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Mapping of conversation networks on Twitter about the Amazon fire crisis

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Summary

This article maps the conversations that emerged on Twitter about the increase in fires in the Amazon. The networks were mapped on August 26, 2019, the day after the highest outbreak record in the region. The records refer to the same period of the previous year and were widely reported, reaching international attention. It was concluded that the debate was defined by the identification with profile values of public figures not linked to the environmental cause. It was confirmed that despite the seriousness of the case, the dissemination of information was determined by behaviors such as homophily. The methodologies used were Social Network Analysis (SNA) and Contingency Analysis.

Keywords

Social networks; Dissemination of Information; Identity; Amazon; fires.

Introduction

A central feature of social networks is the fulfillment of a search for a primary identity of users. Several identity expressions can be present in the network. Resistance against the predominance of market values in the defense of the environment would be one of them, according to Castells (2018). It would be a cause that could inspire a sense of belonging (Castells, 2018). This theme has already been consolidated outside of networks, with a significant amount of social mobilization power. By combining these two aspects, this research aims to investigate identity factors related to the environmental issue that pervaded Twitter discussions about the Amazon during the peak of the fires in 2019.

The conversations that emerged on August 26, 2019, which was a time of significant repercussions regarding the increase in forest fires in the Amazon¹, were specifically mapped. The fact was reported shortly after the end of the 45th summit of the G7 (group of the seven most industrialized countries in the world) that took place from August 24 to 26, 2019, in France. The issue reached the status of an international crisis, having been on the agenda not only during the G7 summit but also at the 74th United Nations General Assembly, in the USA, in September of the same year; at the Synod of Bishops for the Pan-Amazon Region, in October, in the Vatican; and at the Climate Conference, held in December, in Spain.

The pronouncement of authorities and international celebrities about the rise in outbreaks in August had a strong impact on Twitter conversations, reaching the top of the platform's Trending Topics list, a daily ranking that presents the main terms and topics that received the most interaction in the previous 24 hours.

Among the platforms, Twitter enables the easiest collection of conversations and information flows using both continuous and public data. It becomes a possible indicator of trends of what happens in other networks, which are more restricted to data collection.

Regarding the constitution of a new discursive space, Twitter is considered by Amaral (2017) as a central platform: "From our perspective, essentially because it is not a social network, but a network of content and conversations." (Amaral, 2017, p. 86). This indicates that the platform has outgrown its original purpose of facilitating human connection, which corroborates the statement by Santaella and Lemos (2010, p. 17): "Twitter messages not only make use of networks but create networks, and they are also the network itself".

This research contributes to a better understanding of social network behavior on the internet, not only in terms of environmental issues but also in terms of identifying patterns that can aid in the understanding of other important topics.

Environment and Social Networks

The representation of nature and the relationship between man with the natural environment have been historically constructed with very different ideas and practices. According to Pereira (2018), it was only in the 1970s that the social sciences began to consider the environmental dimension in their analyses. "There were periods when the need to protect it was emphasized, in others, its intensive exploitation was justified." (Pereira, 2018, p. 339).

Soares (2010) corroborates this statement and points out that the environmental paradigm began to be developed in the early 1970s.

The exhaustion of the current's nature exploration model became evident, either in its

1 According to the National Institute of Space Research - Inpe, there were 89,176 fires in the Biome of the Amazon in 2019, which is approximately 23% more than in 2018, when 68,345 fires were registered. In addition, August 2019 had the lowest average of the year with 30,900 active spots, a significant increase compared to the same month in the previous two years.

capacity to supply materials, or in its capacity to absorb direct and indirect waste from the production and consumption of goods. Problems like these were initially made explicit at the meeting of the United Nations, UN, in Stockholm, in 1972. (Soares, 2010, p. 13)

What motivated historians to explore the relationship between humans and nature would have been “both the emergence of environmental movements in several countries and the holding of international conferences and the changes in the world of knowledge, consolidated in the 20th century.” (Pádua, as cited by Pereira, 2018, p. 340). Castells also attributes this influence, largely, to the environmental movement: “The multifaceted environmental movement (...) lies to a large extent at the heart of a drastic reversal of the ways in which we think about the relationship between economy, society and nature, enabling the development of a new culture.” (Castells, 2018, p. 224).

Within this context, environmentalism can be understood as “all forms of collective behavior that, both in their discourses and in their practice, aim to correct destructive forms of relationship between man and his natural environment.” (ibidem, p. 143).

Regarding environmental awareness, this new scenario “began to permeate the institutions of society and its values began to have political appeal at the price of being refuted and manipulated in the daily practice of companies and bureaucracies” (ibid., 1999, p. 40). Furthermore, for the author, this movement reached a great impact on the popular classes.

The media would be one of the tools used to disseminate and strengthen the environmentalist perspective, with “massive dissemination in the media to digital activism in their mobilizations.” (Gomes Jr. 2017, p. 15). This factor reinforces Castells' statement (2018, p. 26) that politics in the network society is, above all, media politics and the conception of power requires an understanding of the structure and dynamics of mass media.

Apart from traditional media, debates about the environment and the Amazon can be found in digital media spaces and, as a result, on social media platforms, where thousands of actors debate and take positions on, often, opposing points of view. In the various aspects of society, the senses present there help to compose the new reality and, as a result, contribute to a transformation even of the users' cognition: in the way they perceive, experience, live, and give meaning.

The research on networks is so extensive that it spans multiple spheres of human knowledge and is not limited to social networks, or even digital networks (Santaella and Lemos, 2010, p. 13).

In the human sciences, the early twentieth century saw the emergence of research on networks with an emphasis on interpersonal relationships within delimited communities, as evidenced by the works of Granovetter (1973) and Moreno (1973), which continue to inspire research on connected structures. Smith (2015) reaffirms that social networks “illustrate the ways in which people are involved in webs of relationships and institutions.” (Smith, 2015, p. 17).

The studies on internet networks understand that a far more comprehensive transformation is taking place, rather than a simple projection of offline networks to the online universe or the creation of new networks that did not exist previously. As stated by Recuero (2012), digital networks are a complexification of offline social networks and need to be differentiated because they rely on the mediation factor.

In the classic work *Sociedade em Rede*, Castells (1999) discusses the new paradigm that has emerged as a result of the digitization of information, Information Technology, which finds one of its primary characteristics in the logic of networks, and is responsible for profound societal transformations, reaching the technological and economic spheres (Castells, 1999, p. 41).

One of the main transformations pointed out by the author would be the generation of a new sociability, directly related to the need for belonging, which creates deterritorialized bonds, centered on perceived and shared values.

The search for religious, ethnic, territorial, and national identities is visible on digital networks

platforms through the feeling of belonging, which is defined by the emergence of spiritual communities, movements, and causes. "In a world of global flows of wealth, power, and images, the search for identity, whether collective or individual, ascribed or constructed, has become a fundamental source of social meaning." (1999, Castells, p. 41).

Such meaning can also be constructed within networks through the latent cultural behavior of that time, highlighted by Jenkins (2009), which is participatory.

The expression participatory culture contrasts with older notions about the passivity of media spectators as occupants of roles separated, we can now regard them as participants interacting according to a new set of rules, which none of us fully understands. (Jenkins, 2009, p. 30)

The new sociability pointed out by Castells, which in turn is permeated by participative constructed values, as proposed by Jenkins, directly impacts the circulation of information in the networks. "Being in such networks is being able to enjoy the information that is disclosed in them and, more than that, being able to enjoy the information that belonging provides, which will help in the construction of identity." (Recuero, 2007, p. 12)

Specifically, on social networking platforms, several researchers have focused their attention on understanding how the production and access to information occur in these spaces. We can refer to Santaella and Lemos, 2010; Primo, 2013; Recuero and Zago, 2009, among others.

Although social network platforms were not designed as mechanisms for disseminating information, they have been applied for this purpose by users and, in an emerging way, they also behave as media (Recuero, 2009). These operating mechanisms emerge dynamically and reveal themselves, as they point to a complex logic, which must also be understood in the context of public access to information.

In terms of information diffusion, each link established in a social network can facilitate the flow of information between a user and the rest of the network, while adhering to the dynamics of resource appropriation and the combination provided by the network's own resources, which include searchability, replication, and persistence of information (memory) (Boyd, 2007).

Thus, a text published on a user profile can initiate a network conversation, as it can be recovered at any time, as well as commented on, reproduced and shared, through the tools' own communication mechanisms, such as likes, commenting and sharing. "Such collective practices remain accessible to different groups, interconnected within the same network" (Recuero, 2012).

In digital social networks, not all participants are equal in terms of the power they wield. Some users are more credible in relation to the information they publish, while others contribute more heavily to making it circulate, for example. Castells (1999) emphasizes that "(...) the morphology of the network is also a source of drastic reorganization of power relations. The connections that link the networks represent the privileged instruments of power. So, connectors are the power holders."

In this context, the popularly known influencers are those who exercise greater power in the dissemination of information. Kleinberg and Easley (2010), for example, show that the circulation of information in the network can influence a large number of individuals and even generate a mass behavior, called the cascade effect, which occurs by imitation. "This imitation is the result of a rational behavior, constituted by the actors from the available information" (Recuero, 2012, p. 6).

Another common behavior that can be used to influence the dissemination of information is the homophilic tendency of networks, which would have the equivalent effect of algorithmic customization of filters. Homophily is characterized by the aspect of the human psyche of faster acceptance of ideas that are in accordance with previously adopted values and beliefs, favoring the formation of bubbles in the circulation of information. For Santaella (2018), even if the algorithms were eliminated, filter bubbles would still be created as a way of bringing people together, which would be like mirrors of their own

beliefs.

As a result, despite the recognition of the importance of traditional news for the production and dissemination of information, it is understood that, in the context of social networks, the observation of the content in circulation does not necessarily need to start from profiles that represent the press, but it finds a very rich path in the wide circulation of the content. This alternative permits the identification of previously unknown but relevant network actors.

Methodological pathways and categories of network analysis

The analysis of data derived from social networks presents numerous challenges, which is why we employed a multidisciplinary approach to data interpretation based on social networks analysis (SNA) and frequency and co-occurrence analysis (Analysis of Contingency), which seeks to extract the most salient aspects of the data. Since 2017, each tweet has been limited to 280 characters. The methodology of contingency analysis is used to identify the possible meanings of the tweets published in the conversations, considering the 100 most frequent words, as well as the co-occurrence between them, enabling the most common associations to be identified.

Social Network Analysis (SNA), on the other hand, aims to observe the behavior of the structure of connections between actors. This analytical model has its precursor in graph theory, a descriptive method in which the network is understood as a set of points or nodes (actors) that are connected by lines or edges (interactions/connections), with the graph providing the visual representation of the network.

Thus, each Twitter profile is counted as a node, while interaction mechanisms are counted as loops or edges. "The structure is concretely understood as a network of relationships and constraints that exerts influence over the choices, orientations, behaviors, and opinions of individuals." (Marteleto, 2001, p. 72). Some SNA analytical categories used in this study are the indegree, outdegree, and modularity metrics. The data analyzed below are the result of a collection made using the NodeXL software, which extracted the information directly from the Twitter API. The keyword 'Amazonia' ('amazon') was used as a filter (without accent, as it is a spelling more used in these networks than, properly speaking, the correct one).

Data collection was conducted at two different times, 10 pm and 11 pm, on 26 August 2019. Each capture lasted forty minutes. The time was chosen in order to document the response following notification of the event's major facts on that day. The observation of networks in a temporal way was conducted to elucidate the flow of messages and aspects of discourse variation.

Two spreadsheets were generated with the profile username, the transcript of the published tweet, and information such as the number of followers and followed by each user, among others.

We call 'Network A' the first data spreadsheet that counts 23,100 rows, with 14,260 nodes (actors or profiles) and 21,521 edges (interactions). In the second moment, the 'Network B' spreadsheet was collected with 25,575 lines, 13,419 nodes (actors or profiles), and 23,674 edges (interaction or tweets).

Among the metrics applied in network analysis is the indegree, which refers to the number of interactions (likes, shares, retweets) that a tweet or node received. The node with a high indegree possibly indicates the performance of opinion makers, influencers, and industry experts, for example.

An actor who receives many social connections, for example, might be someone who is highly popular in that network, which may also indicate that this actor is more likely, compared to other nodes, to receive information that circulates in the network. Furthermore, in a citation network, the in-degree can indicate an actor who is cited more than others, also evidencing a privileged position in the network. (Recuero, 2017, p. 48)

The high outdegree from a node, on the other hand, indicates how many times the user has tweeted or interacted with others on the network and may be referring to fans, engaged people, activists,

content distributors, or even, as Recuero states:

(...) may indicate actors who try to get closer to others in the network, seeking to establish relationships. These connections are not necessarily reciprocal. Furthermore, in a conversational network, a node with a high outdegree may indicate an actor who cites a lot more than the others, and who is possibly more active in the conversation. Unlike a very popular actor, he can play an actor who is very invested in conversation, that is, very participatory. (Ibidem, p. 49-50)

Both metrics, indegree, and outdegree are indicated in graphs (graphic representation of networks) by the size of the nodes, which are the profiles. The higher the index, the larger the node in the view of both measures.

Another metric is modularity, which generates the visualization of profile interactions by grouping them and allowing the identification of how the network is organized into clusters. This index is also used to position the nodes in relation to the entire network, bringing them closer or further apart according to the frequency and intensity of the relationships and generating a map of the circulation of messages.

Relationship patterns can also be used as important metrics and categories of analysis. Recuero (2009) defines affiliation or associative network as the form of relationship that creates a feeling of belonging to a certain group or idea. The act of following pages produces affiliation networks because the followers probably share affinities from a social point of view and in relation to values. They also interact with each other more often than with people outside of these circles. Recuero understands that an affiliation network represents a stable relationship, as they are associations on the platforms. These would be long-lasting bonds and the formation of stable collectivities.

Emerging networks would be another category presented by the researcher, which in turn, represents interactions between people. They create bonds from the acts of conversation between profiles on networks. "To analyze social exchanges in this type of network, therefore, we investigated the comments exchanged, the conversations, the 'live' network." (Recuero, 2009, p. 94). Thus, emerging networks have distinct characteristics, as they demand the involvement of participants in discursive exchanges.

In social media, these aspects are learned through specific conversational mechanisms. On Twitter, users can mention or reply to tweets to create emerging links. In addition, the dissemination of messages through sharing is viewed as the formation of these networks.

Identifying the use of hashtags is also useful for reading networks. Platform users adhered to the use of the symbol associated with keywords as a practice to index content with the intention of promoting viral dissemination and, according to Amaral (2017), it has become important for the collective consumption and distribution of information. Hashtags, in addition to content indexing, identify subjects of common interest and allow the creation of movements, promote adherence to them, and ensure information streaming. "Collectively, in an emerging way, the networks are building, delimiting, and influencing the messages that are propagated there." (Recuero, 2012, p.1).

Thus, Table 1 was prepared to clarify the relationship between the different interactions, the formation of the different types of networks, and the categories of analysis they represent, as well as the metric used to measure them.

Table 1 - Analyzed variables of qualitative analysis categories

Qualitative Analysis	Type of Network	Interaction	Metric
Associative belonging	Affiliation Network	Follow	Followers
		Interactions (likes, mentions and shares)	Indegree
Relacional belonging	Emergent Network	Use of Hashtag	Use of Hashtag
		Interactions (likes, mentions and shares)	Modularity

Source: Elaborated by the author

Network Description and Analysis

In Tables 2 and 3, it is possible to identify the ranking of the profiles with the highest indegree into networks A and B. It should be noted that none of them is identified with an environmental cause. Table 2 shows, in network A, the nodes @bchartsnet, @jairbolsonaro, @brazilfight, @jbalvin, @augustosnunes, @hugogloss, @ailtonbenedito, and @emmanuelmacron as the eight profiles with the highest indegree among more than 14,260 nodes that integrate the network.

Among them, there is a political leader in charge of an elective position, President Jair Bolsonaro, while the others play the role of articulators and influencers: three with a conservative position: @brazilfight (a militant profile), @augustonosnunes, a journalist from Rádio Jovem Pan and @ailtonbenedito; a government critic @bchartsnet; a representative of the entertainment segment @hugogloss. Two others were only mentioned but did not tweet: @emmanuelmacron, president of France, and @jbalvin, a Latin singer who delivered a speech defending the Amazon at an international music award ceremony held on the day of collection, a few hours before the start of data collection. Regarding network B, Table 3 shows that the eight profiles with the highest in-degree are: @jairbolsonaro, @gen_helena, @leandroschel, @sf_moro, @reginaduartebr and @brazilfight, all with a conservative and supportive political stance to the government.

It is necessary to point out that, from the analysis of the information available in tables 2 and 3, there was no double-counting of data (at least in the most significant portion of the network), despite the captures being only one hour apart. This is because the metrics of in-degree and modularity were calculated in relation to the tweets, which are not repeated in both networks, as shown in the rightmost column in each of the tables.

Table 2 - Analyzed variables of the profiles with the highest indegree in Network A

	Id / Node	Indegree	Outdegree	Followers	Tweet
01	bchartsnet	884	01	107539	J Balvin makes an appeal for the preservation of the Amazon while thanking the Video Music Awards for his award: "We need everyone's help to save our rainforest." Will you cry, B0Is0n4r0? https://t.co/C7xWmYPol6

02	jairbolsonaro	682	02	4980514	- I also had the opportunity to speak with the presidents of Ecuador, Chile, Argentina, and Spain, who expressed solidarity with Brazil and its fight against a campaign of fake news, and offered to assist in the fight against the fires in the Amazon.
					More than 43 thousand military personnel from the Armed Forces are reinforcing efforts to combat forest fires in the Amazon. // Via @DefesaGovBr https://t.co/KcDWPRMxRe
03	brazilfight	594	1	34009	The New York Times published an article titled "Amazonia's destruction throughout Brazil." The newspaper attacks the president of Brazil, as it does with Trump: "A global treasure lies at the mercy of President Jair Bolsonaro, the smallest, dullest, and pettiest of leaders."
04	Jbalvin	565	0	6449853	
05	augustosnunes	549	2	668008	"Bolsominions on the streets defending burnings in the Amazon, attacking democratic institutions and advocating power abuse.", lied Renan Calheiros. And asked: "Where is this country going to get? Response: at a historical moment when all "Renans" will be in jail.
06	hugogloss	375	1	2384683	.@JBALVIN magnificently used the #VMAs stage to call attention to the Amazon! This is what a Latin king does!
07	ailtonbenedito	358	1	57013	More incarceration of criminals, fewer crimes. This applies to deforesters and arsonists in the Amazon as well. When caught in the act, those on the left who falsely pose as environmentalists will be the first to defend themselves, claiming that "prison does not solve the problem."
08	emmanuelmacron	222	0	4124505	

Source: Elaborated by the author

Table 3 - Analyzed variables of the profiles with the highest indegree in Network B

	Id / Node	Indegree	Outdegree	Followers	Tweet
01	jairbolsonaro	1491	02	4981683	- Watch the action of our C-130 Hercules aircraft in the fight against fires in the Amazon, departing from Porto Velho (RO)! through @DefesagovBr https://t.co/kcBuFHhsbY
02	gen_helena	769	01	92481	Journ Mônica Bergamo of Folha de São Pravda, shall we say Folha de São Paulo, claims that the government blames the GSI for the delays in responding to the Amazonian protests. What nonsense!!!! It's difficult to tell whether a statement is absurd or ridiculous.
03	leandroruschel	585	01	299623	Here is the graph I was looking for. Cumulative fires in the Amazon over the last 20 years. 2019 is the curve in green. Practically average. https://t.co/4sXe3h8h5n
04	sf_moro	566	01	1340518	Yes, I was contacted today by PR @jairbolsonaro about the fact and requesting a rigorous investigation. The Federal Police will, with its expertise, investigate the fact. Criminal fires in the Amazon will be severely punished. https://t.co/DweaatqHqn
05	reginaduartabr	486	02	7627	Watching Jornal Nacional defend Macron's thesis in favor of the internationalization of the Amazon just to attack the Bolsonaro government was one of the most disgusting scenes in national journalism. Globo needs to answer criminally for this report, do you agree?
06	brazilfight	425	01	34060	Bolsonaro promises revelations: "Tomorrow, August 27, at 10 am, in a meeting with governors of the Amazon, the truth about what others want with this rich region. It will be an unmissable João 8:32, broadcast on our LIVE."
07	augustosnunes	370	02	668027	The donation of R\$ 83 million from the G-7 to fight fires in the Amazon and the conclusion of the Federal Police investigation into Rodrigo Maia are among today's topics of #OsPingosNosIs. Live at 6pm on @radiojovempan https://t.co/DvXgoM40ex

					“Bolsominions on the streets defending burnings in the Amazon, attacking democratic institutions and advocating power abuse.”, lied Renan Calheiros. And asked: “Where is this country going to get? Response: at a historical moment when all “Renans” will be in jail.
08	camilaand5h__	333	01	22124	#VMAs GET THIS PERFORMANCE FUCKKKKK WHAT A WOMAN WHAT A WOMAN WHAT A WOMAAAAAN I LOOKED AT THE WHOLE AMAZON AND SHOUTED A R T I S T https://t.co/DU7ee4SUdr

Source: Elaborated by the author

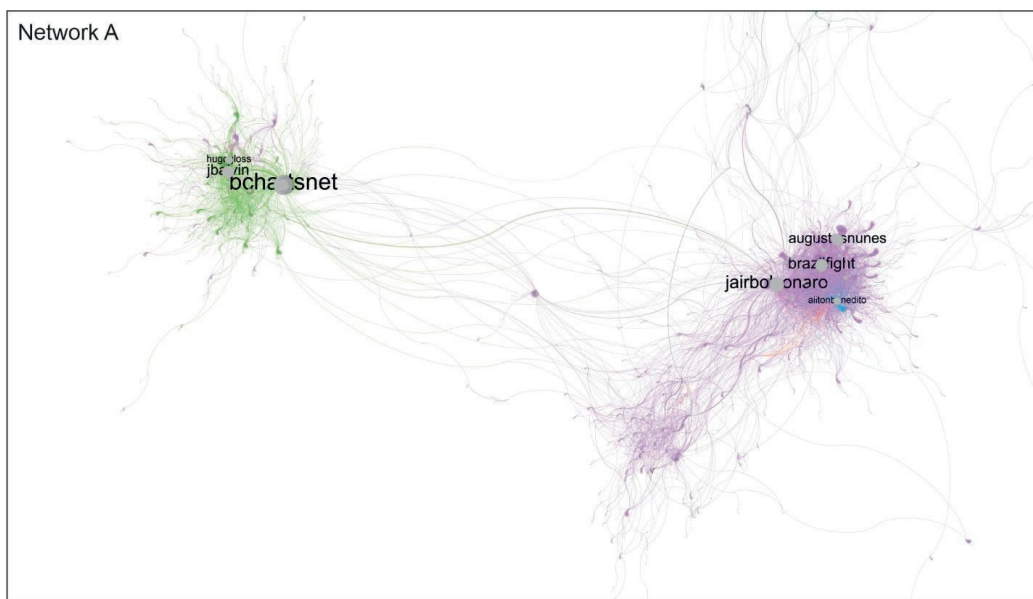
Tables 2 and 3 show the high indegree of the first eight profiles in each network, which coincides with a large number of followers. This could indicate the existence of an associative sense of belonging that is more closely tied to the values of these profiles than to the defense of the Amazon against fires. This associative belonging may have favored the homophilic tendency, common among network users, and may have had a direct impact on the dissemination of information.

Even though this associative belonging is based on a social foundation, it has the effect of algorithmic filter personalization, which may favor the homophilic trend, which is quite prevalent in social media.

In Figures 1 and 2, we observe the visual result generated by the modularity metric, which places the nodes that interact more or less frequently with each other near or far, highlighting the existence of groups, while the different colors indicate the different uses of hashtags.

The positioning of the two large groups, far from each other in network A, Figure 1, points to the circulation of messages in an isolated way within the groups and with little intermediation, forming echo chambers or bubbles, which makes it difficult for actors to have access to opinions different from their own.

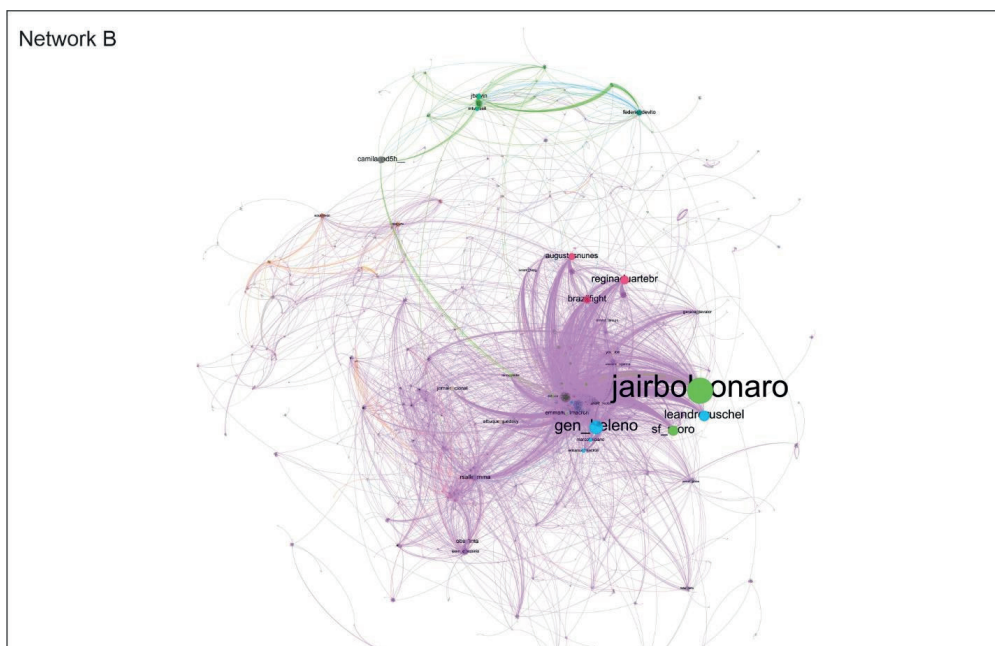
Figure 1 - Graph of Networks A



Source: Prepared by the author
Caption: #vmas in green/ #nulo (#null) in purple

Unlike network A, network B in Figure 2 shows greater homogeneity in the circulation of information without such pronounced echo chambers.

Figure 2 - Graph of Networks B



Source: Created by the author
Caption: #vmas in green / #nulo (#null) in purple

The use or not of hashtags is categorized in the graphs by the colors green and purple, the first being linked to the hashtag #vmas1 and the purple to the absence of a hashtag. The hashtag #vmas appears in the tweets as comments on the speech of the Colombian singer J. Balvin about the fires in the Amazon, who asked for help to preserve the forest, while being awarded at the MTV Video Music

Awards 2019 (VMAS)² event, which took place on the day of the collection, between 6 pm and 10 pm, Brasília time): “We need help with the Amazon, which is on fire. We need a cure for the Amazon, we need everyone's help.”³

This repercussion occurred by replicating the tweet (retweet) published by the profile with the highest indegree in the network, @bchartsnet: “J Balvin appeals for the preservation of the Amazon by thanking his award at the #VMAS: 'We need everyone's help to save our forest.' Will you cry, B0Is0n4r0?” (Table 2).

The use of the hashtag #vmas points once again to the existence of the feeling of belonging, in this case, through interactions, that is, in a relational way. Belonging and homophily would be generated by cultural affinity. associated with the own network topology, once again constitutes a determining factor to generate the bias of the perception by the actors regarding the topic under debate.

The hashtag #nulo (#null) network, which was the most prevalent in both networks, largely shared @jairbolsonaro's tweets with mentions of support for the policy adopted by the government to combat fires, a similar behavior to that of the other group: endorsing the speech of the profile that was already followed and probably supported before the issue emerged.

A high outdegree was not registered for any of the nodes of the two networks. This fact reduces the chances that artificial mechanisms were used to inflate the debate in favor of some point of view. According to the Laboratory for Research in Media, Discourse and Analysis of Social Networks - Midiars (2021), signs of artificiality and activism would be, for example, a large number of tweets (the outdegree) in a short time, such as a thousand tweets in just one day, in addition to newly created accounts with monotremes.

This shows that there is a very engaged group (which possibly has artificial accounts or artificial mechanisms) that is directly involved in promoting the manifestation and gaining visibility for it, seeking to make this agenda present in the conversation. (Midiars, 2021)

Comparing networks A and B, there were small variations in terms of the most used words in each group. In the first #vmas, some terms disappeared from one network to another, while new ones emerged: looked, shouted, performance. The ones that remained were @jbalvin, speech, save, and we need.

This small variation also occurs in relation to the null hashtag group, which is greater in the number of tweets and, consequently, in the number of words. The words most frequently remained: Bolsonaro, burning, government, Brazil, macron, sovereignty, internationalization. There is also a smaller semantic range in the hashtag #vmas group in relation to the null hashtag.

² Vmas is the acronym for the Latin Music Video Music Awards event.

³ Retrieved August 10, 2021 from: <https://entretenimento.uol.com.br/noticias/redacao/2019/08/26/vma-2019-colombiano-j-balvin-ganha-premio-e-pede-ajuda-a-amazonia-nos-eua.htm?cmpid>.

Regarding the words that are more dispersed in the graph, a greater contextualization is perceived in relation to the event of the fires in the Amazon due to the greater diversity of words, but proportionally, they do not reach as much prominence as those that are grouped.

In the null hashtag word network, the formation of three small groups can be identified in co-occurrence: the first, in which the words are presented: in favor, globo, need, scenes, repugnant, national, internationalization; the second group brings the words together: institutions, democracy, jail, response, country, history, abuse, fires, bolsominions; another group repeats the co-occurrence of the words of the tweets that used #vmas: forest, prize, save, thank you, we need attention, burning, @jbalvin; and finally, in a more dispersed way are the words: defend, world, Brazilian, sovereignty, @jairbolsonaro, countries, fires, sovereignty.

It is noticed that despite a greater diversity of words, the null hashtag group seems, in the same way, to only reproduce the content published by the profile that received the highest indegree, in the case of @jairbolsonaro, which points to relational belonging, since users only intended to share without contributing to the enrichment of the debate on the subject.

Final remarks

The two networks analyzed were captured the day after the end of the 45th G7 summit, August 26, 2019, in which the widely reported debate about the highest peak of fires in the Amazon that year was highlighted.

In network A, information circulated largely in isolation within each of the two largest conversation groups. One of the groups, identified with the hashtag #vmas, was motivated to participate in the conversation by a factor not directly linked to the events that took place in the Amazon, but by the action of a celebrity who spoke out on the subject, an action that was mentioned on the platform by via @bchartsnet's tweet, the most replicated on the net. Thus, the existence of a feeling of belonging is identified that may have favored a homophilic tendency of users and the consequent formation of bubbles in the circulation of information.

It was possible to perceive that the flow of information varied a lot in a short time, a factor caused mainly by the ephemeral participation of the group linked to the use of the hashtag #vmas.

In network B, it can be seen that the flow of tweets from the cluster using the hashtag #vmas loses strength and is considerably reduced. On the other hand, the cluster identified by the absence of hashtags, registered an increase in the flow of information, presenting a greater diversity of words, which reinforces the understanding that more people contributed to the debate. Network B, therefore, is characterized by highly connected actors and few isolated participants in which there is a lot of sharing and mutual support.

From the analysis performed, it was noticed the existence of belonging in both groups, expressed by different mechanisms, namely associative and relational belonging. For this reason, identity factors that could be raised by the environmentalist cause did not gain strength in the talks on the Amazon. There was, on the other hand, articulation generated by the identification with the values defended by the profiles that had repercussions on the subject, without proper contextualization regarding the information necessary for the formation of a more balanced opinion.

The fires in the context of conversations on Twitter only served as a backdrop for strengthening identity issues not linked to the environmental issue, thus lacking the necessary depth so that information on the subject had the proper reach and clarification to network users.

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