as a form of peer-to-peer communication, has the power to influence human behaviour from product adoption to voting behaviours (Jansen, *et al.*, 2009; Sheshasaayee and Jayanthi, 2014). Twitter offers a convenient and efficient global platform for sharing opinions or referring to news items. Using hashtags, users can reach vast audiences who are already interested in specific topics regardless of spatial and temporal considerations. Twitter also provides a historical record of eWOM communication where the popularity of any topic can be gauged from the numbers of likes and retweets. Greta is an avid Twitter user who uses the platform to promote the Fridays for Future protests for climate change. Therefore, to investigate the global attitudes towards Greta's cause, we utilised sentiment analysis of Twitter content to gauge how users worldwide feel about Greta and her movement. Sentiment analysis (also called opinion mining) simply involves analysing data contained in natural language such as those featuring in Tweets. Sentiment analysis refers to performing natural language

processing (NLP) via the use of computational linguistics software to extract and identify quantitative data about positive and negative sentiments towards a particular issue (Hutto and Gilbert 2014; Mihanovic, Gabelica and Krstic, 2014).

**Keywords:** Friday for Futures, Greta Thunberg, Twitter, influencer, sentiment analysis

**Case study:** Friday for Futures

## Introduction

Monitoring user-generated content (UGC) is becoming increasingly relevant for brand reputation management (Puschmann and Powell, 2018); however, monitoring the increasingly complex social media platforms and their use by various special interest groups is not easy as the way individuals and organisations communicate is changing (Daou, 2019). Public relations practice has not yet fully embraced the power of social media; indeed, one study referred to ‘*how to use social media when dealing with crisis or combatting activism.... [rather than] focussing on how to pre-empt such events*’ (Cooper, Stavros and Dobeles, 2019, p.685).

Identifying the emotions expressed by incidences of consumer communications are valuable as it can ‘*put the flavor to our everyday lives in politics and business*’. Besides, limiting one’s analysis to purely quantifiable data may lead to false conclusions (Cestnik and Kern, 2013, p. 169). Therefore, tracking consumer opinions towards particular issues and brands makes good business sense. Tracking consumer sentiment as expressed via social media is particularly important as these types of exchanges can produce “echo chambers” that amplify and spread specific agreed-upon messages online. This mechanism provides a particularly fertile ground for encouraging activism (Cinelli *et al.*, 20210), and is based on homophily, the human tendency to surround ourselves with people who share similar characteristics and qualities. However, the dangers of homophily are that it can “*amplify tribal mindsets and*

*produce 'echo chambers' that degrade the quality, safety, and diversity of discourse online'*  
(Gillani *et al.*, 2018, p. 1).

Social media algorithms curate the news and messages to which we are exposed on social media; these echo chambers make us further select content that supports our predispositions. Further, our choices of narratives on social media then guide the algorithms to suggest related content that we might find interesting. This process reinforces existing opinions and even moves the whole group towards a more extreme interpretation of the issue, which represents the main problem with echo chambers on social media (Cinelli *et al.*, 2021).

Activism refers to the *'process by which a group of people exert pressure'* to change current norms or practices. Although activism is not a new phenomenon, the emergence of social media has provided activists with an always-on global reach, where specific narratives can be magnified via online engagement (Ciszek, 2015, p. 447). Activism is not a new genre of communications; historically, public relations theory and practice have viewed activism negatively, even when both utilise similar tactics (Ciszek, 2015; L'Etang, 2016). Meanwhile, others argue that activism is an *'example of PR practice... a way of disrupting practice and fostering critical perspectives... a way of broadening the social legitimacy of the public relations profession'* rather than an isolated silo of study (Mules, 2021, p. 1).

Activists and corporate PR professionals can coexist symbiotically: when organisations listen and act on activists' messages by implementing the necessary changes in their policies or practices, this can encourage favourable public opinion towards them. For example, the Fridays for Future movement has ensured that the issue of global warming has remained firmly on the agenda and revealed traditional political discourse's failure to agree on concrete

measures to combat Co<sup>2</sup> emissions and embrace renewables. Unfortunately, at times, such advocacy can also be linked to strong political undertones that distract audiences from the well-intended calls for positive, societal change, as is the case with the movement against global warming (L'Etang, 2016). This is particularly the case in the USA, where political party lines are now embattled on social media, such as Twitter, and global warming has become a highly charged political debate.

Via social media, consumers and activist groups have managed to gain considerable power and influence over corporations; indeed, many firms are now shifting their marketing and PR budgets from traditional mass media advertising to social media channels (Cooper, Stavros and Dobele, 2019). Social media analytics can provide great insights into corporate decision making (Daou, 2019) and the implementation of agile sentiment analysis into the public relations workflow enables organisations to better understand the issues their stakeholders are engaged with to further organisational PR goals (Cestnik and Kern, 2013; Puschmann and Powell, 2018). Understanding high-volume social media communications platforms like Twitter is invaluable for public relations decision-making, and sentiment analysis provides a tool for accessing this complex data.

Sentiment analysis is gaining popularity in gauging the general public's attitudes towards a particular issue (Cestnik and Kern, 2013). Sentiment analysis aims to assist a brand or company in interpreting the moods of audiences engaging in social media and to mitigate the inability to respond to changes due to information overload. In today's hyper-connected world '*sentiment [has a role as] a currency in the attention economy*' (Puschmann and Powell, 2018, p.1). That said, sentiment analysis represents a new, emerging field of study; exact interpretation of the emotions expressed in textual form cannot accurately be used to

gauge the emotional state of the individual authoring the content (Puschmann and Powell, 2018) due to sarcasm, humour, etc.

This chapter is set out as follows. First, the case study context examining the Fridays for Future movement is explained, followed by an outline of the opportunities text mining offers in interpreting the public mood from social media content. The Konstanz Information Miner (KNIME) software is utilised to extract the sentiments from Tweets. Finally, the chapter concludes by outlining the findings.

### **Case study context**

There is now scientific evidence and consensus that global climate change is man-made (IPCC, 2014). When the release of greenhouse gas emissions stemming from human activities ends up in the atmosphere, they prevent sunlight from being radiated back into space hence creating a warming effect on the planet's surface. Rising temperatures can have catastrophic outcomes for life on our planet: a 1-degree Celsius increase in average temperature can lead to disruptions in weather patterns, the destruction of species, and the loss of agricultural land. It is further argued that a rise above 1.5 degrees should be avoided to prevent climate catastrophe (IPCC, 2014). Nevertheless, predictions based on the current rate of greenhouse gas emissions point to a potential 5-degree rise in average global temperatures by the end of this century (Tollefson, 2020). Only by encouraging drastic changes in human behaviour to decarbonize our transport and industries can help us avoid this threatening scenario.

A crucial driving force of climate campaigns is the blatant discord between scientific evidence and political action. Even the signatory countries to the Paris Agreement are falling behind

their agreed emission reduction targets (Van der Heyden *et al.*, 2020). The youth campaign against global warming is also a significant political movement; the most famous of these climate campaigners started their PR campaigning well before they reached legal voting age in their own countries. These campaigners are also predominately female.

As described in her book, Thunberg *et al.* (2020), when Greta first learned about climate change at school and how it is threatening human life on this planet, she was surprised that despite the scientific knowledge that human behaviour is causing the problem, so little has been done about it. It was very hard for Greta to accept the fact that children of her generation might not have a future worth living for. Greta noticed that the global attempts to increase wealth and prosperity were leading to unsustainable long-term outcomes: adults are simply not doing enough to prevent the climate crisis from happening. In summer 2018, at the age of 15, Thunberg began the first of her school strikes. She was targeting the Swedish parliament and the upcoming parliament elections. For three weeks, Greta sat in front of the parliament instead of attending school. What started with a 15-year-old schoolgirl sitting in front of the Swedish parliament with a simple cardboard sign stating '*School strike for the climate*' turned soon into a massive youth movement known as Fridays for Future that called for organised school strikes on a weekly basis (Fridays for Future, 2021 - see Further reading).

The media quickly picked up on Thunberg's school strike, rapidly transforming her into an eco-celebrity and a leading figure in the global climate movement, allowing her to demand radical and immediate change (Murphy, 2021). In September 2019, during the UN Climate Action Summit in New York, approximately 6 million people participated in the global strikes (see Further reading: The Guardian, 2019). Greta's speech called out world leaders,

underlining their reluctance to act and their collective responsibility to act to safeguard the future of generations to come (Thunberg *et al.*, 2020). With her school strike movement and the speeches, Thunberg reminded the world of the looming climate crisis, and that immediate action is needed. In addition to strikes and public speeches, Thunberg has also become an influential presence on social media. This chapter will take a closer look at, particularly Greta's presence on Twitter. While Greta wants to save the planet from climate-related issues, we wished to investigate people's attitudes towards the Fridays for Future/School Strike for Climate movement via sentiment analysis of Twitter content.

Thunberg and her movement have been studied widely in academic literature. Sabherwal *et al.* (2021), for example, studied the Greta Thunberg Effect by investigating her impact on the public's willingness to take collective action on climate change. The study found that those more familiar with Greta Thunberg showed higher intentions towards pursuing collective action. Furthermore, the study demonstrated that this collective efficacy is present across all age groups and the entire political spectrum, although it proved to be stronger among those who share more liberal values. Bergmann and Ossewaarde (2020) studied the German newspaper coverage of Thunberg and the Fridays for Future movement. They discovered a somewhat ageist media portrayal, presenting Thunberg and her followers as youngsters largely ignorant of the facts and unaware of the economic consequences of their demands. This representation, so the authors argued, aligns with an established environmental governance regime that struggles with phasing out (brown) coal from energy production, surrounded by a highly sceptical and conservative discussion. Mkono, Hughes, and Echentille (2020) analysed the impact Greta's activism has had on travel and tourism. Greta's Atlantic crossing by sailing boat to attend the UN Climate Action Summit in New York was a symbolic act intended to criticise air travel as the most carbon-intensive form of



transportation. Meanwhile, Thunberg also wished to further support the flight shaming movement that had taken root in her home country Sweden. Finally, Jung *et al.* (2020), who also studied Twitter sentiments on Thunberg with a special focus on Greta's rise to prominence, found that celebrities and public figures had played an essential role in Greta's rise to fame. Closer investigation of the influencer groups revealed that some users expressed negative attitudes towards Greta, not because of their disbelief in climate change, but due to Greta's gender and age.

### **Big data and text mining**

Exploiting Big Data represents a new challenge for research due to its unstructured, high-volume datasets. Up to 80% of the data available in various customer relationship management channels (including social media feedback) is currently unstructured and underutilised to support organisational decision-making.

Text mining involves computer-aided analysis of unstructured text to identify patterns of communication useful for organisational decision-making. All text mining applications utilise features including linguistic characteristics (e.g. syntax and semantics), content analysis (gathering, analysing and categorising data), natural language processing (AI-enabled language analysis), and statistical pattern recognition approaches (based on the frequencies of use of key terms, such as synonymy, using machine learning applications), etc. In marketing, the most common use of text mining is to analyse trends in consumer-generated content in online reviews and social media comments to improve profits.

Text mining is an active area of research; it offers value to all researchers interested in human-computer interactions, from marketing to sociology and the political sciences.

Sentiment analysis refers to exploring trends in data contained in natural language using computational linguistics to extract data on research aims (e.g. the polarity of positive and negative sentiments) (Hutto and Gilbert 2014; Mihanovic, *et al.*, 2014). Textual content is considered one of the most useful sources of such data as it provides unprecedented insights into individuals' natural communication including their views and sentiments towards issues, especially in the context of the asynchronous sharing of ideas online.

Social media forms a repository of collective communication that, using text mining, can provide valuable opportunities for aggregating and analysing sentiment. Of the commonly used social media platforms, Twitter also has the most research-friendly terms of use and is an invaluable resource for eWOM analysis to gain insights into peer-to-peer communication with the power to influence product adoption levels or even national elections (Jansen, *et al.*, 2009; Sheshasaayee and Jayanthi, 2014). Twitter offers several ways for users to exchange information: sharing links to news publications to tweeting personal opinions, all of which is free from spatial and temporal limitations. Twitter also provides a historical record of online communications where the popularity of any topic can be gauged from the number of likes and retweets recorded. Twitter is a particularly powerful tool for information sharing (Jung *et al.*, 2020; Misopoulos *et al.*, 2017). In other words, while analysing individual tweets tends not to be insightful per se, analysing an entire Twitter feed provides an unprecedented opportunity to track the '*moods, thoughts and activities of the society at large*' (Misopoulos *et al.*, 2014, p 708). Furthermore, Twitter sentiment has been found to correlate with the Dow Jones Industrial Average (DJIA), NASDAQ, as well as Standard & Poor's 500 stock values (Mao *et al.*, 2012). UK and US Twitter users have been identified as 'younger and wealthier' than the rest of the population and more actively engaged with activities varying from socialising to entertainment and commercial activities than the non-tweeting population. Not

surprisingly, Twitter users also tend to have a positive attitude towards internet-related matters (Blank, 2017)

While various text-mining applications are available from SAP, IBM, and Microsoft, the open-source KNIME tool is considered the best when measured on the metrics of *ability to execute* and *completeness of vision* (see Further reading: Piatetsky 2018). KNIME is specialist software for data analysis, manipulation, and visualisation, as well as text mining purposes to extract comprehensible themes from large-volume unstructured datasets. KNIME uses structured workflows that consist of individual nodes that perform a single process (e.g. extracting tweets via API). Each node must be configured individually and completing a workflow can be time-consuming. KNIME offers a complete work environment for text mining popular trends and sentiment analysis via its direct API access to Twitter

### **Methodology**

A KNIME Twitter API connector was implemented to collect tweets weekly from 20<sup>th</sup> February 2020–23<sup>rd</sup> May 2021. The Twitter API has volume limits for the number of tweets that can be requested (including a seven-day historical limit). A weekly maximum sample of 5000 tweets was collected for the following three categories: (i) Greta Thunberg (a total of 289418 Tweets, of which 47950 were original); (ii) School Strike for Climate (a total of 54439 Tweets, of which 2358 were original); and Fridays for Future (a total of 294284 Tweets, of which 4985 were original). A total of 638141 Tweets were collected. Specifically, the search terms were: ‘greta thunberg’; ‘school strike AND climate’; and ‘schoolstrike4climate OR fridaysforfuture OR climatestrike’. As we intended to perform sentiment analysis using the Twitter API (not identify who was responsible for Tweets), all tweets were merged for lexicon-based sentiment analysis.

The combined pool of tweets was analysed by using KNIME at three levels. First, the general hashtag trends for the whole pool of tweets were analysed to identify which of the relevant hashtags were trending. Second, only English-language tweets (as identified by the Tikka Language detector node) were used to compare the volume of original tweets vs retweets. This pool of original English-language Tweets was subjected to sentiment analysis using the MPQA dictionaries for positive and negative sentiments. This sentiment analysis is based on a *bag-of-words* analysis where the words in Tweets were lemmatised and stemmed to bring individual words at their most basic representation (e.g. ‘am’, ‘are’ and ‘is’ are all represented by ‘be’, and equally ‘book’, ‘books’, book’s’ and books” are all represented by ‘book’). Stopwords (e.g. ‘the’, ‘an’, ‘so’) and terms representing numbers (e.g. ‘ten’) were filtered out, all text was also converted to lowercase letters for analysis. As Tweets were uniform in document size (maximum 280 characters); absolute term frequency was used to identify the most widely used terms identified as positive or negative (see Further reading: Tursi and Silipo, 2019).

## **Findings**

To gauge the trending hashtags in the data, the frequencies of the most common hashtags were identified. As this was a general analysis to determine which hashtags dominated during the survey period, all Tweets were included in this analysis (regardless of the original language used or Tweet/retweet status). Tweets with unique hashtags that are widely retweeted cause ‘trending’. In our data, Tweets entitled #schoolstrike4climate, #climatestrikeonline, and #flattenthecurve peaked noticeably during June–August 2020 (Figure 1). Tweets entitled #schoolstrike4climate, #climatestrikeonline, and #flattenthecurve peaked noticeably during June–August 2020 (Figure 1) coinciding with World Environment

Day on June 5<sup>th</sup>. During this period, these Tweets were dominated by ‘*sign the petition*’ message from national sustainability organisations, a large volume of retweets of Greta’s message of ‘*climate crisis doesn’t go on summer holidays*’ as well as celebrating the second anniversary of the School Strike for Climate movement. Greta’s meeting with Angela Merkel also attracted significant attention.

[INSERT FIGURE 1]

Retweeting requires significantly less effort than creating original Tweet content; hence it is expected that retweets would dominate in a frequency analysis (see Figure 2).

[INSERT FIGURE 2]

As the number of retweets was significant, we conducted a separate qualitative analysis of the most commonly retweeted subjects by subject content. The analysis of the most popular retweets revealed, for example, amongst our top-eight ranking retweets, there were four separate news reports (CNN, ABC, Wired and Time) on Greta’s ‘*You have stolen my dreams and childhood*’ speech at the UN, their combined retweets reached a total of 207961 retweets during the survey period, making this the most noteworthy event in our data. The second most shared original tweet refers to the Greta-Trump tweet exchange of ‘*she [he] seems a very happy young girl [old man] looking forward to bright and wonderful future. So nice to see!*’ [with sarcastic undertones] with photographs of both Greta and President Trump (129013 retweets during the survey period). The third most retweeted message was a satirical video (The Greta Thunberg Helpline for Adults Angry at a Child) with 114403 retweets

during the survey period. The Time Magazine tweet featuring Greta Thunberg as the 2019 Person of the Year reached fourth place in the retweets during the survey period (102372 tweets). These high-ranking retweets did not feature hashtags; most of them simply drew the readers' attention to linked online content.

Figure 3 illustrates the positive and negative sentiments identified from the original tweets in English (black words represent negative sentiment; grey words represent positive sentiment). The size of the words in the tag cloud in Figure 3 reflects the frequency with which these terms were used in the collected cohorts of tweets.

INSERT Figure 3

To gain a comprehensive understanding of the sentiments intended by those posting the content of the tweets, those associated with positive and negative sentiments were identified and explored. Tweets expressing negative sentiments were concerned with themes such as *the futility of striking for climate, encouraging students to skip school, fear-mongering in general, Greta's Asperger diagnosis, and the ongoing Trump vs. Greta debate*. The Trump-Greta debate attracted both positive and negative views and was mentioned in tweets containing both positive and negative sentiments. Other topics included *the imbalance of active news reporting of climate campaigning vs. world poverty and war*. Moreover, the reasoning behind encouraging School Strikes for Climate was questioned on a few levels: are these 'strikes' simply futile banter or are children simply taking advantage of the School Strike for Climate movement as an excuse to skip school? The school strike in Bristol, UK, in which Greta participated was also a matter of concern due to the damage the mass gathering caused to College Green where the meet took place. General negative sentiments were also

expressed towards *fear-mongering* and *political agenda* were evident: some tweets in this category also included references to the Covid-19 crisis and the Black Lives Matter movement.

In terms of tweets expressing positive sentiments, the most frequently mentioned theme was *discussions about young people influencing the future and climate change*, and *Trump*. The most surprising initial finding in this theme was the positive sentiment allocated to then-president Trump. However, closer inspection of these tweets revealed that these tweets mentioned the *ongoing Greta-Trump debate*, *the age gap between them*, and *the cult-like following of former president Trump*. Specifically, Thunberg's supporters expressed positive views on how she handled the online exchanges with Trump, which was why the theme *Trump* appeared in the positive sentiment results from those following the School Strike for Climate movement/Fridays for Future debate. Greta's Time magazine cover was also considered a win.

## **Conclusions**

There is no doubt that the climate debate and the Fridays for Future movement initiated by Thunberg have gained worldwide attention and attracted a huge number of Twitter users to participate on both sides of the debate. Thunberg and her campaign have achieved high engagement figures (she has almost 5 million Twitter followers and the Fridays for Future (@Fridays4Future) has almost 110,000 followers). Besides, as demonstrated by the above analysis of the Tweets and retweets, Thunberg has also achieved significant global engagement with her campaign and message.

Specifically, the sentiment analysis highlighted several interesting trends. First, discussion around Greta Thunberg and the School Strike for Climate movement cannot be assessed in isolation from social phenomena such as gender and age prejudices. There were clear incidences of intersectional sexism and ageism expressed towards Thunberg: for being female and for being young, respectively. Moreover, the overall political nuances of current world issues were highlighted by climate-concern-related Tweets being interlaced with concerns about Covid-19 and the Black Lives Matter messages, which indicates the highly political nature of communication and debate on Twitter.

However, analysing large-scale, unstructured, eWOM datasets (as used in the present study) is often difficult. Besides, NLP technology is still under development. Identifying humour and sarcasm is generally problematic in eWOM datasets using sentiment analysis packages such as KNIME as these tools remain under constant development to increase their levels of accuracy. For example, tweets defending Thunberg and those mocking her Asperger's-related characteristics were often classified under the negative sentiment category when sentiment was gauged by a dictionary-based approach. Therefore, in the present study, the researchers had to revisit the tweet content after sentiment analysis to check the actual sentiment of the message. Besides, the study was subject to the limitations inherent in interpreting the qualitative data contained in the tweets without the opportunity to clarify the users' actual intention to ensure the sentiment analysis was accurate. As a research technique, sentiment analysis has also been widely criticised in terms of the extent to which the classification of written content into positive/negative categories is valuable for enabling decision-making (Puschmann and Powell, 2018). However, sentiment analysis was never intended to replace psychological studies of why people behave as they do. Yet, being



informed of the large-scale sentiment trends expressed by cohorts of users on Twitter can help public relations professionals in decision-making.

Twitter is a key battleground for political debate on climate change that has attracted many millions of Tweets globally over recent years. This large-scale eWOM content is useful for researchers analysing public sentiment related to social and political affairs at the domestic and global levels. Unfortunately, *'the most common language on Twitter is re-tweet'*, which represents the lowest possible level of online engagement (Alshaabi *et al.*, 2020, p. 1).

Furthermore, any high-engagement debate on Twitter is likely to attract deliberate attempts to gear the conversation towards specific goals by saturating specific Twitter feeds with bot-generated content (Al-Rawi, Kane and Bizimana, 2021). Bot generated Twitter campaigns were not identified in this study.

In terms of reaching vast audience and attracting widespread global support for her cause, Thunberg has harnessed Twitter to promote her Fridays for Future campaign with considerable skill. For example, the global warming debate has reached the highest levels of decision-making: Ursula van der Leyen and Frans Timmermans have implemented campaigns for the new EU Green Deal in 2021 designed to ensure that Europe will be climate-neutral by 2050. Furthermore, Thunberg's movement has gained the support of individuals from all walks of life — from school students to scientists — who are also further amplifying the climate change message across Twitter and other social media platforms (Van der Heyden, *et al.*, 2020).

Successful social media campaigns can also be equally effectively counterattacked by using the same medium. Trolling refers to the systematic use of inflammatory messages that often

attack the personal characteristics of the individuals responsible for the initial messages. Trolls aim to disrupt the conversation to dissipate its impact or simply reframe the message. The Fridays for Future campaign was targeted by Twitter trolls who often focused on attacking Thunberg herself; for example, former president Trump. However, our data showed that Thunberg successfully managed to repel Trump's (and his supporters' attacks) using a combination of sarcasm and counter-attack by turning the focus to Trump's ability to govern and considering his advanced years.

The intersections between influencer marketing, advertising, and PR are now more fluid than ever due to the emergence of social media platforms where users can actively utilise analytic software to manage and influence their audience in the most effective ways. Furthermore, social media influencers now perform many traditional advertising functions in the form of paid promotions. Therefore, this raises the question, can the Fridays for Future Twitter campaign be considered activism, influencer marketing or PR? The campaign's Twitter communication around the School Strike for Climate movement certainly fulfils many of the characteristics of PR in terms of building '*deliberate, planned and sustained .... relationships between ... stakeholders*' (Wolf and Archer, 2018, p. 496). Yet, it is difficult to gauge an overall strategic or systematic approach that characterises this campaign. However, some of the Tweets that featured in our dataset were posted by national sustainability organisations and, perhaps following a planned publication schedule (e.g. the United Nations' World Environment Day in June). The sustainability agenda has certainly been integrated into the corporate PR agenda by many organisations globally, which provides a classic example of how social media platforms are continuing to disrupt traditional marketing and PR sectors. An interesting avenue of future research would be to investigate the extent to which the online echo chamber effect affects in-person gatherings. For example, what are attendees'

true motives for joining mass gatherings based on trending online exchanges such as climate change or vaccination demonstrations?

### **Lessons for future research**

- Current machine learning and sentiment analysis techniques fail to provide accurate classification of content featuring humour and sarcasm. For this reason, it is recommended that researchers carefully validate findings by consulting the textual data.
- Due to the limitations of current machine learning approaches, the interplay between images and text in terms of its contribution to providing an overall message also requires human analysis.
- Overall, it would be useful to learn how the highly political use of Twitter during President Trump's term of office has impacted the nuances of Twitter sentiment analysis in the long term.

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### **Further reading**

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Figure 12.1. Most popular hashtags used in our data during the sampling period

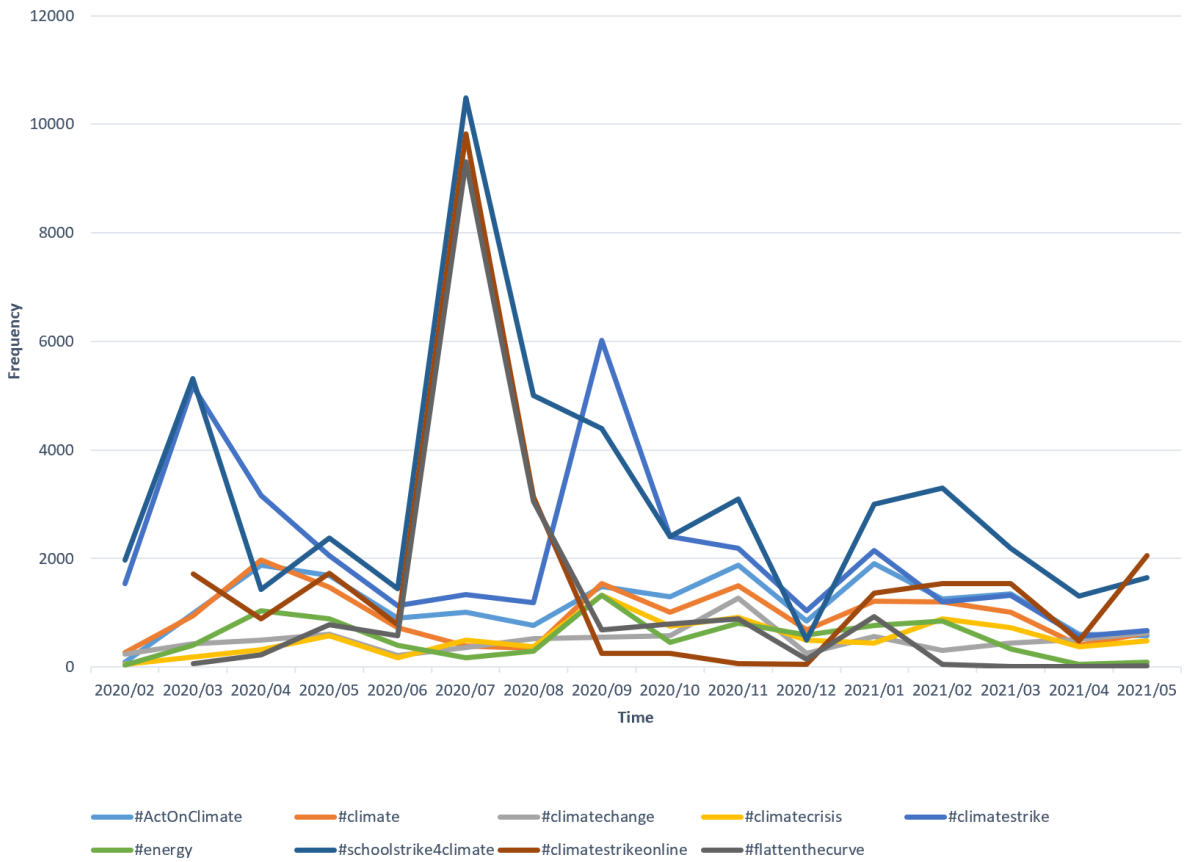
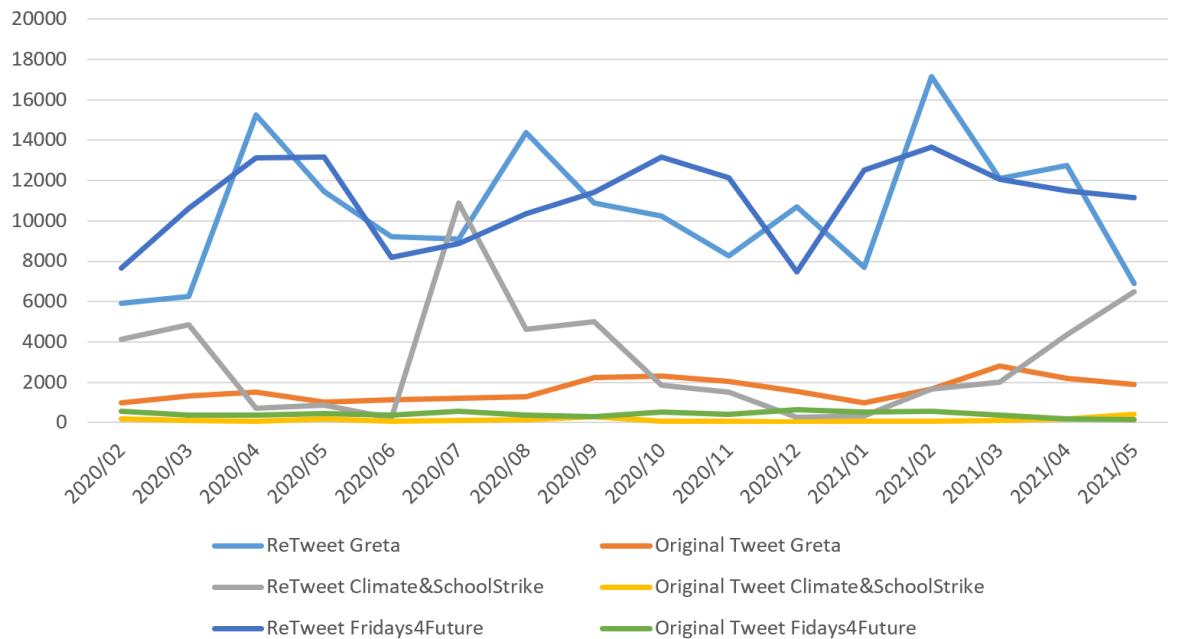


Figure 12.2. Comparison of original and retweets by volume





**Figure 12.3. Sentiment word cloud**



Legend:

Negative sentiment – Black

Positive sentiment – Gray