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Altmetrics and Journalism: Using Twitter Comments to Analyze Public Engagement

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Abstract

This article presents the potential of the extraction and visualization data in Social Networks for the field of Journalism. The role of people's participation in networks emphasizes and praises facts that have been published in the media. We used Social Network Analysis (SNA) as a methodology to identify alternative metrics or "altmetrics" in a case study involving news about the death of the Rector of the Federal University of Santa Catarina (UFSC - Brazil), Luiz Carlos Cancelier. We applied the cloud based tool Netlytic to retrieve a volume of comments made on Twitter after the Rector's death, from 2017-11-28 to 2018-01-02. The analysis has two variables, the first one in the Social Network environment and the second focused on the people participating on it. Results indicated an interesting connection between SNA and the journalistic area, as an instrument to verify the impact of news and the engagement of the public commenting or sharing it.

Keywords: Journalism; social network analysis; metrics; altmetrics; twitter.

1. Introduction

Popular participation in Social Networks is not a current phenomenon, but a process that has been built and facilitated by the popularization of the Internet, new technologies and more user-friendly content platforms. In 1993, Howard Rheingold, the first author to comment on virtual communities, described communities from a social perspective as cultural aggregations that emerge when enough people bump into each other often enough in cyberspace. "A Virtual Community is a group of people who may or may not meet one another face to face, and who exchange words and ideas through the mediation of computer bulletin boards and networks" (Rheingold, 1993, pp. 57-58).

We had the first moves in Virtual Communities and Virtual Communities of Practice (Wenger; McDermott; Snyder, 2002) to bring people together to discuss issues or solve problems. Particularly, a Virtual Community of Practice is considered an organization that, as such, is composed of people whose values and beliefs inevitably influence their thoughts and actions (Paulino, 2011).

In a previous paper, Paulino (2013) talks about the great and infinite community with which we live, called the Internet. We come to study, to know and to understand its forms of interaction and coexistence: the people who "live" in the network teach us and also learn from us, in a typical contemporary lifestyle. This environment, according to the author, will never be controlled by machines, whose decision-making capacity will always be limited since they only recognize the form of the information, but do not interpret its meaning; only humans can give meaning to information, so we will always have a regulatory role in the virtual world.

According to Wenger (2010), communities have already enhanced network identity and connectivity. It seems that these concepts today are intertwined in the sense that they also involve

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connections between members. Although there is no identification with a domain and no commitment to a learning partnership, there is the commitment to participate in giving voice to what they consider right or wrong.

In this context the article intends to show how we can retrieve a great volume of comments from Social Networks and extract from these comments other information that identifies the feelings or position of the people about pieces of news and media coverage. As a case study we used a series of events that began with an action conducted by the Federal Police of Brazil at the Federal University of Santa Catarina (UFSC), which culminated in the suicide of the Rector Luiz Carlos Cancellier. This news generated a strong repercussion and consequently the participation of people in Social Networks. We used, in the context of Social Network Analysis (SNA), the Netlytic tool to retrieve comments posted on Twitter after the Rector's death. This volume of extracted data includes the time frame from 2017-11-28 to 2018-01-02. This research is based on the concept of alternative metrics, or "altmetrics", to identify the impact and relations that arose from the analysis.

2. Background

2.1. Social Networks

A social network is a type of relationship between human beings based on the flexibility of its structure and the dynamics among its participants (Martino, 2014). The idea of networking is relatively old in the human sciences, but it gained strength when technology helped build social networks connected by the Internet. In the 1990s, Wasserman e Faust (1994) already highlighted that the notion of a social network and the methods of SNA had "attracted considerable interest and curiosity from the social and behavioral science community in recent decades" (1994, p. 3).

We can identify a myriad of types of social organizations developed through history, each founded on specifics bonds between participants. Business ties are based on the wish of success; family is based on affection; friends, on friendship. What is evident in networks, nevertheless, is that these ties are less rigid, usually based on common interests or values - political, social, economic, etc. In the Social Sciences the notion of "social networks" describes these kind of relationship between people, within the Internet environment.

Each social network has its own dynamics, and this is linked to the technology upon which social interaction is built. If we take a mail list (one of the earliest forms of digital networks) as an example, we have considerably different dynamics: it was often slower than instant mobile social networking connections. Also, the message style and size were different, usually longer and deeper. This scenario leads to quicker and more fluid bonds between "actors", established as needed at one point and dismantled in the next instant.

In some situations, actors can serve as social networking nodes (Martino, 2014). As the author remembers, a blog is both an actor within the networks formed by similar blogs and, at the same time, a node that houses the social interactions in the comments of each post. Actors do not necessarily have to be human: a company can be considered an actor in a certain network - the word actor, within

networks, is linked to action. Summarizing, the principle of a social network is the relational nature of its composition, defined by flexible bonds, and by the agile dynamics of the relations between its actors, human or not.

2.2. Social Media Analysis

Social Network Analysis (SNA) is the process of investigating, measuring, and mapping social structures and relationships, providing visual and mathematical analysis to the researchers (Easley & Kleinberg, 2010). The term social network refers to the articulation of a social relationship, ascribed or achieved among individuals, families, households, villages, communities, regions, and so on (Bandyopadhyay, Rao & Sinha, 2011).

What matters the most for a SNA study is that the object has a mappable structure and that this mapping is useful for understanding the phenomenon that the researcher aims to investigate. SNA studies are getting closer to Journalism and Communication ones. Among examples of current studies that merge the fields we have papers focused on computer-mediated conversations (Bruns, Burgess, Crawford & Shaw, 2012), on the emerging collaboration processes (Recuero, Bastos & Zago, 2015), and on how to apply these other premises on top of the metrics constructed by SNA (Malini, 2016).

Before presenting the main findings we approach some concepts according to Recuero (2017, p. 26). The analysis of social networks works with the representation of groups as sociograms (social graphs), which are analyzed from the measurements of their structural properties. In this metaphor, social relations (called links, ties, or edges) constitute the connections between nodes (networked structures) that are the social actors. Depending on the object studied, thus, the connections can be observed as interactions, informal relations, or more structured social bonds. Nodes in the network can be things, people or groups and the links (or ties or edges) between them are how we can perceive flows, interactions, and relationships.

2.3. Alternative metrics - altmetrics

Roemer and Borchardt (2015) understand the need to incorporate alternative web-based metrics into the academic context, since they consider that bibliometrics - term coined in the 1960s by Alan Pritchard to refer to the "application of mathematics and statistical methods to books and other media of communication" (Roemer & Borchardt, 2015, pp 27-28) - are not sufficient anymore to satisfy the impact-related needs of scholars. This happens since the field of bibliometrics developed in a time when books and journals monopolized the academic area. Nowadays not only we have personal computers and the Internet widespread, but there are more universities, research centers, and consequently more pressure to publicize work and demonstrate impact.

The concept of altmetrics was first used in the academic context to refer to nontraditional methods of evaluation of a paper, that is, not based on the number of citations it has. The process of formally being cited by other researchers can take several months or years. Altmetrics focus on social media, a much quicker form of communication than scholarly citations. It can consider as metrics the number

of likes, tweets, bookmarks, downloads, click-through numbers, peer collaboration tools, blog posts, etc. in social media and the web (University of Denver, 2018).

> *"The advent of social media has already changed many aspects of scholarly communication; researchers can present their ideas in blogs, discuss their research with colleagues on Facebook, and share their articles on Twitter and Mendeley. Because research is increasingly being brought out from the closed scientific ecosystems to the open web, even people other than just researchers can participate in discussing research and disseminating new discoveries to a wider audience. New forms of scholarly communication require new methods for measurement of impact."* (Holmberg, 2015, p.1)

Many quotes and many tweets could indicate a dialogue or interest in a work, but would not attest to the quality of what is being said. However, a look at the comments would be an opportunity to detect early interest or controversy over the results presented. This practice would be strategic for communication actions of the researcher or institution in the debate that will follow with the press and society as a whole (Gouveia, 2016). The Netlytic tool provides the possibility of extracting data on four social media platforms: Twitter, Facebook, Instagram and Youtube. We chose Twitter due to the facility to find more discussions on a certain theme through a keyword or a hashtag (#).

2.4. Topic subject: the death of the Rector of UFSC

Since September 2017, the Federal University of Santa Catarina (UFSC) and its Rector, Luiz Carlos Cancellier, had their names involved in a series of news reports on Operation Ouvidos Moucos of the Federal Police of Brazil, which sought, according to this institution, to dismantle an organization that diverted resources from UFSC distance education courses. The Rector and six other defendants were arrested on September 14th. The Rector was also dismissed from his duties and forbidden to enter university.

18 days later, he committed suicide (October 2nd), opening a wide debate about hasty convictions, unfounded investigations, culpability, among other issues, in the media and in social networks. As of the closing date of this article, the investigations are still underway by the Federal Police. The lack of any conclusion continues to encourage debate on the subject.

In the first moment of the analysis, the comments show shock and solidarity to the Rector. His name is quoted more than 1.000 times on Twitter, and among the main words involved are: UFSC, death, rector and fascists. Three days later, after the initial reactions, Cancellier's name continues to be widely commented, but it is now related to other issues, such as comments about abuse of authority, criticism to Rede Globo (the main Brazilian broadcast company) and even the Brazilian president Michel Temer.

3. Methodology

Considering the events that led to the death of the Rector Cancellier, this research intends to verify the popular participation through the public interaction on an issue of impact addressed in the media. We will adopt the concepts defined by Recuero (2017) on social networks as a structural metaphor for observing groups of individuals, understanding the actors and their relationships. In this metaphor, ties or social relations constitute the connections between the nodes that are the social actors.

Depending on the object studied, thus, the connections can be observed as interactions, informal relations, or more structured social bonds. In this paper our network involves the people who interacted on Twitter from December 1st to 3rd, 2017.

3.1. Data extraction tool

We used Netlytic, a cloud based tool, to extract the comments. It does text-based analysis (comments) to present the formation of clusters, a set of nodes more densely connected than the others in the network. Gruzd, Paulin, & Haythornthwaite (2016) define it as a tool that allows users to capture and import online conversational data, and find, explore, and visualize emerging themes of discussions.

Netlytic is one of the most interesting solutions for academic researchers on social media, as well as a great support tool for commercial projects. It was developed by the previously cited Anatoliy Gruzd, a professor at Ryerson University (Canada). By summarizing large amounts of data, Netlytic reveals interactions that have been occurring in one or many social media platforms.

After the data is collected, we chose the Text Analysis page, that has two options: Keyword Extractor and Manual Categories. The first is intuitive for anyone who has ever used a social media monitoring tool. Its first function is the simple counting of the more frequently words (Words Cloud). The second function measures the frequency evolution of words over time (Words Over Time), allowing us to identify the relevance of topics and to visualize keywords within the desired context.

The focus of this analysis is the texts and their relationships, so in the Netlytic tool we used the features "Name Network" and " Chain Network". The first one is a communication network built from personal names mined from the messages analyzed. To discover links in Name Networks, the user can choose between two main options: "connect a sender to all names found in their messages" and / or "connect people whose names co-occur in the same messages".

The second one, Chain Network (also known as a 'who replies to whom' network), is a communication network built based on participants' posting behavior. To build such networks, Netlytic provides a range of options: from 'connect a sender to the last person in the post chain only' to 'connect a sender to all people in the reference chain with decreasing relevancies'.

3.2. Data extraction process

In this analysis we used the keyword UFSC as a guideline to extract the comments during the time frame set: from 2017-11-28 23:30:13 to 2018-01-02. The goal of this analysis was to verify the free positioning of people, influenced or not by the traditional press, over the above mentioned set of events at UFSC.

As mentioned before, we chose Twitter due to the facility to find more discussions on a certain theme through a keyword or hashtag (#), not based on profiles. On Facebook, for instance, Netlytic extracts data by the ID of a profile or page, but in this case feedback might be influenced by a certain profile (people, company, institution). Alyami & Toze (2014) cite surveys (Hu et al., 2012) that present

the topological features of Twitter and its power as a information sharing platform and found that the dominant topics of the most active tweets (about 85%) are headlines, or informational content. The authors examined how the news spread through Twitter and concluded that Twitter was the first to generate many online news, even before traditional media.

4. Results and discussion

4.1. First analysis

During the 32-day review, we had a return of 24.408 comments with the keyword UFSC. Although we did not choose a moment immediately after the events occurred, it is clear to notice a great amount of comments on the subject. Figure 1 shows the graph of most recurrent keywords related to the term "UFSC".

In the graph the results can be visualized in a Words Cloud with the more recurring ones (terms appear stacked above the term UFSC itself). This was extracted through the use of the Keyword Extractor tool, that identified common words in the tweets using #UFSC. In addition to presenting the words, it indicates the emphasis or strength of the words quoted over the time surveyed. The "Keyword Extractor" feature identifies popular topics in this data set, by the frequency in which every word appeared.

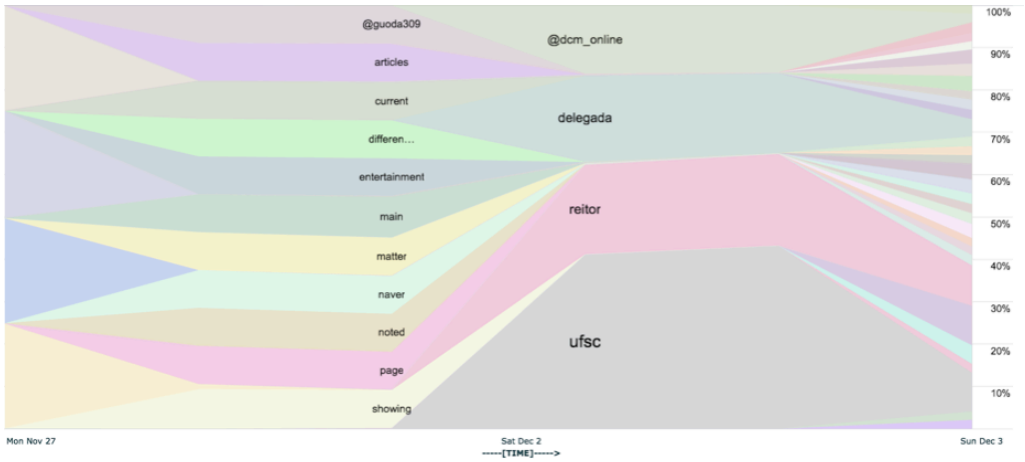

Figure 1. Volume of topics covered at the beginning of the analysis. Source: Netlytic.

The thicker the colored lines involving the word, the more recurrent it was. The high frequency in which the keyword "UFSC" appears in the set of terms analyzed suggests that people clearly refer the subject they are talking about, regardless of the topic they talk about. In Figure 1, above the term "UFSC", we see the words "Rector" ("reitor"), "Chief Police Officer" ("delegada") and "@DCM_online" (Diário do Centro do Mundo, a news website), all referring to comments on the death of the Rector.

The graph in Figure 1 indicates that more than 50% of the comments in the time frame, excluding the UFSC topics, were about the fact that occurred. This confirms the thesis of Alyami & Toze (2014) that indicates Twitter as a source of information and self-replication of news. We found repercussions

throughout the Americas, as well as in European countries and also in Japan. At this first moment, the Free Journalists ("Jornalistas Livres") page had a lot of prominence in engaging with the public.

4.2. Second analysis

Netlytic can be configured to extract for a determined period of time, from 1 to 31 days. When many days are set, the Words Cloud and the Term Emphasis graph may change over time, which can be seen in Figure 2.

This is the same word analysis process from Figure 1, using the Keyword Extractor, but at another time. New facts emerged after a few days. Twitter posts got more emphatic. Note that the words "Suicide" (suicídio) and "Rector" (reitor) appeared with greater emphasis, which indicates the community manifested itself intensively in relation to the death of the rector. We see new terms emerging, such as "UFMG", related to a similar police approach in another Brazilian University, which we will specifically approach later.

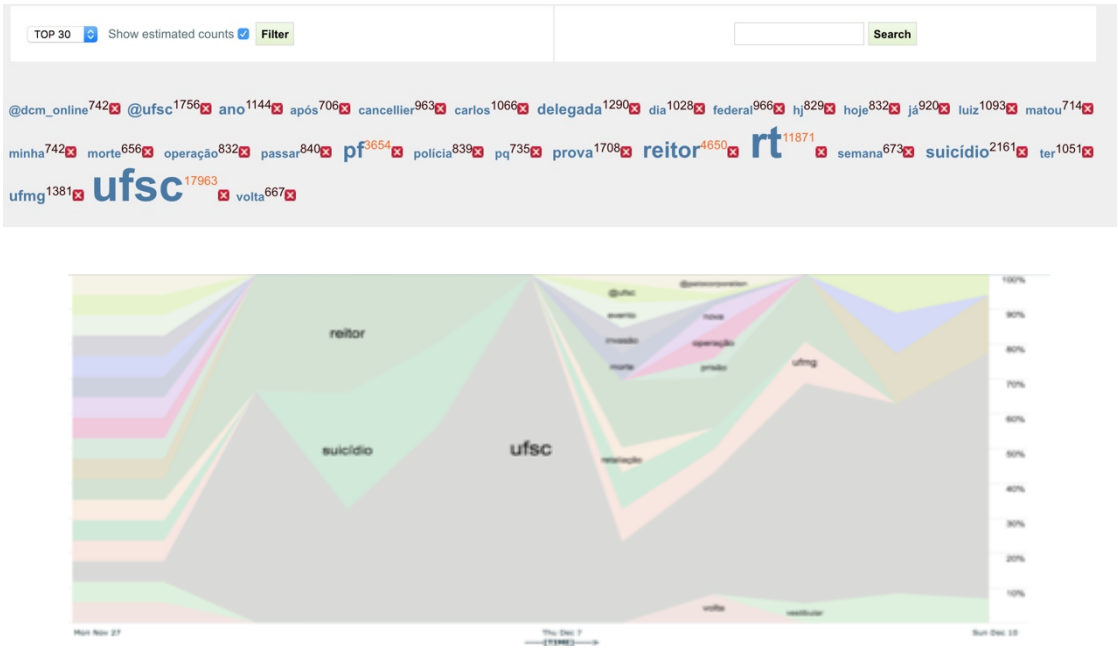

Figure 2. New words appear six days after the first analysis: 2017-12-10, 9:59PM Source: Netlytic.

The term "Suicide" (suicídio) had 2.161 mentions, probably associated with news published by Estado de S. Paulo newspaper questioning the investigation, widely replicated on Twitter. The graph in Figure 3 shows that December 3rd - the same day of the publication[1] - was the day with more replications. This reaffirms the agility of the news dynamics on Twitter.

[1] https://politica.estadao.com.br/noticias/geral,suicidio-de-reitor-poe-pf-sob-suspeita,70002105813

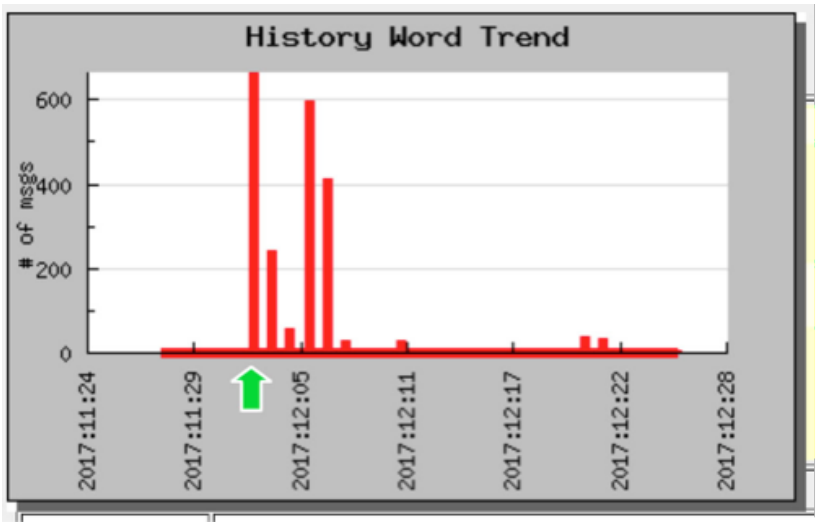

Figure 3. When selecting the term "Suicide" the tool offers visualization of the graph of the term tendencies: 2017-12-10, 9:59PM. Source: Netlytic.

Other Netlytic feature worth highlighting is the possibility of making analysis from a cropped term. In this case, by cropping the term "suicide", we can identify the public's feelings about the fact, through a simple speech analysis of the posts. References to the Federal Police of Brazil (the term "PF") were made 3654 times, with a negative connotation. This happened not only in posts about suicide, but when other terms were involved. There are many users questioning the exaggerated approach to the people cited in the process, especially the Rector.

Another actor quoted in this analysis is the Chief Police Officer (the term "delegada"), mentioned 1.240 times. We can perceive through the speeches the influence of popular mobilization. On December 1st, the media announced the start of Operation Ouvidos Moucos, which mobilized public opinion and the media. According to Table 1, a succession of comments against the way the Chief Police Officer commanded the situation generated an uprising and the Federal Police suspended the promotion she was about to receive on December 8th.

Table 1. Comments about the Chief Police Officer's promotion. Source: Twitter data extracted by Netlytic

2017-12-01 18:46:37	RT @DCM_online: A lei é para todos: **delegada** da PF que mandou prender reitor da UFSC que se matou é promovida. Por Kiko Nogueira https://t...
2017-12-03 08:20:55	Suicídio de reitor põe PF sob suspeita. Ministério de Justiça manda apurar atuação de **delegada** Érika Mialik Marena https://t.co/CErKmyC8Tg
2017-12-03 09:58:16	RT @PTnaCamara: Paulo Henrique Amorim: **Delegada** da PF vai pagar caro pelo suicídio de reitor da UFSC https://t.co/ovDLy3tY tt via
2017-12-03 10:21:05	RT @revistaforum: **Delegada** da PF que prendeu ex-reitor da UFSC é alvo de investigação na Justiça, a pedido da família
2017-12-07 15:55:06	RT @DCM_online: **Delegada** da PF que mandou prender reitor da UFSC que se matou é investigada e tem promoção suspensa https://t.com/x1LWDfPBM6
2017-12-08 13:19:46	RT @DCM_online: **Delegada** da PF que mandou prender reitor da UFSC que se matou é investigada e tem promoção suspensa https://t.com/x1LWDfPBM6

On December 6th, a new fact mobilized the Social Networks. As seen in Figure 4, a new term - the abbreviation UFMG, Federal University of Minas Gerais -, appears in the image and points to comments on Twitter about a new Federal Police intervention in this University, with the same procedures that happened at UFSC, including the coercive conduct of the Rector. Figure 4 shows a peak of Twitter posts about this news, which in a way has brought again contestations about the Federal Police's action in Brazilian Universities.

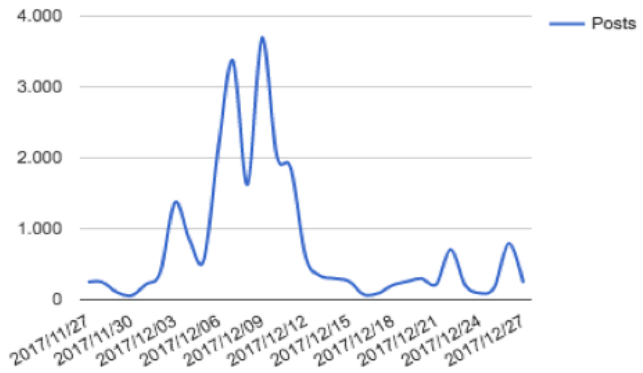

Figure 4. Increase of Twitter posts using the term UFSC on December 6th. Correlated news about investigations at UFMG. Source: Netlytic.

4.3. Properties of the network and the clusters

Until this moment we considered the "text" variable for our analysis, but Netlytic has resources to analyze Networks (Connections), that is, to identify nodes and their relations. When considering the term "UFSC", we identified 5 clusters of specific nodes and one set of clusters with a more dispersed characteristic (Figure 5) that synthesizes the connections over the term. Not all of the identified nodes, even when "UFSC" is related, referred to the Rector's case. These cases will not be considered. The nodes are differentiated by color, and the green ones are specifically about the case analyzed.

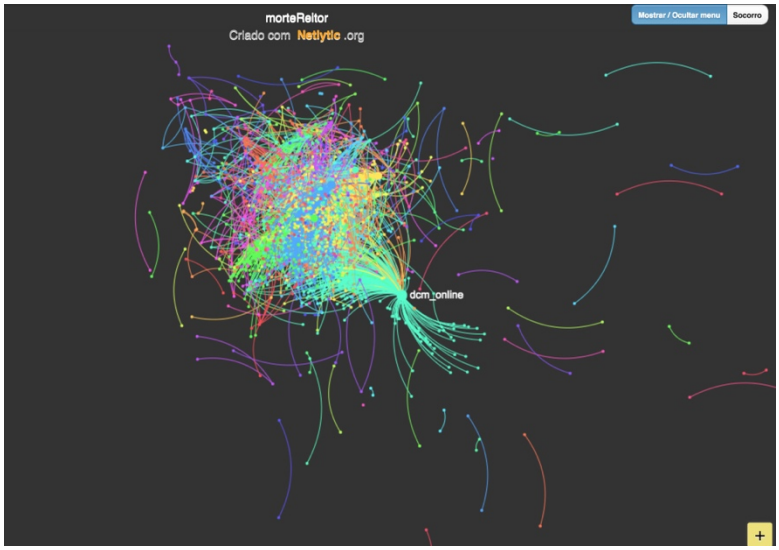

Figure 5. The network built from Twitter posts using the term "UFSC" from 2017-11-28 to 2018-01-02. Source: Netlytic.

Even the nodes with more scattered features also belong to the same theme. The networks have some characteristics or metrics that relate to measures in which the node is not the central focus, but it is inserted in the network as a whole and in its properties and characteristics (Recuero, Bastos & Zago, 2015).

Regarding the network's forms and connections, it can be seen from four different perspectives: Centrality, Density, Reciprocity and Modularity.

A Centralized Network measures the average degree of centrality of all nodes within a network. When a network has a high centering value closer to 1, it suggests that some central participants dominate the flow of information. Values close to 0 are considered decentralized, with information flowing more freely among many participants. The network of Figure 6 is considered with a low centralization value: 0.07.

The Density variable considers the ratio existing links-total possible links in a network. In other words, it is calculated by dividing the number of existing connections by the number of possible connections. This measurement helps to illustrate how close the participants are in a network. The density measurement is complementary to the diameter, since both evaluate the speed of information flow. The closer this measure is to 1, the closer the community/conversation, which suggests that the participants talk to many others. On the other hand, if the value is closer to 0, this suggests that almost nobody is connected to others in the network.

The analyzed network presented the parameter 0.0007, which indicates people are not part of the same network or the same community, but interact due to a specific reason. Since the network analyzed in this paper was formed from pieces of news, people who do not know each other can engage in discussions that they considered important through Social Networks. Thus, we suggest that networks that originate from journalistic content have low density values.

This behavior also reflects on a low Reciprocity of the network. Reciprocity is a proportion of connections that show two-way communication (also called reciprocal links) relative to the total number of existing links. There was not much discussion among the people who participated in the nodes analyzed, the most noticed behavior was posting or retweeting content that express the user's position, not necessarily expecting some answers.

To categorize clusters there is the Modularity variable, which helps us determine if the clusters found represent distinct communities in the network. Higher values of modularity indicate clear divisions between communities. Low modularity values, generally less than 0.5, suggest that the clusters found by Netlytic overlap more, are more concise. In the network analyzed the value found was 0.8 which reinforces the disparity of connected groups, and little clusters formation.

The comments of this complete network (Figure 5) are not limited to the discussions on the case of the Rector's death. They also refer to the broader term "UFSC". Therefore, we highlight Clusters a, b, and c in Figure 6 for the specific interactions that are limited to the Rector's Case. The Netlytic tool provides the retrieval of comments and individualized analyzes per cluster.

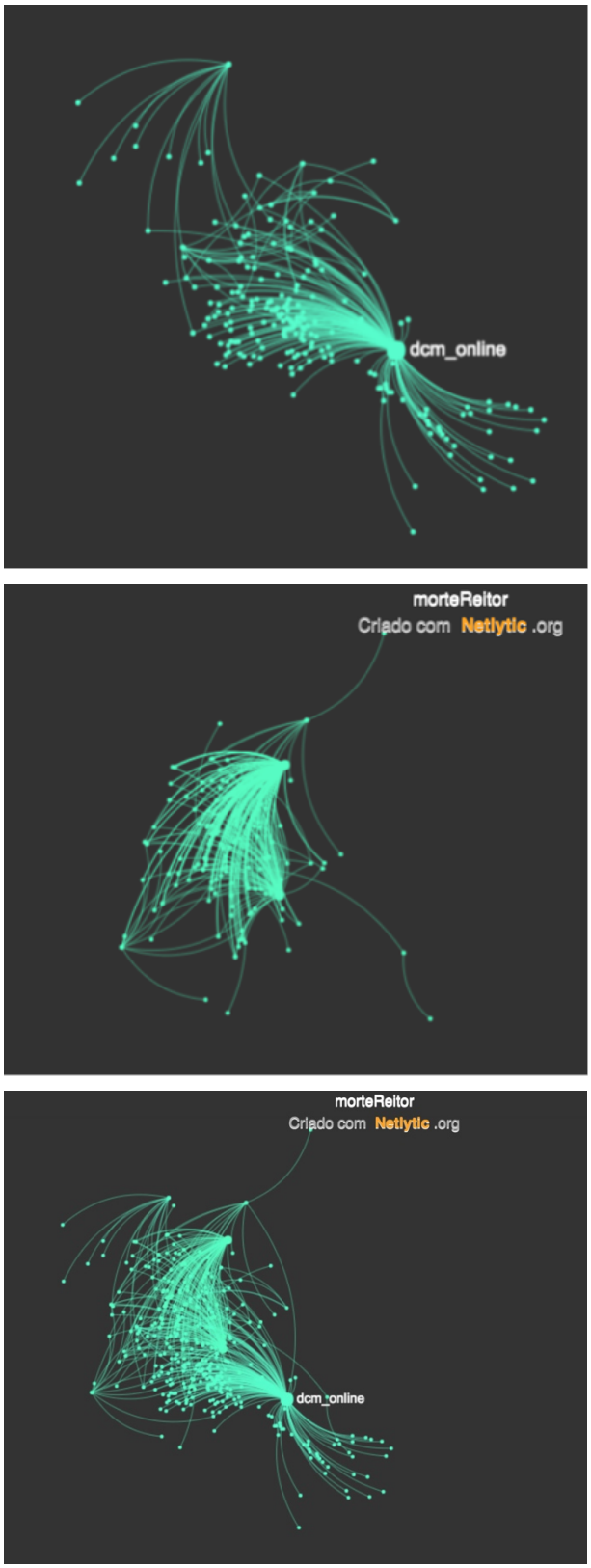

Figure 6. The 3 clusters above are subgroups of the larger network shown in Figure 5. Source: Netlytic.

5. Conclusions

We presented in this paper a possibility to identify metrics to analyze the participation of the public on Social Networks, commenting on journalistic information. This resembles the metrics applied in the processes of altmetrics, that aim to measure different forms and patterns of meaning and the use of scientific products, not only verifying the traditional forms of publication, but also the wider process of dissemination in emerging environments (Barros, 2015). Authors on altmetrics already recognize Twitter as an important platform to share context. To Holmberg (2015), much of the current research has focused on Twitter and Mendeley, two sites that appear to have the most extensive coverage of scientific publications.

We consider Social Networks an emerging environment to track what individuals publish, link or answer online, directly or indirectly, by connecting to another individual online. Social interactions are meaningful because they provide researchers with support, influence, exchange and share of information, as well as shared knowledge construction (Munro, Hartt & Pohlkamp, 2015).

Regarding the journalistic area, we consider SNA an effective instrument to verify the impact of news and the engagement of the public commenting or sharing it. The case of the Rector's death initially mobilized a University, then a city, and a country. We found repercussions throughout the Americas, as well as in European countries and also in Japan. That was only possible because of the Internet and the Social Networks. The dynamics observed reaffirm the characteristics of digital social networks (Martino, 2014): quick and fluid relationships between actors, established as needed at one point (in this case, to share news) and dismantled in the next instant. Also, we identify some non-human actor in the network, such as media Twitter accounts, being "@DCM_online" (Diário do Centro do Mundo, a news website) one example.

The analysis we made suggested the displeasure of the community with the intervention of the Federal Police of Brazil. So far, months have passed and we do not have a result of this investigation, but the feeling of indignation over the death of the Rector, identified in this article by the public's participation in Twitter, remains.

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