

## Article



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# VISUAL METHODS FOR JOURNALISTIC IMAGES ANALYSIS: an exploratory study

*Métodos visuais para análise de imagens jornalísticas: um estudo exploratório**Métodos visuales para el análisis de imágenes periodísticas: un estudio exploratorio* Eduardo Leite Vasconcelos

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**ABSTRACT:**

This paper explores how research on visual journalism can apply visual methods to analyze journalistic coverages, considering characteristics that emerge in the contemporary context of convergence and platformization, such as labor precarization, image profusion in the digital environment, journalistic image production decentralization, and multiplatform circulation. We applied three methods in a case study to understand how Folha de S. Paulo portrayed the Brazilian presidential election campaign of 2022 in six months of publications on the outlet's website: (1) image grids; (2) computer vision networks; and (3) timelines. We identified that the research on visual journalism can benefit from applying these methods as they align the quantitative and qualitative aspects of research. At the same time, analyzing images in groups allows for comparative observations of the images in relation to each other and the coverage as a whole.

**Keywords:** Visual journalism, Photojournalism, Visual methods, Computer vision, Image grid

**RESUMO**

Este artigo explora como a pesquisa sobre jornalismo visual pode aplicar métodos visuais para analisar coberturas jornalísticas, considerando características que emergem no contexto contemporâneo de convergência e plataformação, como precarização do trabalho, profusão de imagens no ambiente digital, descentralização da produção da imagem jornalística e circulação multiplataforma. Aplicamos três métodos em um estudo de caso para compreender como a Folha de S. Paulo retratou a campanha das eleições presidenciais brasileiras de 2022 em seis meses de publicações no website do veículo: (1) grids de imagens; (2) redes de visão computacional; e (3) linhas do tempo. Identificamos que pesquisa sobre jornalismo visual pode se beneficiar ao aplicar esses métodos pois eles alinham os aspectos quantitativo e qualitativo da pesquisa. Ao mesmo tempo, analisar imagens em grupo permite fazer observações comparativas das imagens tanto em relação umas às outras quanto em relação à cobertura como um todo.

**Palavras-chave:** Jornalismo visual, Fotojornalismo, Métodos visuais, Visão computacional, Grid de imagens

**RESUMEN**

Este trabajo explora cómo la investigación sobre periodismo visual puede aplicar métodos visuales para analizar coberturas periodísticas, considerando características que emergen en el contexto contemporáneo de convergencia y plataformación, como la precarización laboral, la profusión de imágenes en el entorno digital, la descentralización de la producción de imágenes periodísticas y la circulación multiplataforma. Aplicamos tres métodos en un estudio de caso para comprender cómo Folha de S. Paulo retrató la campaña electoral presidencial brasileña de 2022 en seis meses de publicaciones en el sitio web del medio: (1)

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rejillas de imágenes; (2) redes de visión por computadora; y (3) líneas de tiempo. Identificamos que la investigación sobre periodismo visual puede beneficiarse de la aplicación de estos métodos, ya que alinean los aspectos cuantitativos y cualitativos de la investigación. Al mismo tiempo, analizar imágenes en grupo permite realizar observaciones comparativas de las imágenes entre sí y en relación con la cobertura en su conjunto.

**Palabras clave:** Periodismo visual, Fotoperiodismo, Métodos visuales, Visión por computadora, Cuadrículas de imágenes

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The author state that all data used in the research has been made available within the body of the article.

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## Introduction

Made with digital equipment, not necessarily by journalism professionals, and with multiplatform circulation purposes, journalistic images are gaining new contours from their convergence and platformization (Vasconcelos, Barbosa, 2024). These new characteristics also rise the need for new approaches to this kind of image (Schneider, 2015). Based on this, this paper follows the proposal we made on another occasion for applying digital methods as a possibility for adapting to journalistic images contemporary characteristics from a methodological building that follows the medium's logic (Vasconcelos, 2024).

From the literature review made for the PhD thesis finished in the Contemporary Communication and Culture Post Graduation Program at Universidade Federal da Bahia (Vasconcelos, 2024), in this paper, we apply three methods identified then in a case study with journalistic images. From Gillen Rose's (2016) concept, we name the methods used in this paper as visual methods: images built by researchers themselves as a methodological tool for carrying out the research. All three methods employ the principle of image grouping for their analysis, a technique widely used by researchers who wish to analyze large numbers of images, whether by these images' visual, theme, context or circulation similarity. Thus, we'll explore in this paper (1) image grid organized by color, (2) computer vision networks, and (3) image timelines.

To apply the chosen visual methods in a case study, we chose to analyze the images published by the news outlet Folha de S.Paulo in its website during the 2022 Brazilian presidential election coverage. We chose Folha as the outlet to be analyzed in this case study due to its relevance as one of the most important legacy media outlets in the country. Folha's coverage influences both the public debate and the coverage made by other news media outlets.

The election was chosen as an analysis theme because it was one of the most spoken about topics through 2022, having repercussions in the following years, with Luiz Inácio Lula da Silva's inauguration on January 1st 2023, the following coup d'état attempt by Jair Bolsonaro's supporters who invaded and vandalized governmental buildings on January 8th by not accepting the election's results, and Jair Bolsonaro's indictment by coup d'état attempt in November 2024.

For our sample, we considered six months of news pieces about the electoral campaign theme. This period was chosen because, despite the official campaign only started on August 16th 2022 (TSE, 2021), potentially electoral acts from the main candidates started way before the official date. For example, in May Folha had already published in its website 482 pieces among news and opinion pieces that mentioned the term "elections". It was important, then, to choose a period that was representative of the outlet's coverage as a whole. A longitudinal study of Folha de S.Paulo's coverage allowed us to not only identify image patterns from the outlet's coverage but also to identify how the journalistic current crisis (Silva Jr., 2014; Reese, 2020) affects Folha de S.Paulo's image coverage. Thus, the research question we aimed to answer with our case study was: how did Folha de S.Paulo portray through images the 2022 Brazilian presidential elections during six months before the election day?

## Dataset building

In order to answer the research question, we started by identifying every news piece related to the presidential elections from May 1st to the election day, on October 30th, 2022. To build this case study dataset, we triggered the R script *FolhaR2* (Barcellos, 2021) using the keyword "elections" and adjusted it to search for it only in the chosen period. When triggered, the script searches for the keyword on Folha's website and generates a spreadsheet containing the following data from these pieces: section, title, resume, timestamp, and URL. During the chosen period, Folha published 4,524 news pieces on its website mentioning the keyword "elections".

After collecting, we cleaned this data. Taking into consideration that we're analysing the photographic coverage of the elections, we decided to restrict our dataset exclusively to news pieces. Therefore, we eliminated from our dataset columnists texts (including the sections **Painel** and **Painel S.A.**) and the pieces published in the sections **Opinião** and **Painel do Leitor**. We also eliminated news pieces that did not mention in their titles and/or resumes the names of the election candidates. This decision was made because, despite being the main theme in most news pieces in the raw data, the script also returned news pieces about other countries' elections and also other levels of the 2022 elections because, in that year, Brazilians also elected deputies, senators, and governors. After the refinement, our dataset resulted in 1,821 news pieces.

In order to extract these news pieces images, we built an automation using the Hexomatic software, that accessed each of the URLs from the news pieces in the dataset and extracted the URL from .jpg and .jpeg files in those pages. After triggering the automation and checking its results, we downloaded all the images using Google Chrome's extension *DownThemAll*. Our dataset resulted in 1,903 images.

The number of published images increased monthly: 179 images were published in May, 194 in June, 229 in July, 338 in August, 421 in September, and 542 in October. Concerning the sections in which these images were published, 1,544 images (81.6%) were published in the politics section entitled **Poder**. In the economy section **Mercado**, there were 219 images (11.5%). In the international related news section **Mundo**, there were 53 photographs (3.3%). In the culture, arts and entertainment sections, there were 30 images (1.6%) in the section named **Ilustrada** and 13 (0.7%) in the section **Ilustríssima**. In the section that publishes news pieces related to the city entitled **Cotidiano**, there were 11 images (0.6%). Seven photographs (0.4%) were published in the ecology and environment section **Ambiente**. Two images (0.1%) were published in the entrepreneurship section **MPME**. And one image (0.05%) were published in each of the following sections: **Equilíbrio e Saúde** (Health), **Educação** (Education), **Guia Folha de Teatro** (Theater), and in the kids section **Folhinha**.

Beyond the obviousness of a presidential election being majorly represented in the politics and economy sections, this data is interesting to explore some aspects of the dataset. For example, only 6 of the 63 news pieces published in the international affairs section **Mundo** don't mention the former president Jair Bolsonaro. Most of these news pieces narrate the government's international relations during the months prior to the election, which had repercussions in the election. In the section **Ilustrada**, Jair Bolsonaro's name is mentioned in 27 of the 30 news pieces. However, most of these mentionings are criticisms of the former president made by culture and entertainment personalities. In the section **Ilustríssima**, only one news piece does not bring criticisms to Jair Bolsonaro. Half the news pieces in the section **Cotidiano** relate to the increasing number of guns in society due to Bolsonaro's government policies of gun ownership. And every news piece published in the section **Ambiente**, with news pieces about ecology and the environment, are critical to Jair Bolsonaro.

In the following topics, we'll analyse the dataset images using the three methods described in this paper's introduction, highlighting the possibilities and limitations of each of these methods to journalistic images studying.

### Method 1 — Image grid

Inspired by image grids used for image analysis in other contexts, especially for social media platforms imagery (Colombo, Bounegro, Gray, 2023; Greene, 2022; Niederer, Colombo, 2019; Omena, Granado, 2020; Pearce et al., 2020; Rogers, 2021), we used the app Image Sorter (Visual Computing Group, 2014) to identify image reusing throughout the dataset and the coverage's plastic patterns. The app groups images according to their formal properties, organizing them by color similarity (Figure 1).

Folha's coverage color pattern has mainly three highlights: the colors red and yellow, with images portraying campaign acts from the main candidates (Lula and Bolsonaro), and the blue that is seen mostly in TV news and election debates broadcasted on TV backgrounds, which indicates that this type of image was widely used to illustrate news pieces about the election. Zooming in, we realized that the images in red and yellow are not strictly related to their respective candidates. By putting the Brazilian flag in the background of his events, Lula's image shows up in the yellow cluster. At the same time, Jair Bolsonaro's close up shots are shown alongside the red images.

Concerning image reuse, the image that most appears in the dataset is a montage putting Lula's portrait during a campaign event side by side with a screenshot that shows Jair Bolsonaro during an interview to *Flow* podcast (Figure 2). This image was used to illustrate 13 different news pieces. Beyond that, other 212 images were used to illustrate more than one news piece. These images follow a wide variety of news pieces. Figure 2, for example, illustrates news pieces about several themes, such as voting intention polls, legal issues related to the election, candidates' spending during the campaign, or their supporters. The captions that follow this image in every news piece in which it appears are redundant texts that only name the people in the image, with a few variations, such as "Lula and Bolsonaro", "the candidates Lula (PT) and Bolsonaro (PL)", "former president Lula and president Jair Bolsonaro", among others. Most the images reused in the dataset follow the same format as Figure 2: montages putting Lula and Bolsonaro portraits side by side, used to illustrate news pieces about the widest variety of themes during the whole election coverage.

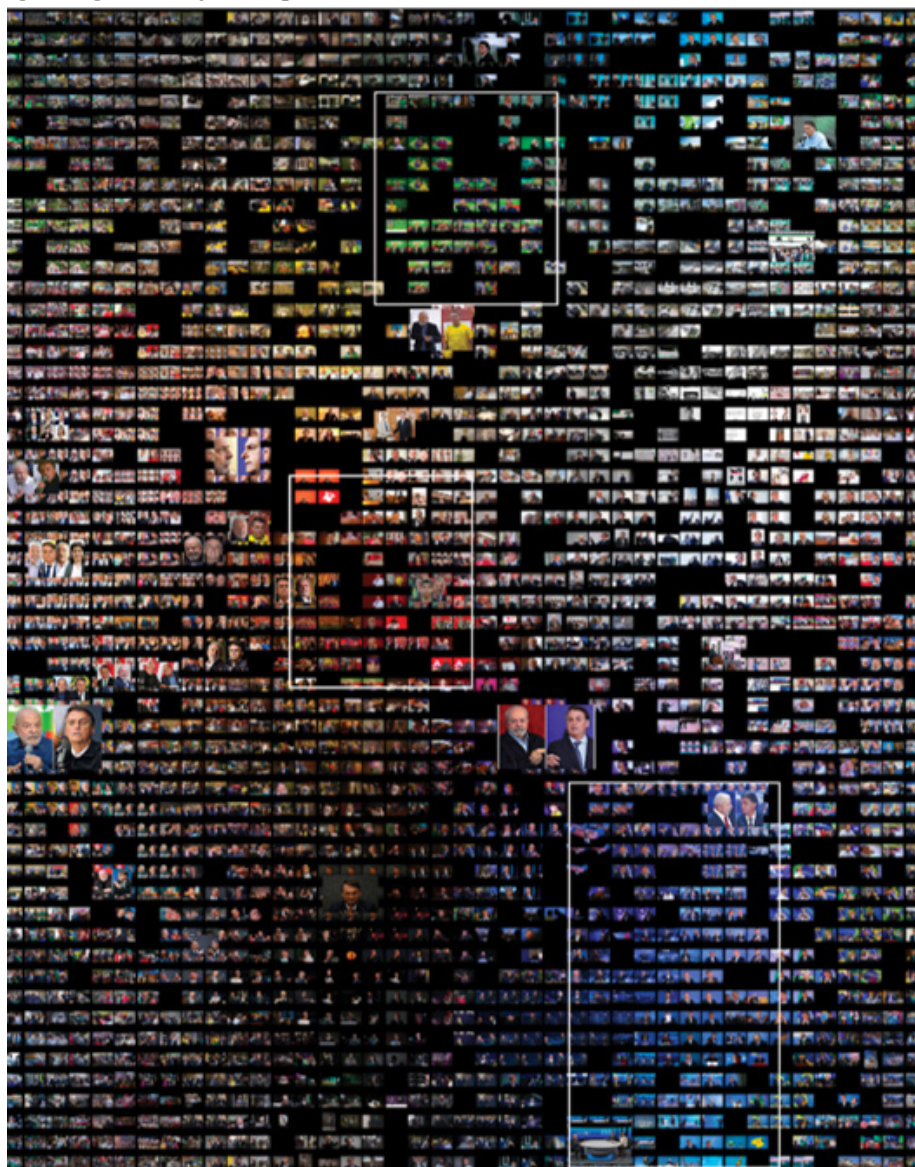
### Method 2 — Computer vision networks

The second method chosen for our study were computer vision networks (Omena et al., 2021). These networks are created using computer vision APIs' outputs as data that will be used to build networks through the software Gephi (Bastian, Heymann; Jacomy, 2009) and spaced according to similarities in the classification made by the API through a force algorithm contained in Gephi itself, in this case ForceAtlas2 (Jacomy et al., 2014).

Among the available computer vision APIs, we chose to work with Google Vision AI (GV), triggered by the app Memespector GUI (Chao, 2021), taking into consideration works that identified it as the one with the most specific vocabulary and biggest specialization degree among the ones tested by the researchers (Silva et al., 2020; Omena et al., 2023).



**Figure 1:** Image grid organized by color patterns dataset visualization



Source: visualization made by the author

**Figure 2:** Image most used in the dataset is a montage portraying Lula and Bolsonaro side by side

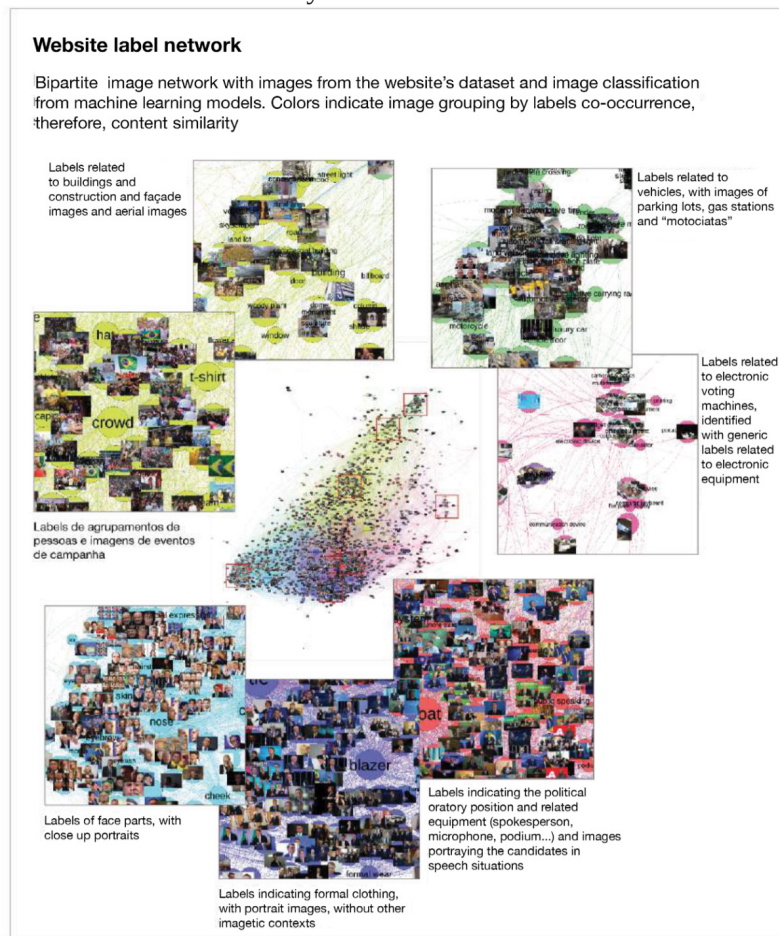


Source: Folha de S.Paulo

Among GV options, we chose to use image classification made by machine learning models, called label detection. This module reads the images and classifies them according to predefined semantic categories (Mintz, 2019), i.e., labels classification refers to characteristics of content within the image itself, without considering its context (Omena *et al.*, 2021; 2023).

The network analyzed in this paper (Figure 3) was divided in clusters by Gephi's modularity algorithm, which allowed us to classify and analyze these images both in groups and in comparison to the whole dataset. The labels most identified in our dataset were the ones majorly related to portraits, present in the network's three biggest clusters. The first one, in purple, gathers labels related to the candidates' formal outfits during the campaign. The second, in red, brings together labels related to their positions as political actors. All the images in these two clusters are portraits of people with significant roles during the elections, like the candidates, supreme court ministers, and candidates' famous supporters, always in moments of public speech.

**Figure 3:** Computer vision network used to analyse the dataset



**Source:** visualization made by the author

The third cluster, in blue, brings together labels related to parts of the human face and its expressions. This cluster's images are also portraits, but much closer, with no margin to identify other elements in the photograph other than the faces portrayed in them. The yellow cluster relates to outdoor images. Most of these images portray campaign events. In this cluster, we can identify that Jair Bolsonaro was frequently portrayed on stages and away from his audience. The same does not appear in Lula's images, who, beyond being portrayed in images similar to Bolsonaro's, is also portrayed in shorter stages, on truck beds, and, therefore, closer to his supporters. This cluster also includes images without people in them, with labels related to city aspects. These images are façade photographs, portraying majorly government buildings, but also gas stations, parking lots, and aerial images in general.

The green cluster groups images identified with labels related to transportation vehicles. In this cluster, we can see that most of these images are related to Jair Bolsonaro, especially the ones classified with motorcycle-related labels, images that show the candidate's motorcycle campaign acts, called *motociatas*, in which the former president would ride a motorcycle surrounded by his followers through the streets. Gas station images are related to news pieces about gas prices, one of the main debate themes during the elections due to their high increase during Bolsonaro's government.

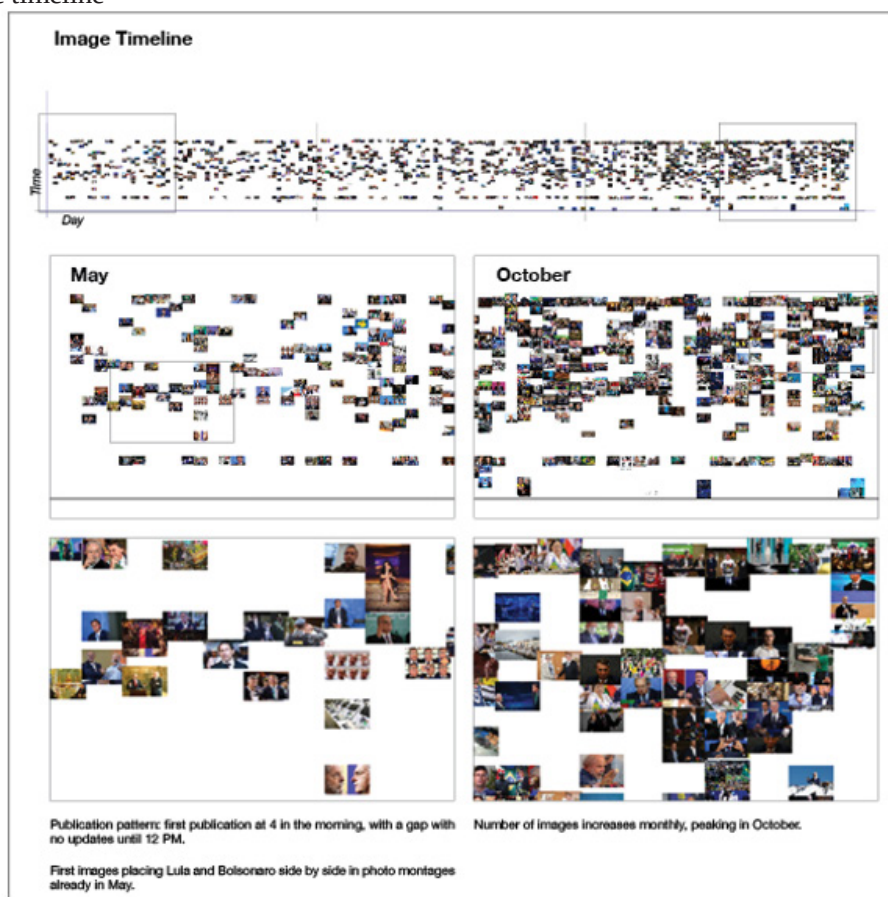


The pink cluster brings together labels related to a variety of objects and themes related among them. It's in this cluster that voting machine photos appear. They were used as an illustrative element to several news pieces in our dataset.

### Method 3 — Image timeline

Finally, using a timeline (Figure 4), we're able to observe the publication routine patterns in Folha de S.Paulo's website during the period analysed in this paper. The first thing that draws our attention is how the number of images related to the elections increase monthly, concomitantly with the number of images that portray a polarization between Lula and Bolsonaro. While in May, we only have 8 photo montages like Figure 2, in October, this number is already surpassed by the fourth day of the month and this type of image keeps showing up until the day before the election.

**Figure 4:** Image timeline



**Source:** Source: visualization made by the author

Beyond that, the fact that Folha de S.Paulo's news pieces are published majorly during the afternoon and the evening also drives our attention. Throughout the timeline, we see very few images published between midnight and 4 A.M., which indicates a website's update time pattern, followed by a gap with no new publications until noon, time when images start to get published with no apparent pattern until 12 A.M.

Each of the methods described here, therefore, has served to identify different aspects of Folha de S.Paulo's coverage. These methods may, then, be applied in different studies on photojournalism and visual journalism depending on what one wants to identify in such studies, their research questions, and the approach one wishes to take while studying this type of digital object. We'll discuss these aspects and the analysis results based on each of these methods on this paper's next topic.

### Discussion

After applying these methods in our case study, we can make some considerations. The image grid organized by the images' color patterns was very useful for the dataset's first visualization, familiarizing us with the image

collection in a broad way before going deeper in the analysis. With this visualization, first we identified a big image repetition throughout the six months analyzed. Beyond that, most of these images are the main candidates' portraits, especially photo montages putting Lula and Bolsonaro side by side. We can argue, therefore, that Folha de S.Paulo's website visual coverage has focused more in the candidates' portraits than their campaign events, people's mobilization and other related themes. By choosing to mainly focus in the candidates' portraits, then, Folha's coverage emphasizes the personalist politics practiced in Brazil, in which the voters choose their candidates much more based on the public figure they're voting for than in their ideological inclinations.

Beyond that, when we align the grid to the image timeline, we realize that Lula and Bolsonaro photo montages were already significant way before the second turn period, in which in fact there were only two candidates. That showcases an endorsement to the polarized election between two extremes speech, putting them in direct conflict since the beginning. We're not saying that the election wasn't polarized or that this speech was created by Folha, but the images published by the outlet reinforce this bias.

The timeline also allowed us to identify that a lot of images were repeated throughout the months. In the first moment, we imagined that repetition could take place because of the same themes and correlated news pieces developments. However, the temporal difference between several images publications showcases that these images were not there as a fact reporting, but solely as a visual adornment to the written news piece. This aspect matches the rising financial crisis that journalism outlets are currently facing (Mir, 2020; Reese, 2020), taking several outlets to terminate their photography sections and to fire all their photographers (see Silva Jr., 2014; Mortensen, Gade, 2018). While we were writing this paper, Folha de S.Paulo still had a photography section and a team of photographers. What we highlight here then is the option for image repetition as a way to not need to mobilize their photography team to coverage some themes, decreasing expenses.

Computer vision networks work as a resource for systematically looking at the image collection, so as to identify patterns through the images position in the networks. By bringing them to the analysis, we can go beyond what was already said in order to typify the types of images used by the outlet during the chosen period. As already identified with the other methods, the network allowed us to confirm that most of the images used in the coverage were portraits showing significant people in the electoral process, majorly the candidates Lula and Bolsonaro. Beyond that, this network allowed us to identify that, when there are no people in the images, a good portion of the photographs portrayed building façades, electronic voting machines, aerial images, and gas stations. This type of image was used by the outlet on several occasions to illustrate a wide variety of news pieces.

Electronic voting machines photographs, for example, were majorly used by Folha de S.Paulo to illustrate news about their confidentiality, a topic brought to the public debate by Bolsonaro and his supporters in several moments. However, this was not the only type of news piece these images illustrated. These photos were used to illustrate news about electoral polls, news pieces related to the Electoral Court, questions about the use of cell phones during the voting act, a murder that happened during that time, among other subjects. They were followed by captions that only indicated that that equipment shown in the image was an electronic voting machine. This characteristic even goes against to one of journalistic images fundamental characteristics: the need for some kind of written text linked to the image in order to guide the audience towards the meaning the outlet wants to give to those images (Amar, 2005; Sousa, 2004), as a way to avoid polysemy. The most curious case in that sense was when Folha de S.Paulo publish a picture of an electronic voting machine with the caption "electronic urns sealing in São Paulo" to illustrate a news piece about the murdering of a Lula elector that happened in the state of Ceará.

These images, along with the observation that several portraits came from news agencies, image banks and even social media showcase Folha de S.Paulo's constant choosing for the so-called generic visuals (Aiello et al., 2020) to illustrated news related to the elections, images that are not memorable and are also immediately recognizable and do not demand attention for understanding their content. It is important to highlight that this kind of image appears in a way bigger quantity than those images considered to be iconic and more significative during the coverage, like campaign acts aerial images, which, despite being massively shared through social media, were the minority in Foha's coverage. The outlet prioritized candidates portraits, usually a closed-up, even during these events throughout the whole period analyzed in this paper.

## Conclusion

From what was exposed in this paper, we can understand how journalistic image studies may benefit from applying visual methods, specifically images built to work as methodological resources (Rose, 2016). With the huge image proliferation in journalistic images' convergence and platformization contexts, it is fundamental that we consider the analysed medium characteristics, avoiding methodological anachronisms that try to solely apply



a classical method developed for image studying in other times, with other characteristics. The methods used here aim to take as a starting point the big image proliferation allowed by the digital environment, which allows a single coverage about a single theme in a single outlet to be formed by thousands of images, for example.

Obviously there are significant limitations when applying such methods. By looking at these images through their grouping, all the images have the same weight throughout the analysis, no matter what's in them. By doing that, we may miss some significant moments of the coverage. To minimize this aspect, it is fundamental to have deep knowledge about the coverage analyzed and adjust the approach to the coverage according to the research goals. For example, if we had chosen to build our dataset from the images published in Folha de S.Paulo's website home page throughout the analyzed period, we would probably have different results. This limitation may be minimized by aligning more qualitative methods in other research moments. The methods applied in this paper could also be used as tools to identify the most significant images for the coverage, and then analyze them on a deeper level in another moment of the research, balancing, then, the images' weight, without leaving blind spots in the analysis.

Specifically regarding computer vision, we need to be aware of the used APIs' fallibility. It is necessary to always take into consideration the API's language, that prioritizes certain image aspects over others, and also has a limited vocabulary to characterize certain images. In our dataset, for example, the electronic voting machines were classified as calculators, office equipment, electronic instruments, machines, gadgets, and laser printing machines. That does not mean that the API failed in its classification, but that it does not have the specific vocabulary to identify that that equipment is a voting machine. Because of that, we cannot solely rely on the computer vision API classification. It is essential to observe the images and how they were classified. Plotting the images in the network for the analysis is, therefore, indispensable to understand nuances that computer vision APIs are not capable of identifying. For example, let's think about Agência Estado photographer Wilton Junior's photograph of the former president Dilma Rousseff pierced by a sword or the more recent image made by Gabriela Biló for Folha de S.Paulo that shows president Lula behind a broken glass. The political contexts and linguistic nuances are fundamental to understand and interpret these images. Therefore this is not about outsourcing journalistic image analysis, because we may leave fundamental aspects of these images unnoticed without paying close attention to these details.

Finally, it is necessary to highlight that this type of analysis has a limitation concerning text analysis. The methods applied in this paper only consider images as an analysis unit, i.e., the analysis, as the title of this paper indicated, is strictly visual. However, isolating journalistic photographs from their related context may leave out of the analysis fundamental pieces for journalistic speech building. It's necessary, then, to search for ways to mix visual with textual analysis so we can make more robust considerations on journalistic coverages visualities.

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