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Sentiment Analysis and Visualisation in a Facebook Group: A Case Study of 'Marvel' Group

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Abstract: *Fan community is developing its presence in establishing the Word-of-Mouth and increasing brand loyalty. In this context, it is necessary to analysing the public sentiment of a Facebook group for the management of marketing strategies. This paper evaluates the sentiment of fans in a Facebook group named 'Marvel', and visualises its outcomes for clearing social network. Results suggest that lightly positive sentiment could be seen in 'Marvel'group, and brand could both benefit and suffer from virtual fan community. Members in is group prefer give likes and reactions instead of interacting with others.*

Keywords: *Sentiment, Facebook group, social network site, Word-of-Mouth, Marvel*

1. Introduction

Facebook is currently one of the most popular social network sites and is regarded as an online community for fans attracted by TV series, movies, superstars, etc. Fans of a specific brand could see contents in their walls and interact with each other by sharing, liking, and commenting [11]. Jansen et al. defined the Word-of-Mouth (WoM) as information disseminated from person to person about goods, services, or companies. In the information era, the Word-of-Mouth is accelerated by Web 2.0 and transfers from offline to online, with an increasing number of social media users forming a fan community to share their attitudes and opinion [5].

Famous for Marvel's cinematic universe and numerous superheroes (like Iron Man, Captain America, and Thor), Marvel Comics has released two trailers about Black Panther and Avengers: Infinity War in November 2017, which result in sparking heated discussion in Facebook groups, especially for fans of Marvel movies. They forecasted the direction of the plot and debated which movie and superhero were more attractive and more fantastic.

To analyse the Facebook group, namely MARVEL / DC UNIVERSE, I divide this report into four parts. Firstly, I will review pieces of literature in relation to the fan community on social media and display my research questions. Meanwhile, I would argue what data and how I capture it. What's more, the outcomes of software would be described in words and forms. And the last part of this report is about the discussions of findings and limitations of the whole report.

2. Literature review and research question

With the widespread use of social media, users embrace more opportunities to express and share opinions and feeling online, as a result, users have a greater impact on the establishment of brand images. The case of Marvel 's Facebook group is quite a new topic, but there are marvelous studies related to fan community on the social network. Relevant literature shows that e-WoM of fan communities on social media is a double-edged sword for companies

Undeniable, virtual fan communities have a positive effect on firms, including attracting users and engaging them to create content and to share within social media [15]. Accordingly, shared value is developed when members have similar opinions or targets on various topics and then discuss them in the community [7]. Through discussion, members of a community could obtain both psychological attachment and social relationships with others, which is beneficial for enhancing brand trust and brand commitment [6]. Similarly, according to Drury, the Facebook community become the main source of brand trust, where members could get access to others' experience of a brand, to most personal, committed, and direct contacts with the brand [3].

McCarthy et al. stressed the negative effect of fan communities where contents influenced other social

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network users' attitudes toward a brand [9]. And he argued that virtual communities on social media pose a threat to companies that negative comments were out of control. Users are empowered to express their experience and viewpoint in terms of a brand, while companies become harder to shape brand images and define brand value online [2]. What's more, Hsu et al. illustrated that when it comes to hedonic dimension, the engagement from appealing contents may become invalid, because users prefer sharing and obtaining information, rather than giving information [4].

There are a great number of articles related to the methods of analysing Facebook fan communities, and fan pages are their major choice to collect data. Sabate et al. displayed factors impacting the popularity of branded contents by using multiple linear regressions to analyse the richness of contents and time series of posts, and the outcome is that posts including videos and pictures significantly increase the popularity, especially when publish at a proper time, however, those posts with links show lower popularity on Facebook [12].

Based on the literature review, I decided to focus on two problems in relation to the Marvel Facebook group.

1) What is the sentiment of the Marvel group after releasing two trailers about Black Panther and Avengers: Infinity War?

2) What kind of effect that the Facebook group has on the brand 'Marvel'?

3. Data and Methods

To answer the two questions, I chose Netvizz to collect data from a Facebook group, namely MARVEL / DC UNIVERSE, and then I used Sentistrength to analyse the trend of sentiment in this group. Finally, Gephi was used to transfer complex data to visual results and to display users' networks.

I collected 118 posts by using *Netvizz* from a Facebook public group named *MARVEL / DC UNIVERSE* dated from 30th November 2017 to 3rd December 2017, and then exported files to Excel to find out the time series of posts as well as engagement, and to analyse type of posts as well as reactions. The reason why I choose this group is that it is quite active and boasts largest number of members (more than 13000) in all Marvel groups . Besides, I prefer the very four days because Marvel Comics have released trailer of *Avengers: Infinity War* on 30th November after uploading the trailer of *Black Panther*, which dramatically inspire fans of Marvel movies to communicate online.

I have used *Sentistrength* to analyse the attitudes of members when it comes to Marvel movies, and to explore whether contents in this group show polarised sentiment or signs of flaming around the two trailers, which contribute to deal with my research questions.

When I use *Sentistrength* to analyse the sentiment strength of Marvel group posts and comments, I find that the value of some specific words needs to make some changes. For example, 'war' shows high frequency in all of posts, because the name of movie is *infinity war*, however, *Sentistrength* judged 'war' as strong negative sentiment, so I tried to change the score from -3 to -1 in emotion dictionary called *EmotionLookup.txt*, and I also changed other words' score for same reasons. Meanwhile, some posts containing links and emoji could not be detected by *Sentistrength*, so I deleted this kind of posts for clearer outcome. And a special change is that I have transferred some texts embedded images into direct words, because numerous users choose pictures instead of words to express their opinion, leading to the failure of capturing message from this kind of posts, as shown in Figure 1.

word	current score	primary score
war	-1	-3
avenge	-1	-2
venom	-1	-4
force	-1	-2
dead	-1	-3
death	-1	-3
accused	-1	-3

Figure 1: Changes of emotion score

Because the outputs of *Netvizz* are lack of visual interface [1], I choose *Gephi* to visualise community networks, and to explore which posts have received more comments as well as reactions and who are more active to interact with others in this group.

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4. Ethical concerns

Privacy challenge is the most important point that should take into consideration during the process of research. According to Markham and Buchanan, social media users usually expect to keep private in terms of the information they share in public, in other words, they have restricted the way to use their data in psychological dimension [8]. On the hand, as *Netvizz* shows, when researcher manages to collect one user's data, it is inevitable that he receives others' data at the same time [10]. Nevertheless, it is beyond my competence to ask every user for permit of grasping and analysing their data.

Although it is unavoidable to invade privacy during capturing, we still could make it different by anonymity or using pseudonyms. In this report, as far as I can, I would hidden the user's personal information and avoid quoting the concrete contents directly. The purpose is to limit potential damages to users.

5. Findings

An overview of the findings is that members have displayed polarised sentiment toward Marvel movies, particular in the two new trailers, namely *Black Panther* and *Avengers: Infinity war.* In general, it is beyond my prediction that positive sentiment just gains the margin upper hand than negative sentiment.

Firstly, after data was imported to Excel, time series graph of posts (Figure 2) illustrated the number of posts written everyday (from 30th November 2017 to 3rd December 2017). Vividly, there was a slight increase in the number of posts from 30th November to 1st December, peaked at 46, and then it significantly dropped to 0 during the last three days.

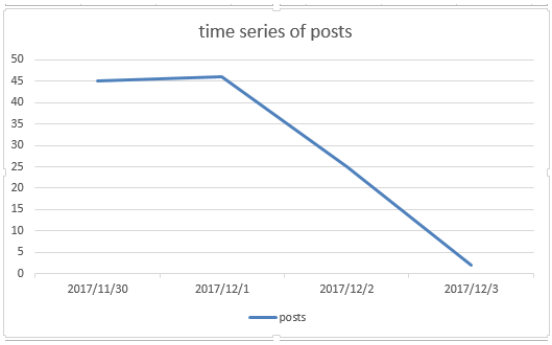

Figure 2: Time series of posts (via Netvizz)

The tendency of four types' engagement (likes, reactions comments, and shares) those posts received are indicated in the Figure below and a steady decrease is seen toward the number of engagement. Obviously, this type of engagement, namely reactions retained its position as the highest-ranking type in the period, and likes were not far behind. However, comments and shares were witnessed the two least popular types of engagement, declining continuously, as illustrated in Figure 3.

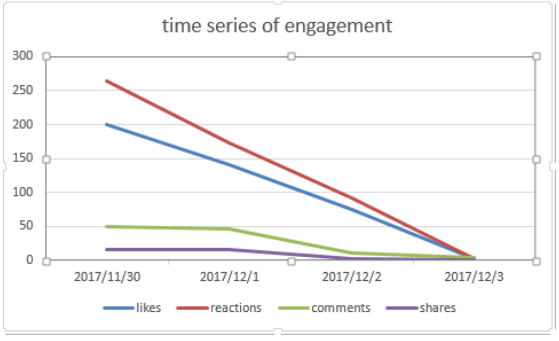

Figure 3: Time series of engagement (via Netvizz)

Furthermore, The Figure 4 below demonstrated the popularity of types associated with posts. As shows in the bar graph below, photos are the most popular types of posts, accounting for 45% of the whole posts, followed by videos, at 37%. In contrast, status were used in posts for only 4%, and less than

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15% users choose to publish links.

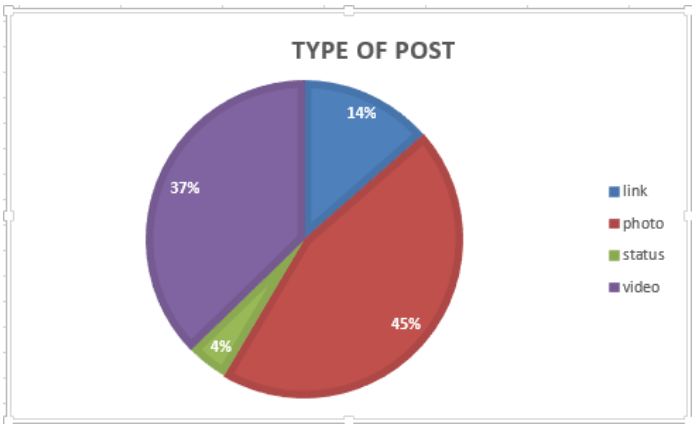

Figure 4: Types of posts (via Netvizz)

Otherwise, the bar chart (Figure 5) indicated the number of seven types' reaction in all posts during the four days. We can see immediately that the reaction named like (416) was by far the most common overall, while the other types- consist of love, wow, haha, sad, angry- displayed significant lower frequency of use in all reactions, and no one showed thankful to any post.

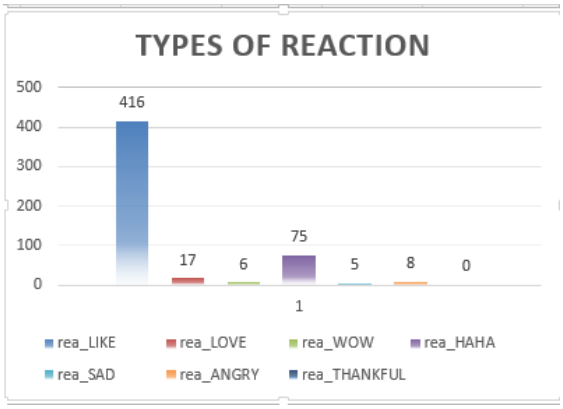

Figure 5: Types of Reaction (via Netvizz)

Then I used *Sentistrengh* to explore the sentiment of the group posts and of their comments, getting some interesting results.

This table below (*Figure 6*) revealed that compared with the number of members owning extreme negative emotion (-3 and -4), the positive sentiment slightly had an advantageous position in the group. It can be seen clear that a large majority (over 68%) hold a neutural standpoint (1,-1) over Marvel movies. One of most surprising finds was that one post was evaluated highest score both in positive and negative sentiment (4,-4), while another one took definite positive emotion in terms of Marvel (4,-1). In addition, when it comes to relatively passive mood (1, -2), it outnumbered members with relatively optimistic attitude (2, 1).

count:Negative	1	2	3	4	total
-4				1	1
-3	4				4
-2	11	4	3		18
-1	81	8	5	1	95
total	**96**	**12**	**8**	**2**	**118**

Figure 6: Sentiment of posts (via Sentistrength)

The *Figure 7* organised data about sentiment of 109 comments. According to the chart, the percentage of members maintaining a neutral stance (1,-1) only accounted for lower than 50%. In this part, we can witness a considerate difference with sentiment of posts. There were major of members with positive attitude towards different posts, whereas no one achieved the strong passion (4, 1).

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count:Positive	1	2	3	total
-4	2		1	3
-3	3	4	2	9
-2	10	4	2	16
-1	51	23	7	81
total	**66**	**31**	**12**	**109**

Figure 7: Sentiment of comments (via Sentistrength)

Nevertheless, *Gephi* visualised the data exported from *Netvizz*, and I have used fake names to mark some vital outcome. The Indegree was symbolised by red nodes, and the Outdegree was yellow nodes. The biggest nodes (*bc/a*) represented the posts receiving most engagement and comments (88), while *dzkm1* boasted for the most active user giving likes for 21 times. Following *bc/a*, *royal fan* can be seen another popular post during the four days, receiving 38 reactions and 14 comments, however, it is shared by nobody. The *batman* and *Iman develop* were witnessed a similar trend as *royal fan*, with being engaged for 33 and 28 times respectively, but failed to be shared. In this group, sharing was regarded as an uncommon way in engagement, up to 7 times per post (named *best scene*). Likewise, some of most active users, consist of *dzkm1, dzkm2, location, haha*, preferred giving reactions and likes rather than sharing or commenting, which displayed same results as *Figure 8.*

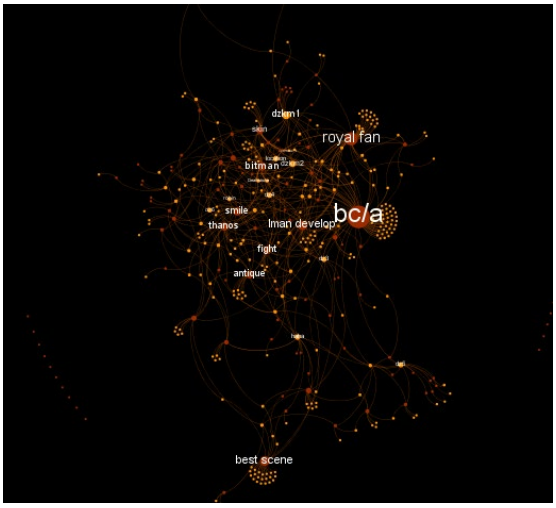

Figure 8: Members' networks (via Gephi)

Afterwards, I rechecked the sentiment strength of more popular posts and of more active users. Firstly, the post receiving most engagement was evaluated neutral emotion, while the comments demonstrated positive attitude toward this topic. Similarly, other popular posts were inclined to show neutral even positive sentiment to the topic in relation to Marvel, accompanied by optimistic comments. Otherwise, it was shameful that most active users did not make any comment but give likes. Thus, considering the general outcome of comments' sentiment, I tend to believe that they hold positive view about Marvel movies.

6. Discussion and conclusion

This report proposed and empirically tested the public sentiment and the networks of members in Facebook group. (*MARVEL / DC UNIVERSE*). Figure 6 and Figure 7 give the evidence that the major sentiment is inclined neutral, or slightly positive, however, there exists polarised sentiment toward Marvel movies. One main reason is the heated debate between fans of different camps, involving superheroes they support. The recent argument is whether the Avenger trailer is much better than the whole Justice League movie. And another reason for sentiment polarisation is that some loyal fans express strong expectation for new Marvel movies, while others complain the defects in film, such as the pink skin of Thanos and the similar appearance between Black Panther and Batman.

When it comes to the effect of the eWoM on brand 'Marvel', I can come to the conclusion that the brand could benefits from the virtual fan community, accompanied by potential damages. On the one hand, the Marvel group offers fans a platform to share personal experiences and emotions for movies, as mentioned above, in favour of enhancing brand cohesiveness and brand trust if the contents are valuable.

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On the other hand, previous research stressed on the lack of control for marketers in terms of brand reputation. It is not surprising that the traditional approaches are losing power to control cyber-remarks, and social media users are empowered to establish a different online brand image. According to my findings, another potential danger is that group may be divided into fragmental camps because of overly fierce disputation, particularly in such a big group with different positions on superheroes, which sits ill with reputation and cohesiveness of brand.

Nevertheless, as Figure 2 and Figure 3 displayed, there was a direct relation between the degree of participation and the time of releasing trailers. Meanwhile, it is the most popular way to publish posts with photos, and this kind of posts also rank highest in the number of receiving engagement, particularly when they produce controversial topics. As mentioned above, Hsu et al. argued that users would like to obtain and share information, rather than create contents [4]. According to my findings, members are willing to give likes and reactions but not share information and make comments, even though they are attracted by the posts. In other words, users prefer to show their emotions unilaterally toward specific posts, instead of interacting with other members directly. This result is different from previous studies.

There are numerous flaws in the report. The core limitation is that the accuracy of measuring sentiment strength was not displayed in this research because it is beyond my competence. I have managed to avoid bias in the process of using *Sentistrength* by correcting the score of emotion words, however, the outcomes are far from satisfaction. Otherwise, the preference of photo and emoji use contribute to the losing of post message, as a result, quite a few posts failed to be measured sentiment strength.

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