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OBSERVATOR!O2016

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OBSERVATÓR!O2016

Technical Report
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ABSTRACT

This technical report discusses the development process of OBSERVATÓR!O2016, a web-based platform for collecting, structuring and visualizing the online response to Rio 2016 Olympic Games. This project was developed at VISGRAF Laboratory and is based on two cross related applied researches. This report will cover both of them. First, the conception and design of OBSERVATÓR!O2016's information technology framework and website [1], which provides a medium to explore comments, hashtags and images about the Olympics through interactive visualizations. Second, the deployment of a multidisciplinary task regarding the application of Deep Learning techniques into 180,000 images of our database which led the development of a second website [2]. Ultimately, OBSERVATÓR!O2016 is set in a line of research that seeks to structure big social data (visual and textual) and make it more accessible and discoverable through novel techniques for data capture, analyses and representation.

Keywords

Social Data; Data Visualization; Computer Vision; Deep Learning; Rio 2016; Twitter

OVERVIEW

For the first time in history, a South American country was selected to host the Olympic Games. As it should, the realisation of a worldwide sport event gathers attention from both media and online audience. As a controversial and complex event, it also involves multiple expectations and interests that reflect diverse impressions and moods shared on social networks, especially on microblogging services such as Twitter. As a consequence, this sporting event becomes a social phenomena that produces a heterogeneous debate. But, how to collect, structure and communicate this debate that is spread in non-structured data streams?

Understanding the historical importance of Rio-2016 to Brazil and to the world, the VISGRAF Lab conceived the project OBSERVATÓR!O2016 as a mean to augment and express the perception of the Olympic Games shared on social networks, especially Twitter. Given the common practice of using Twitter to react to events on real time- e.g.. sporting events, political campaigns, music festivals, TV shows and series coverage, etc. - several research approaches have been recently proposed to tackle the problem of monitoring, analyzing, understanding and communicating big social data. OBSERVATÓR!O2016 is one such project with the particular interest of highlighting the multiplicity of perspectives, controversies and themes related to the sporting event before and during the Olympic Games and enhancing cognition through structured and interactive visualizations.

This technical report is organized as follow. In the next section we present the development process of OBSERVATÓR!O2016 web-based platform, including aspects on the following subsections: IT Framework; Naming and visual style; Online Interface Deployment; Insights and blogging; Promotion and Clipping; Google analytics; Unfolding research. Then, in section 2, we describe a particular unfolding research that derives from OBSERVATÓR!O2016 main project. It is a multidisciplinary task that tackles the problem of automatically classifying, clustering and visualizing the collected images from Rio-2016 using Deep Learning approaches. Finally, in the last section we conclude the report and present the future work.

1. OBSERVATÓR!O2016

This project is result of a multidisciplinary team working on the boundaries of Mathematics, Design, Computer Science and Communications from March 2016 to September 2016. The project's conceptual idea was conceived by Julia Giannella in her position of research assistant at VISGRAF Lab with full and continuously supervision of Luiz Velho, the Lab's coordinator. We perceive OBSERVATOR!O2016 as a ground for experimentation and scientific research on novels technologies, medias and tools for approaching Big Data problems.

IT FRAMEWORK

OBSERVATÓR!O2016 collected and analysed around 1 million tweets - a short message containing 140 characters or less and eventually an attached media (image, video or animated gif - via Twitter public API, from 18 April to 25 August 2016. Approximately 180 thousand of these tweets included unique images that were also stored in our database and further reprocessed through Deep Learning approaches (this will be covered in the next session). In early stages, OBSERVATÓR!O2016 considered asking Twitter for an exceptionally full access to all the public tweets, claiming a non-commercial and academic use. After a initial negotiation with the data reseller, the team understood it would be easier, faster and most appropriate to work with Twitter public API, which gives access to 1% of the flow of data.

In other to dribble the limited data access and gather different perspectives of the debate about the Olympics we carefully created seven different Twitter search queries each one with its own operators and parameters. As the project unfolded and the Games came close, OBSERVATÓR!O2016 processed this data stream and visualized the textual messages, hashtags and images looking for a better understanding of the audience response. Twitter data presentation was in eight main visualizations.

Next, we explain, in greater detail, how we gathered data, how we stored it and how we created a CMS environment where we could both easily access our database and create visualizations. Fig. 1 shows an overview of the whole process.
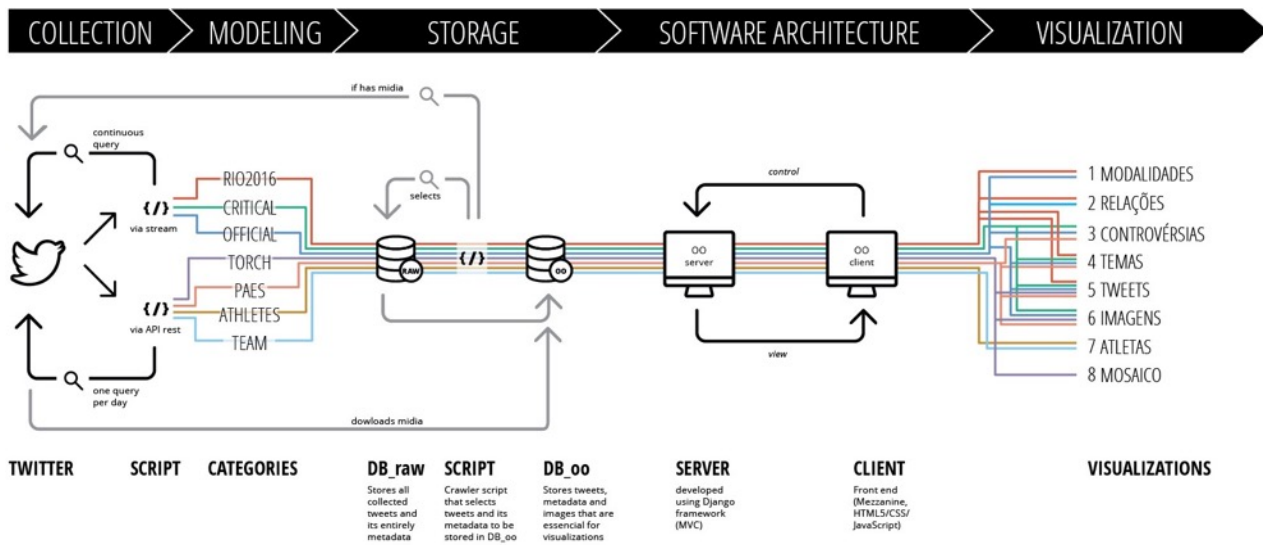
Fig. 1 - Scheme illustrating the IT framework process [3].

Data collection and modelling

For the sake of capturing tweets related to the Rio 2016 Olympic Games, a custom infrastructure was developed and seven search queries were set up based on predefined categories of aspects we wanted to cover and augment. Each one of the search queries categories has its own subject particularity and corresponding technical scripts. Some aspects about the search queries categories are pointed next:

1. *Rio2016*: requests any tweet mentioning the hashtag #Rio2016;

2. *Official*: requests any tweet shared by one of the 27 Twitter profiles identified by us as an official source of Rio-2016 content;

3. *Critical*: requests any tweet that mentions at least one of the 100 hashtags identified by us as a negative critic to Rio-2016;

4. *Torch*: requests any tweet that mentions at least one of the 66 hashtags identified by us as a reference to the Olympic torch relay;

5. *Paes*: requests any tweet that mentions Eduardo Paes's Twitter account (Mayor of Rio de Janeiro) and a word or expression related to Rio-2016;

6. *Athletes*: requests any tweet that mentions an athlete (full name or Twitter account) from a curated selection;

7. *Team*: requests any tweet that mentions an sporting discipline national team (witter account) from a curated selection;

Some categories collected tweets since the website was launched, others captured tweets only during the Olympics. In addition, categories *Rio2016*, *Critical* and *Official* collected tweets via Twitter streaming API [4] while categories *Torch*, *Paes*, *Athletes* and *Team* captured tweets via Twitter Rest API [5]. Finally, the scripts for collecting tweets were developed using Python language and considering Twitter API Objects structure (Tweets, Users, Entities, Entities in Objects and Places) [6].

Storage

The storage infrastructure includes two SQL databases installed on a remote server: DB_raw and DB_oo. The first, DB_raw, stores all tweets including its entirely metadata. Then, a crawler script consults DB_raw and selects just tweets and metadata that will be used later in visualisations and stores them in DB_oo. This same script also recognises image links such as <pic.twitter.com> and go into each of them to download attached images and finally save these images into DB_oo. The search query origin from each tweet is also saved as an additional metadata.

Software architecture

OBSERVATÓR!O2016's website was developed over a Model-View-Controller (MVC) software architecture. The server side was developed using Django, a high-level Python Web framework, and is directly connect to DB_oo. The client side was designed using a web development approach. A Content Management System (CMS) called Mezzanine - built using the Django framework - was used and HTML5/CSS/JavaScript were applied to design the user interface for multiple devices (desktop, tablet and smartphone). Even though we worked towards a responsive and adaptive layout, some visualisations functionalities don't work properly on mobile devices [7].

Visualization

Most OBSERVATÓR!O2016 visualizations were developed by building on code libraries such as D3.js [8]. A full list of all frameworks used are acknowledged in the main website [9]. Each visualisation represents a different data collection of texts, images, connections or hashtags depending on the search query category consulted.

NAMING AND VISUAL STYLE

The team's inclination towards a pluralistic view of the online response to the Olympic led the brand design of OBSERVATÓR!O2016.

The brand name is, at the same time, the fusion between the Portuguese word *observatório* (observatory, in english) and "Rio 2016", the actual edition of the Olympic Games.

When designing the logo for OBSERVATÓR!O2016 we came up with a typographic solution that highlighted "Rio 2016" through font weight variation. Nonetheless, we realized "Rio 2016" is an official designation registered in the name of the IOC (International Olympic Committee) [10]. To avoid intellectual property rights issues, we changed the letter "i " by the exclamation point "!" which in computer languages has various uses, most of them meaning a logical negation [11]. So, in OBSERVATÓR!O2016 logo, "!" suggests the controversial counterpart of a sporting mega event.

In addition to the typographic logo, we also designed a graphic symbol. The stylized combination of the two letter "o" is, at the same time, the synthesis of the first and last letters of *observatório* and an analogy to observations lenses. The colourful and fragmentary fill texture represents our interest in investigating the Olympic theme from a multi perspective approach. (Fig. 2).

Fig. 2 - OBSERVATÓR!O2016's main logo and graphic symbol.

For registration purpose, we designed a more general brand called OBSERVATÓR!O that can be used for future social data monitoring and visualisation projects. The brand was submitted for registration in INPI (National Institute for Industrial Property) [12] (Fig. 3).

Fig. 3 - OBSERVATÓR!O's main logo and graphic symbol.

Finally, the web interface structure and visual style follow a line of visual simplicity because we understand the data visualisations already demand too much cognitive effort from users. We developed and tested a basic layout structure that works on multiple devices and provides a visual identity to the different pages. However, because our data visualisations were built upon existing JavaScript libraries and frameworks, we needed to be flexible in some situations.

ONLINE INTERFACE DEPLOYMENT

We conceive the project as an incremental work in which the process of creation, development and learning is so important as the final result. That's why OBSERVATÓR!O2016's website was launched a couple of months before the Opening Ceremony. Our goal was to iterate the project several times so we could learn from the process and refine OBSERVATÓR!O2016's visual interface, usability and visualizations.

The design process of OBSERVATÓR!O2016's website has been, until now, through four main phases (Fig. 4). At each stage new visualizations were designed and the oldest were improved, modified or discontinued.
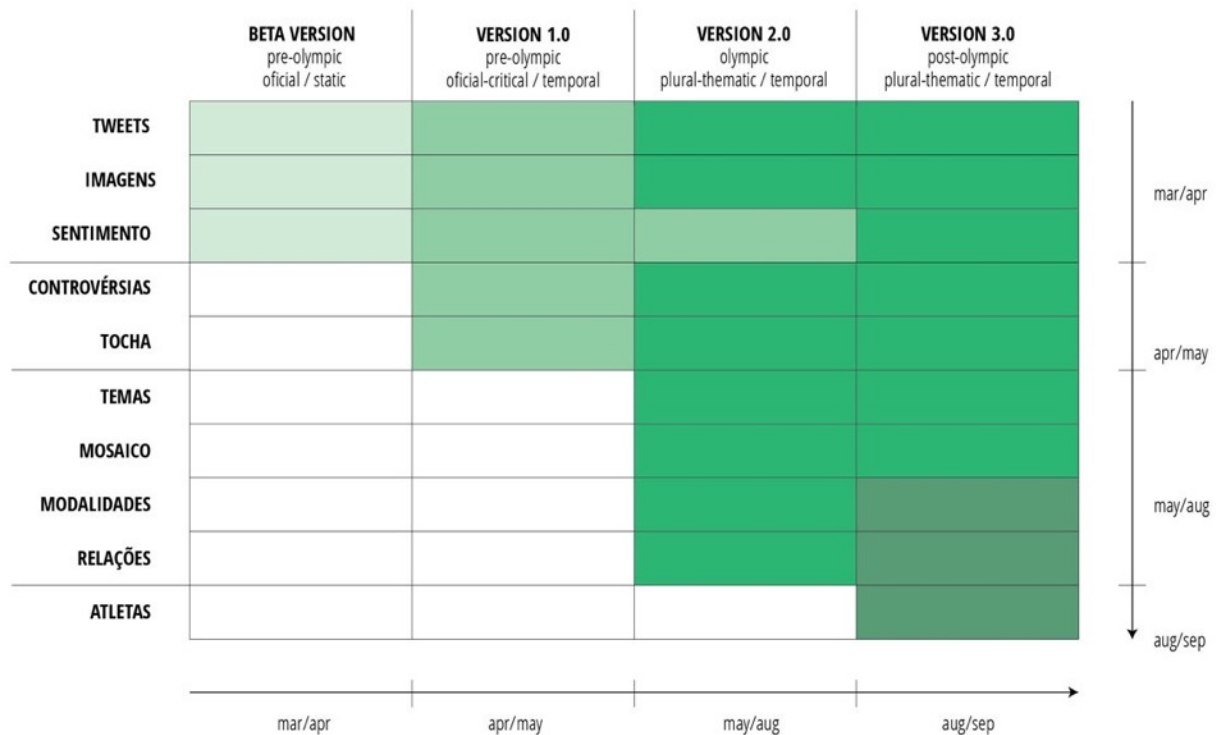
Fig. 4 - Design process of OBSERVATÓR!O2016's website.

For developing the website we called on GitLab [13], a web-based Git repository hosting service that offers website version control and source code management.

Beta version

Working with high volumes of data streams is a challenge. More than designing a custom hardware and software infrastructure to collect, parse and represent data, it's necessary to approach visualisation problems with precise questions and accurate strategies.

The beta version of the website was launched on March 2016 and focused on bringing together tweets (text and media) and news exclusively from the Olympics "official" source, that are the twitter account in Portuguese [14] and website of the Rio 2016 Olympics and Paralympics Games [15]. The temporal apprehension of the experiments designed at this stage was essentially static and inert, snapshots that captured a specific moment of the Pre Olympics.

These are OBSERVATÓR!O2016 's homepage and visualization webpages as they looked like in beta version. Note that, at that moment, we haven't yet designed the current brand.
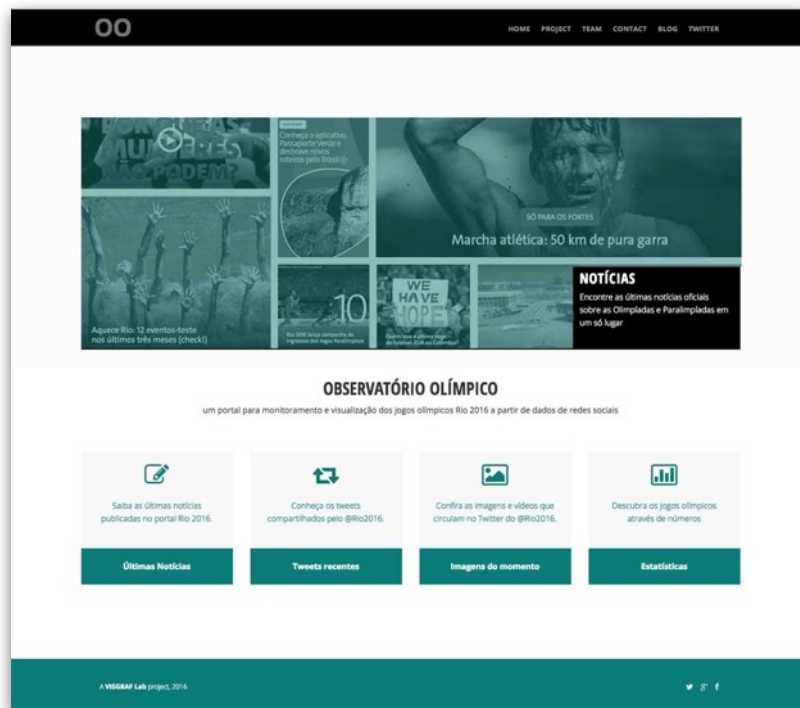
Fig. 5 - Homepage: designed upon a basic template theme from Mezzanine (CMC built using on Django Framework).

Fig 6 - *Notícias* (News): The latest news about the Olympic Games published by the Rio 2016 official website collected using Google Custom Search API [16]

Fig. 7 - Tweets: The latest tweets in Portuguese of @Rio2016 collected via Twitter Pubic API.
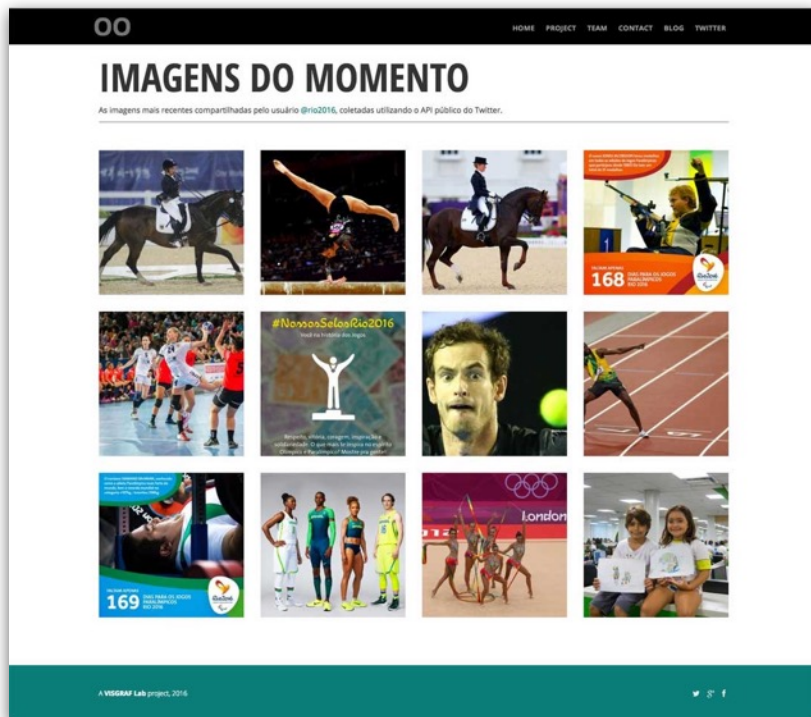
Fig. 8 - *Imagens* (Images): The latest images shared by @Rio2016 collected via Twitter Pubic API.

Fig. 9 - *Sentimento* (Sentiment):Emotional patterns in tweets mentioning the hashtag #rio2016
in tweets (in english) shared by @rio2016_en. [17]

Version 1.0

The version 1.0 followed the beta version. At this stage, we were more familiar with the Twitter interface and also aware of the different online responses to the Olympic Games.

We have broaden our observation lenses towards two directions. First, we diversified our sources of tweets. We expanded the "official" category by gathering tweets from another 25 users accounts. At the same time, we started to collect tweets for what we called "critical" category. This category was based on a exploratory identification of hashtags that opposed he Olympic Games. We were also interested in the stream of tweets concerning the Olympic torch relay - which we collected and classified as "torch" category - so we designed a visualisation experiment to give expression to this particular event. Finally, two other tweet search queries were created in other to highlight different aspects of the olympic debate. "Brasil" category - which was later discontinued - gathered tweets from mainstream and alternative media focusing on national political and economic news. The "Rio2016" category collected any tweet that mentioned the #Rio2016 hashtag and became the main data source in terms of volume of tweets.

The broader and more heterogeneous approach at this stage leaded us to our second strategic decision: include a temporal dimension. The visualizations trie to show a dynamic and dialectical conceptualisation of the opinion and images shared about Rio 2016 Olympics Games.

These are OBSERVATÓR!O2016's website mainly updates in version 1.0:

Fig 10 - Homepage: new brand design and some custom CSS and JS applied upon the latest version.

Fig. 11 - Tweets: organized by temporal and categorical handlers. Hashtags, user mentions and link icons are hyperlinks.

Fig. 12 - *Imagens* (Images) - organized by temporal and categorical handlers. Clicking on the image to enlarge it.
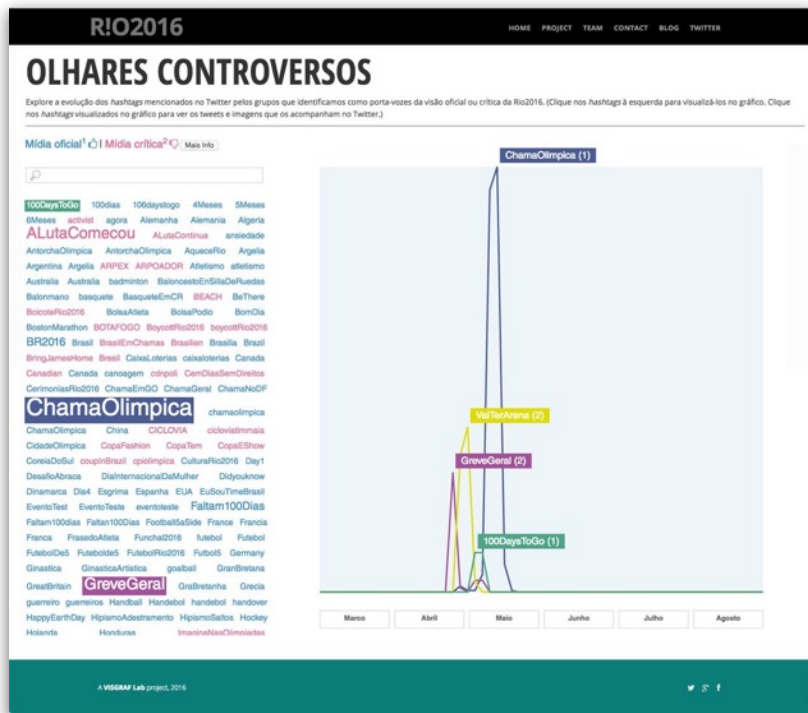
Fig. 13 - *Controvérsias* (Controversies): The evolution and counterpoint of hashtags that represents the official and critical view of Rio-2016.

Fig. 14 - *Trajetórias* (Trajectories): a collage experience that reveals impressions of the Olympic torch relay through a combination of texts and images.

Fig. 15 - *Sentimento* (Sentiment): Emotional patterns in tweets mentioning the following hashtags: #rio2016, #olympics, #jo2016 and #RoadToRio.

Version 2.0

As the project unfolded and the Opening Ceremony got closer, we considered designing visualizations that highlighted interesting topics that were brought to light during the Olympic torch relay and other issues that would be in evidence during the competitions. This led our project to focus, on the one hand, on the backstage of a mega sporting event and, on the other hand, on the sporting disciplines and participating nations.

We explored more sophisticated visualizations capable of communicating layered meanings and improved some features from the older visualizations. The experiment *Trajetórias* was radically changed and ended up called *Tour da Tocha*. In this new version, we collected geo-tagged images from the Instagram account of @rio2016 [18] and visualized them on a timeline map.

These are OBSERVATÓR!O2016's website mainly updates in version 2.0:
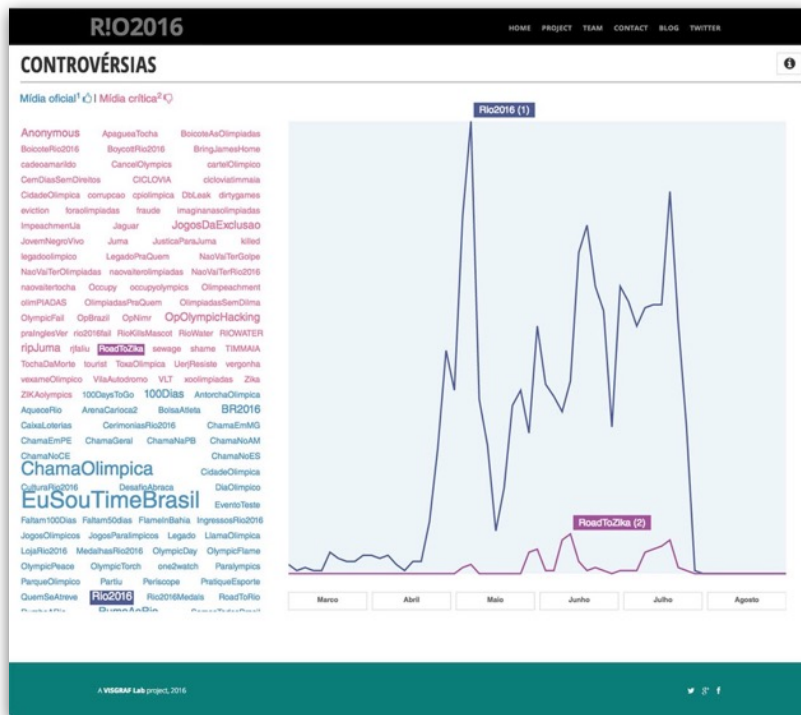
Fig. 16 - *Controvérsias* (Controversies): content reorganization and page layout improvement.
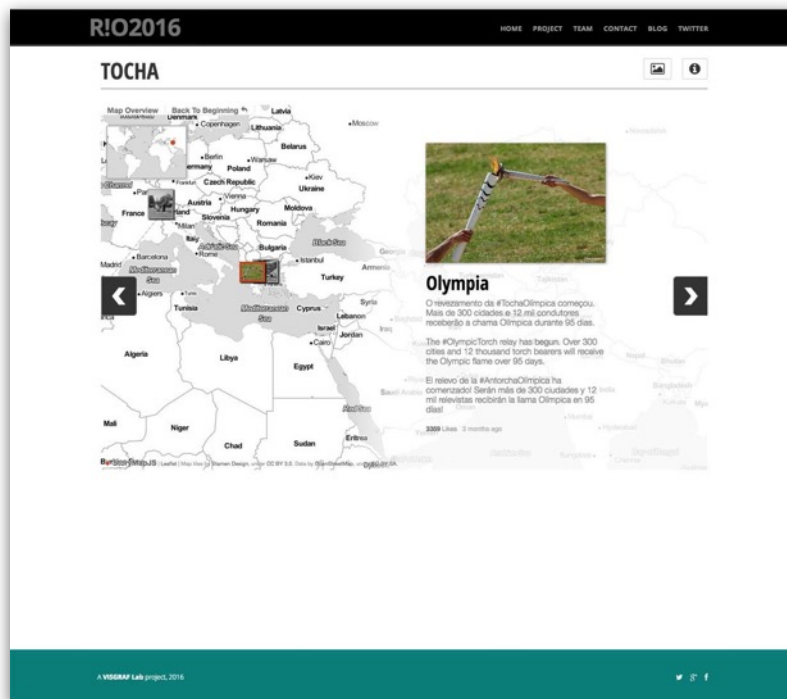
Fig. 17 - *Tocha* (Torch): Geo-tagged Instagram images of the torch relay shared by @rio2016 are showed on a timeline map.
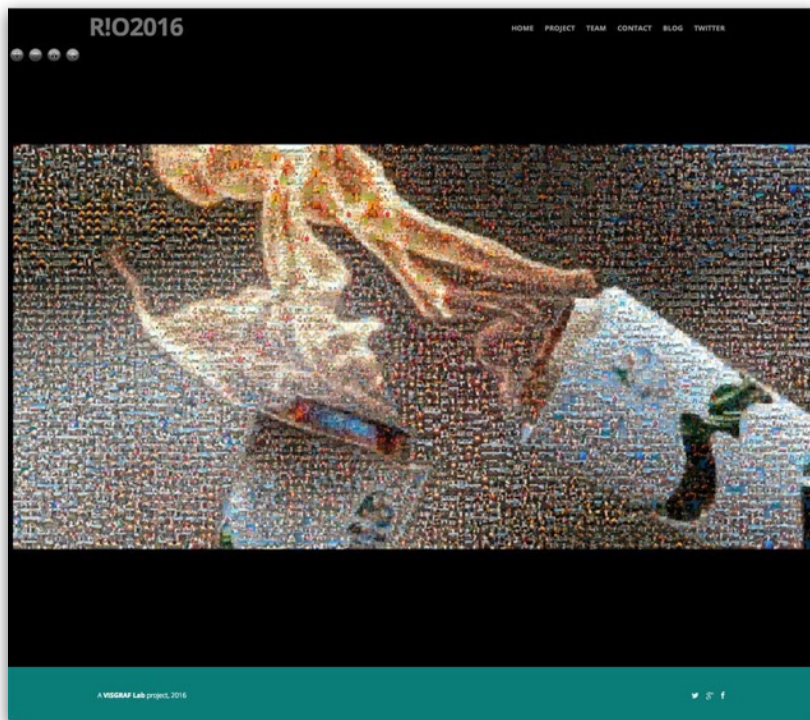
Fig. 18 - *Mosaico* (Mosaic): An interactive mosaic made from 5000 images of the Olympic Torch captured from Twitter and labeled by Deep Learning techniques.
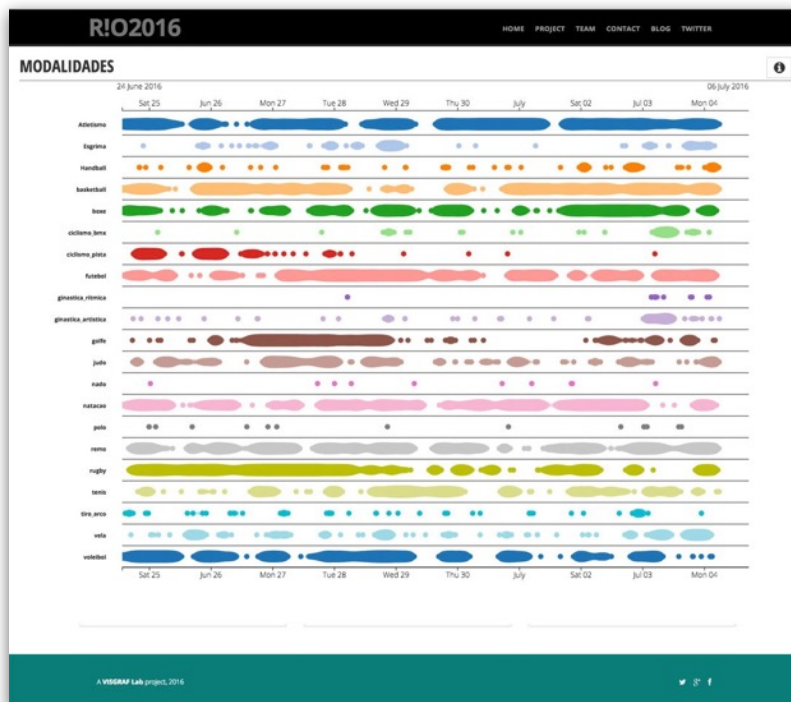
Fig. 19 - *Modalidades* (Disciplines): time based event series visualization shows how olympic sports are mentioned in Twitter.
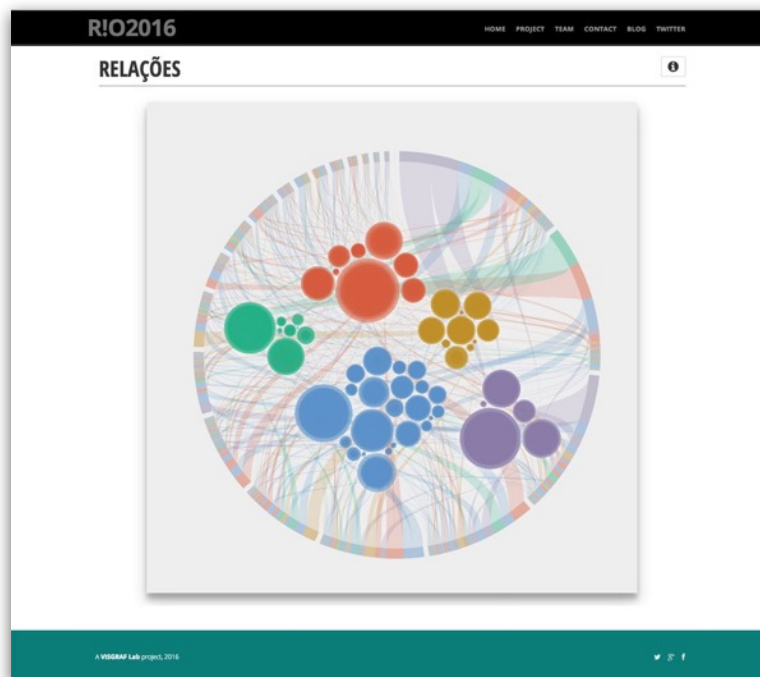
Fig. 20 - *Relações* (Relations): Bi-lateral connections between sports and participating nations of Rio-2016 based on text analysis.
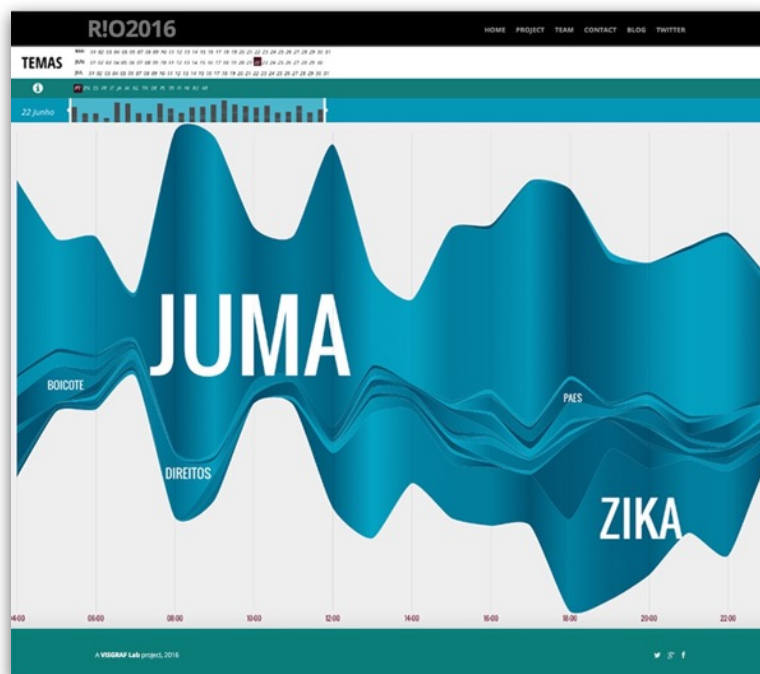
Fig. 21 - *Temas* (Themes): identifies and represents what people are saying on Twitter about Rio-2016 during the pre-Olympics.

Version 3.0

During the Games, we monitored some Olympic topics (athletes, episodes, sports rivalry, statements, etc.) that were creating buzz on Twitter and other issues related to our research. Then, we took a deeper insight into these topics and wrote comments about them in our blog (see next section for more info about blogging), accompanied by images, charts and tweets examples.

At the same time, we identified athletes with better performance in their respective sporting discipline and then created a new Twitter search query which we called "Athletes" category. After that, we designed a visualisation in which the size of the bubbles represents the amount of mentions each one of the identified athletes received during the competitions.

Finally, we implemented temporal sliders in visualisations that have not yet presented this feature.

These are OBSERVATÓR!O2016's website mainly updates in version 3.0:

Fig. 22 - *Atletas* (Athletes): athletes with better performance within their sporting modalities are represented in this visualisation based on their popularity on Twitter.
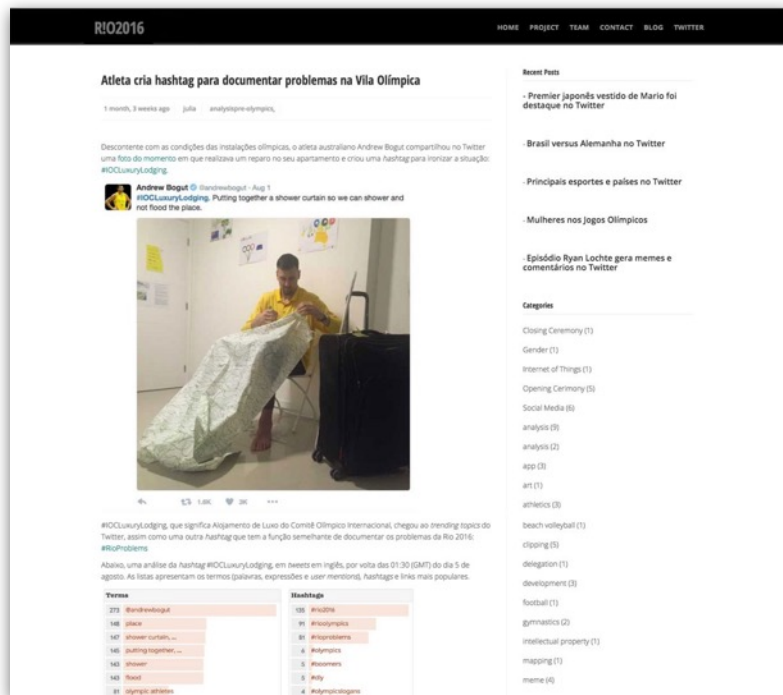
Fig. 23 - Blog: highlights some interesting topics about the Olympics and findings on tweets collected. See next session.
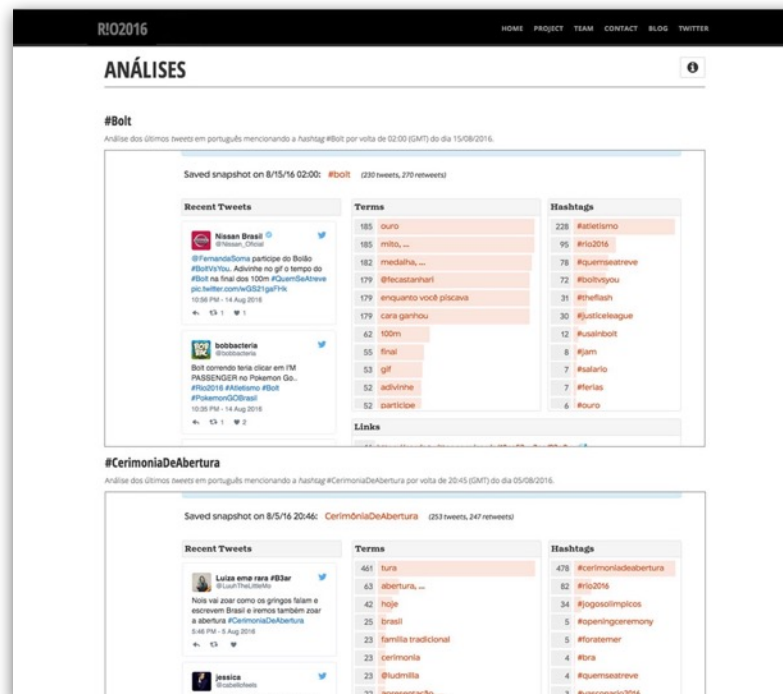
Fig. 24 - *Análises* (Analysis): As a complement to the commentaries in our blog, this page brings deeper insights of Twitter hashtags or words
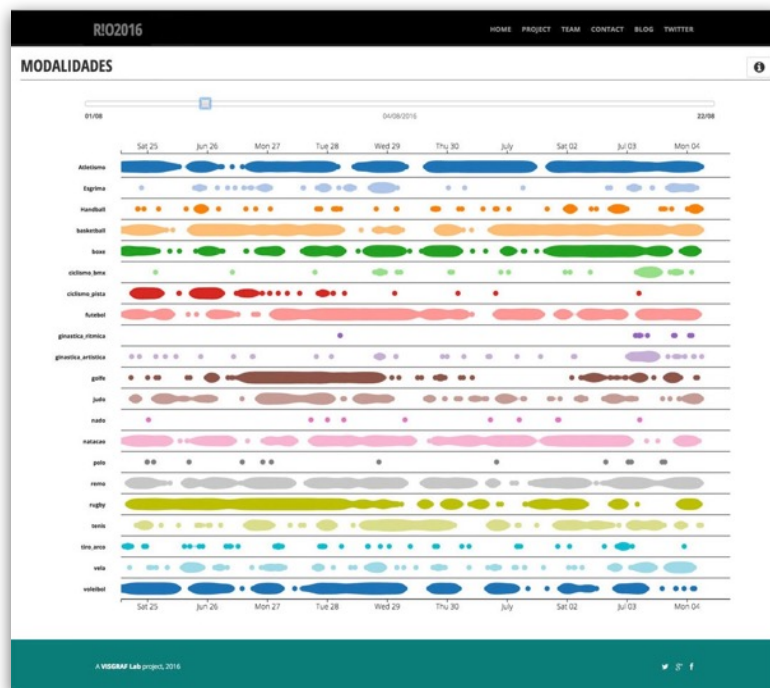
Fig. 25 - *Modalidades* (Disciplines): we improved the user interface by adding a time slider using a time step interval of one day. We did the same for the visualizations *Relações* and *Sentimento.*

INSIGHTS AND BLOGGING

During the Games, we examined some tweets and images shared on Twitter about the Olympics through commentaries on our blog [19] giving the opportunity for deeper insight and reflection of the heterogeneous debate on Rio-2016. In this sense, we highlighted spontaneous tweets and media that created buzz during the competition, such as the meme upon U.S. goalkeeper Hope Solo [20].

We also used our blog to underline impressions on how social media, technology innovations and marketing actions transform the experience over the Olympics.

Finally, as a complement to the commentaries written in our blog, we created an analyses page [21] in which is possible to explore a snapshot of a Twitter hashtag, word or phrase. The analysis was possible due to TwXplorer [22], an open source tool that, given a search query, returns the most commonly used words, hashtags and the mostly frequently shared links within a period of time.

PROMOTION AND CLIPPING

In order to publicize and introduce OBSERVATÓR!O2016 to the world, some marketing actions were taken.

The first channel created was the the main website itself, alongside the press release text in Portuguese [23], which explained the project concept and functionalities. With the help of the IMPA's press officer, the project was publicized which generated news articles [24, 25, 26, 27] a radio interview [28], insert on a important research newsletter [29] (Fig. 26) and on design blogs and newsletter [30, 31].

Fig. 26 - FAPERJ, the State of Rio de Janeiro funding agency, highlighted OBSERVATÓR!O2016 project
on it's weekly newsletter on July 28, 2016.

With a central information point established, social media and blogging was also employed. We used our Twitter account [32] (Fig. 27) and blog to produce content about the project and assemble clipping reports. OBSERVATÓR!O2016 was also mentioned on tweets and on facebook posts. We also received direct comments and suggestions through our contact page and e-mail [33]. A full list with the main news and social media coverage can be found on our documentation website [34].
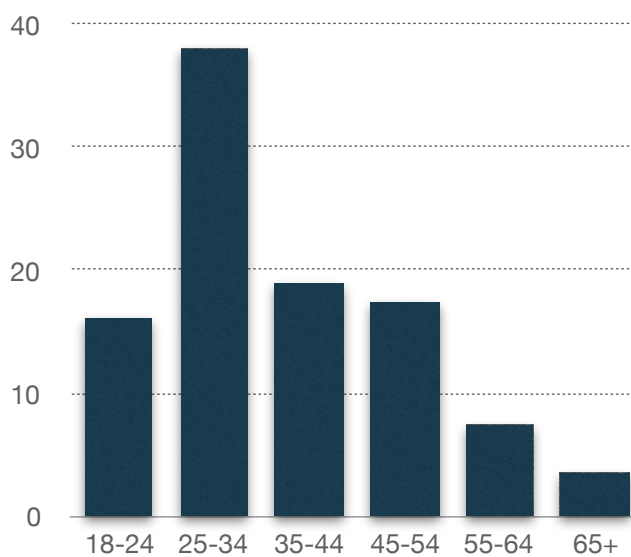

Fig. 27 - OBSERVATÓR!O2016 Twitter's account.

GOOGLE ANALYTICS

The Google analytics tool [35] enabled us to analyse the traffic and audience of our website. The following statistics correspond to the period from 3 July, 2016 to 16 October, 2016:

Overview

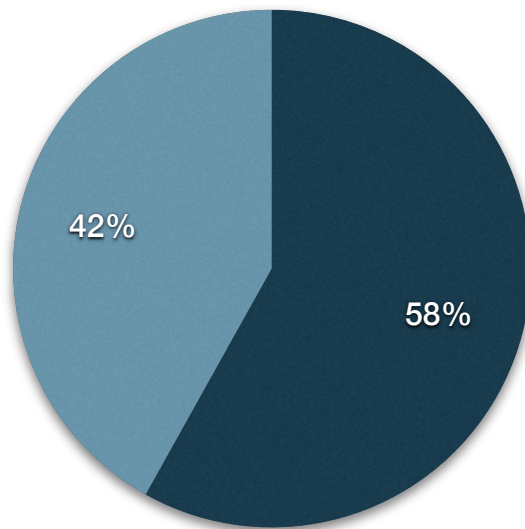|	
Sessions	3.486
Users	2.180
Pageviews	17.511
Pages/Session	5,02
Avg. Session Duration	00:05:13

User demographics: age

*   Key metric is sessions. Just around 20% of the amount of sessions had information about age statistic.

User demographics: gender

● male   ● female

42%

58%

*   Key metric is sessions. Just around 20% of the amount of sessions had information about gender statistic.

User demographics: country

Brazil	3.033 (87,01%)
United States	188 (5,39%)
United Kingdon	83 (2,38%)
Colombia	24 (0,69%)
Peru	13 (0,37%)

*   Key metric is sessions. All sessions had information about country statistic. We show the top-5 countries access.
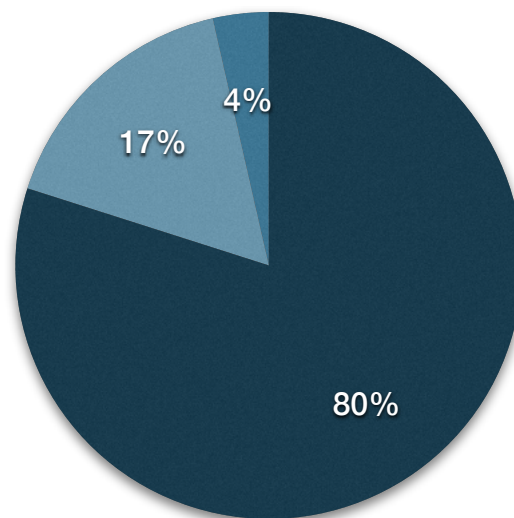
*

Accessibility: browser

Chrome	2.418 (69,36%)
Firefox	491 (14,08%)
Safari	391 (11,22%)
Safari (in-app)	80 (2,29%)
Internet Explorer	40 (1,15%)

* Key metric is sessions. All sessions had information about browser access. We show the top-5 browser access.

Accessibility: device

● desktop   ● mobile   ● tablet

4%

17%

80%

* Key metric is sessions. All sessions had information about device access.

UNFOLDING RESEARCH

After the Olympics, the project continues to expand. OBSERVATÓR!O2016's website will be a digital memory of commentary and opinion on Rio-2016, shared on Twitter. Since the data collected are stored in their entirety, future data analysis and visualization are possible.

In this sense, we are currently conducting a research involving Deep Learning concepts and techniques for approaching computer vision tasks such as image classification and image synthesis. This topic will be deepen in the next section.

Furthermore, a few seminars on the project were conducted. First, a lecturer [36] about data visualisation aspects in *3º Seminário Big Data Brasil* held on September 13th by Luiz Velho and Julia Giannella. The lecturer was recorded and uploaded on youtube [37]. Then, a more academic presentation [38] about OBSERVATÓR! O2016's design process in Simpósio de Design e Tecnologia held on September 20th by Julia Giannella.

Finally, a documentation website [39] (Fig. 28) was developed to give further and deeper information about the fundamentals and methodologies undertaken in the project. We also released a database website [40] where all data gathered about the Rio 2016 Olympic Games can be found, including an API Rest for reading the results of our image classification using a Deep Learning model (Fig. 29).

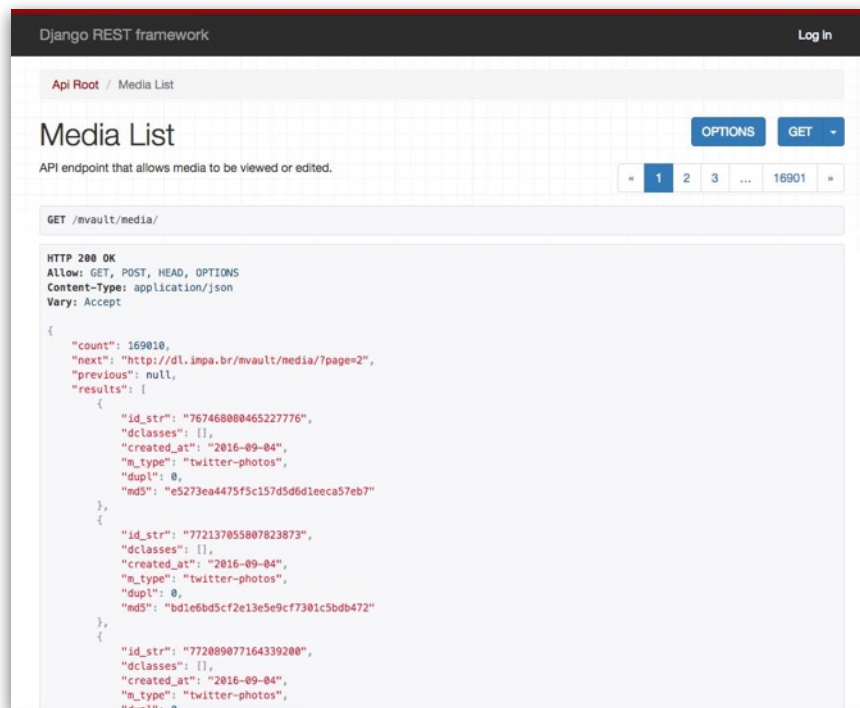Fig. 28 - OBSERVATÓR!O2016's documentation website

Fig. 29 - The results of our image classification using a deep learning model is available via a Rest API.

2. EXPERIMENTS IN DEEP LEARNING

In addition to conception and design of OBSERVATÓR!O2016 website and motivated by Luis Velho's research concerns and initiative, the VISGRAF Lab is also interested in framing Rio-2016 data in the context of Deep Learning. Since the data collected are stored in their entirety, novel experiments and research topics are possible. In this sense, we inaugurated a second research line which involves Deep Learning approaches for attending computer vision tasks such as image classification.

In September we have launched de website "Experiments in Deep Learning" [2] (Fig. 30) that presents three experiments, results from the application of Convolutional Neural Networks (CNN) into the 180,000 images of our database.
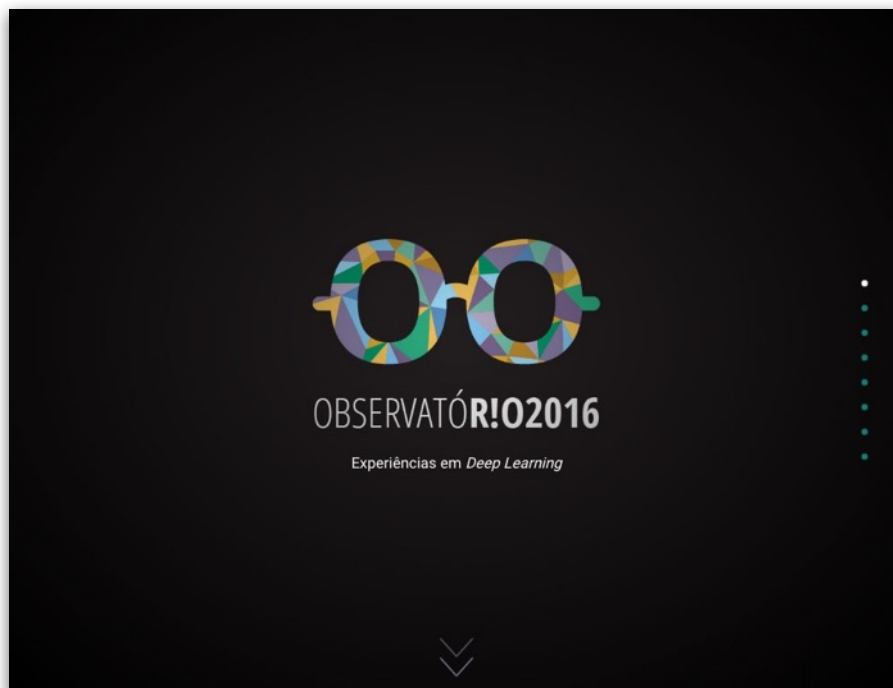
Fig. 30 - OBSERVATÓR!O2016 - Experiments in Deep Learning.

DEEP LEARNING METHODS

The production and circulation of large volumes of digital images on social networks inaugurate new avenues for researches interested in understanding the human creative practice. If, on the one hand, access to this vast imagery repertoire is facilitated by advancements in visual data gathering and storage, on the other hand, access is not always sufficient to propose analysis and synthesis problems for images. Therefore, massive collections of visual artifacts still justify the need to explore intelligent mechanisms for identifying subject and stylistic features and clustering images not only from their textual metadata, but also from computer vision techniques. Aware of that, we decided to explore Rio-2016 images dataset through Deep Learning approaches. The probe resulted three experiments - Torch Mosaic, Video Globe and Sound Impressions - that seek to investigate avenues for clustering and visualizing image features of Rio-2016 collection enhancing the discoverability and expression of the collection.

TORCH MOSAIC

This experience referred to a Deep Learning approach - more specifically a supervised learning model using a CNN architecture - to visually recognize the Olympic torch in the images of our database.

Thanks to Googles' effort, computer vision tasks such as image classification and object recognition have become relatively more accessible and applicable. That's because the company released last year their open source software library called TensorFlow [41], which assists the development of a system for machine learning. This library runs code for image classification on Inception-v3 CNN model [42], which demonstrates substantial gains over AlexNet CNN model: a top–5 error rate of 3.46% compared to AlexNet top-5 error rate of 15.3% [43].

Besides, Inception-v3 can be retrained on a distinct image classification task. By creating a set of training images to teach the network, it's possible to update the parameters of the model and use it for a specific vision task such as recognizing a new image category. That said, we retrained the network to detect the Olympic torch by showing it a sample of one hundred images containing the torch.

Finally, the retrained network ran over our database and returned a set of images with their corresponding confidence score for the Olympic torch category. Until June 25, around 1500 images with over 85% confidence score for the Olympic torch category had been classified by our network (Fig. 31). We used them to create a mosaic image that can be zoomed and panned [44] (Fig. 32). To implement the mosaic we used a web-based viewer for high-resolution zoomable images called OpenSeadragon [45].
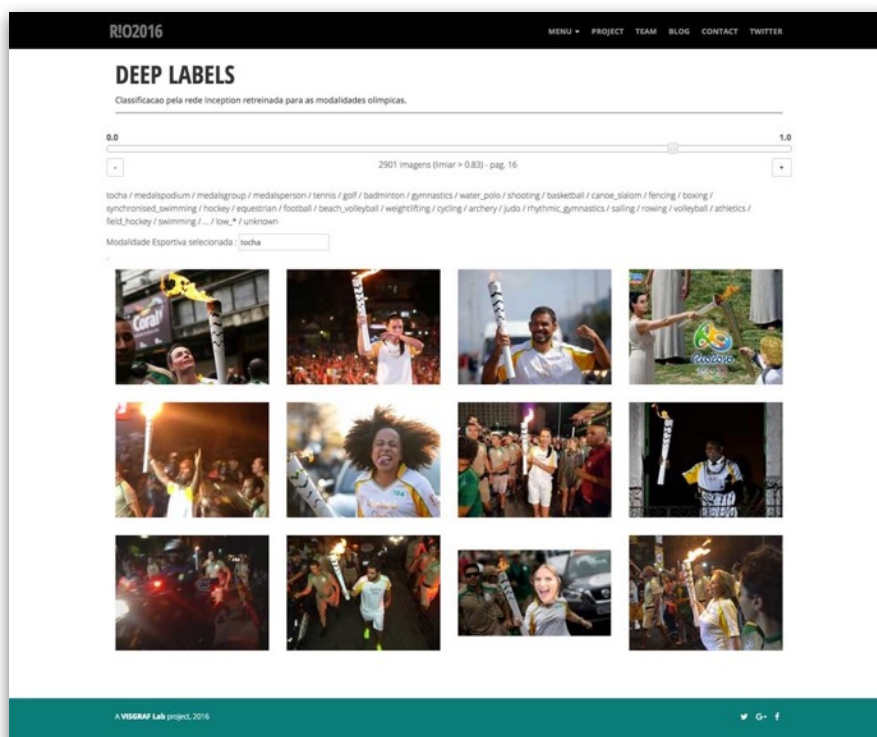

Fig. 31 - A subset of 12 from 2091 images with confidence score over 83% for the Olympic torch category.
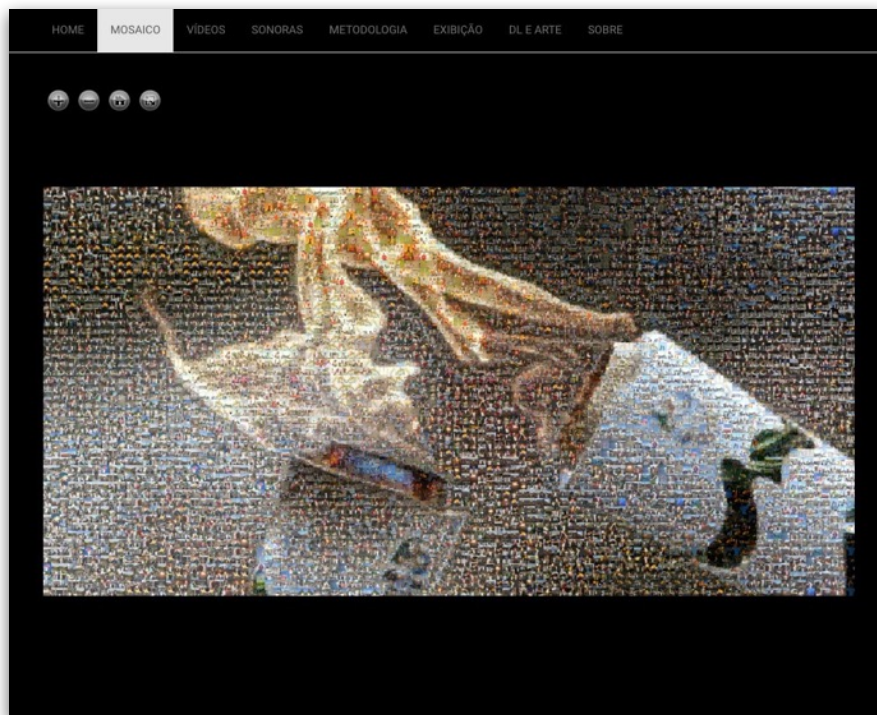
Fig. 32 - The "torch mosaic" webpage.

VIDEO GLOBE

Just as we did for the Olympic torch category, we retrained the Inception-v3 neural network to recognize sporting disciplines and medal awards. However, we propose a different visualisation solution for the images. This time, we explored automated procedures for remixing the classified images into audio-visual results, more precisely musical slideshows that we present in the mean of a video globe on our site. For this synthesis task, we called on automated resources, offered by Apple, for the production of slideshows.

Apple's new operating system (iOS 10) brings a strong presence of artificial intelligence in its native applications [46]. *Photos* uses Deep Learning to recognize faces, objects, and scenes in photos and videos stored in the user's album. *Photos* offers the feature *Memories* that automatically creates musical slideshows based on the recognition of people, places, scenes, and dates. Once the slideshow is created, the application allows properties customization through an authoring environment.

For *Photos* to automatically create music slideshows with Rio-2016 images, we progressively imported collections of images in the application based on the classifications previously achieved by the neural network. Then, we selected 12 music slideshows to create a video globe [47] (Fig. 33). The video globe interface was implemented using a web-based viewer called Videosphere [48]
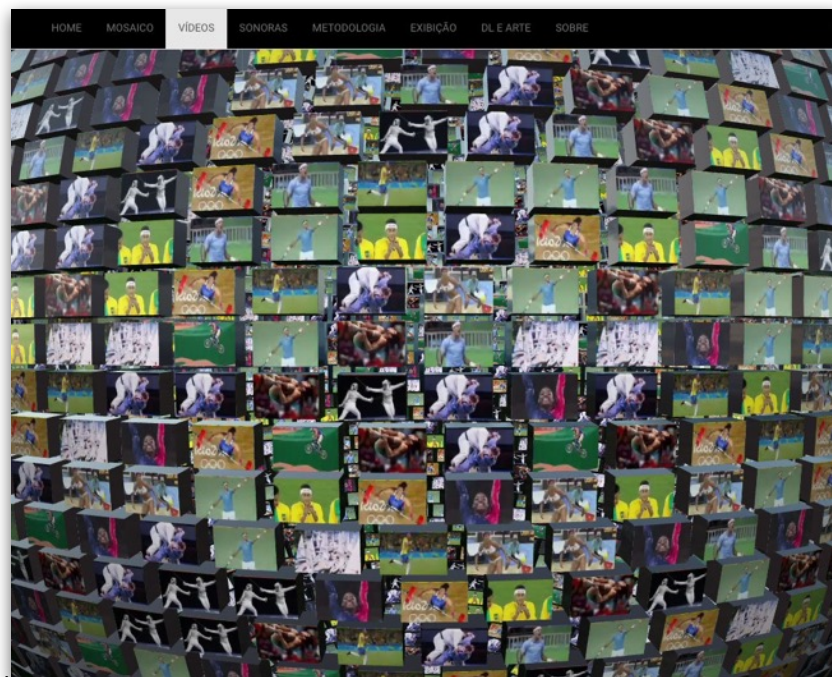
Fig. 33 - The "video globe" webpage.

SOUND IMPRESSIONS

This experience arose from the willing to explore a language that had been little worked in the project: the sound. During the Olympic torch relay and the Games, we collected sound records that marked the mega event - statements by athletes and torch bearers, reports, radio announcements, songs and parodies that created buzz on social networks. These sound records were extracted from videos and stored in a SoundCloud account [49].

Through a curation process, we combined some of these audios with written statements by athletes and torch bearers. The blend of sounds and texts was implemented through a plugin called SoundCite [50].

Although the hybridization between sounds and texts does not employ Deep Learning, the background images were synthesized by a learning model. We select a single picture from the OBSERVATÓR!O2016's database and uploaded it several times in Prisma [51] (Fig. 34) a photo-editing application, available for iOS and Android systems. This application uses deep neural networks to transfer an artistic style to the uploaded picture.
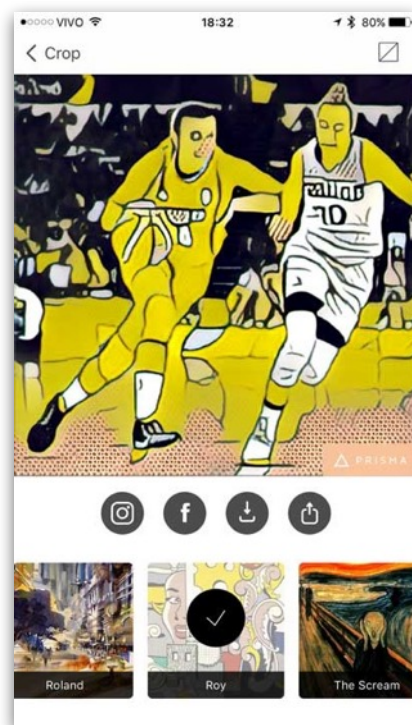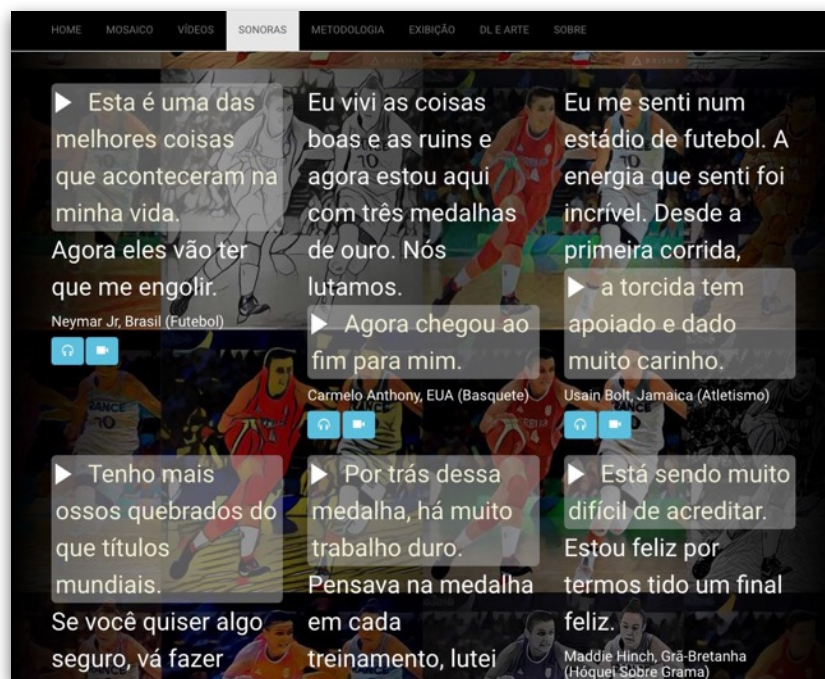
Fig. 34 - Prisma app.

Fig. 35 - The "sound impressions" webpage.

ARTISTIC EXHIBITION

Due to the call for proposals for *Indisciplinas* [52] - 4th meeting of the Graduate Programs in Visual Arts of the State of Rio de Janeiro - we applied our work involving Deep Learning and Rio 2016's image collection to be presented in the format of an artistic exhibition. The proposal was accepted and on November 25th, at Casa França-Brasil, we presented video-projections [53] that blend the three experiences already described.

For the artistic exhibit, we've assembled the 12 musical slideshows from "Video Globe" experience into two unique videos to be projected simultaneously. The videos received a new soundtrack, edited from the audios and songs of the "Sound Impressions" experience.

For the presentation, we prepared a poster (Fig. 36) and brochures explaining the project to be distributed. A pdf version [54] of the brochure can be downloaded on our website and a iBook version will be soon available on iBookstore. Further, we will update "Experiments in Deep Learning" website with pictures and videos of the presentation. The conference proceedings are expected to be released on March 2017.
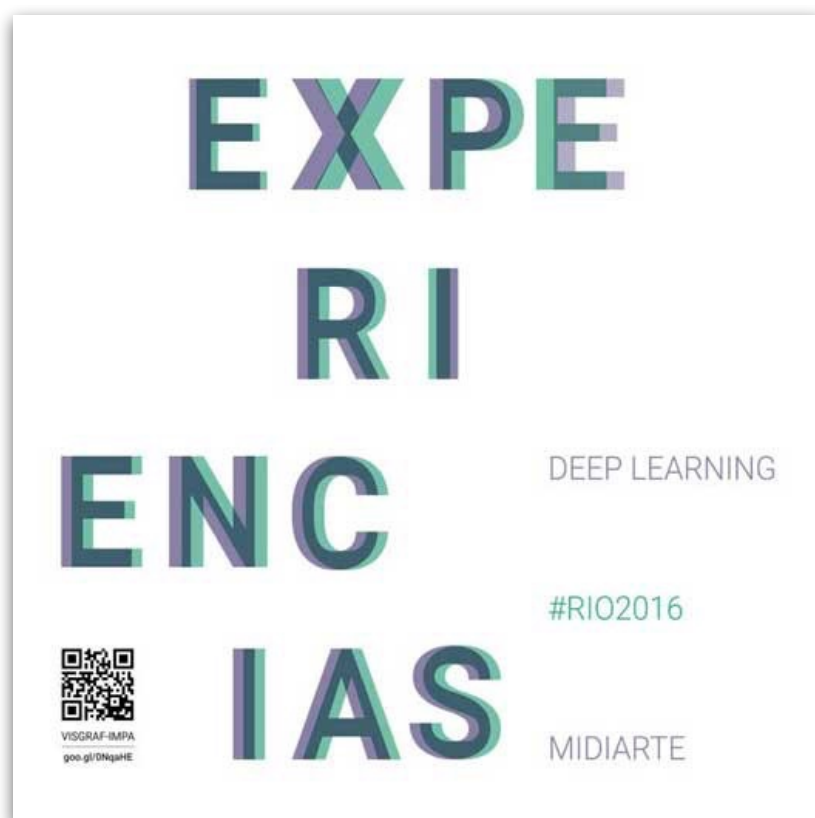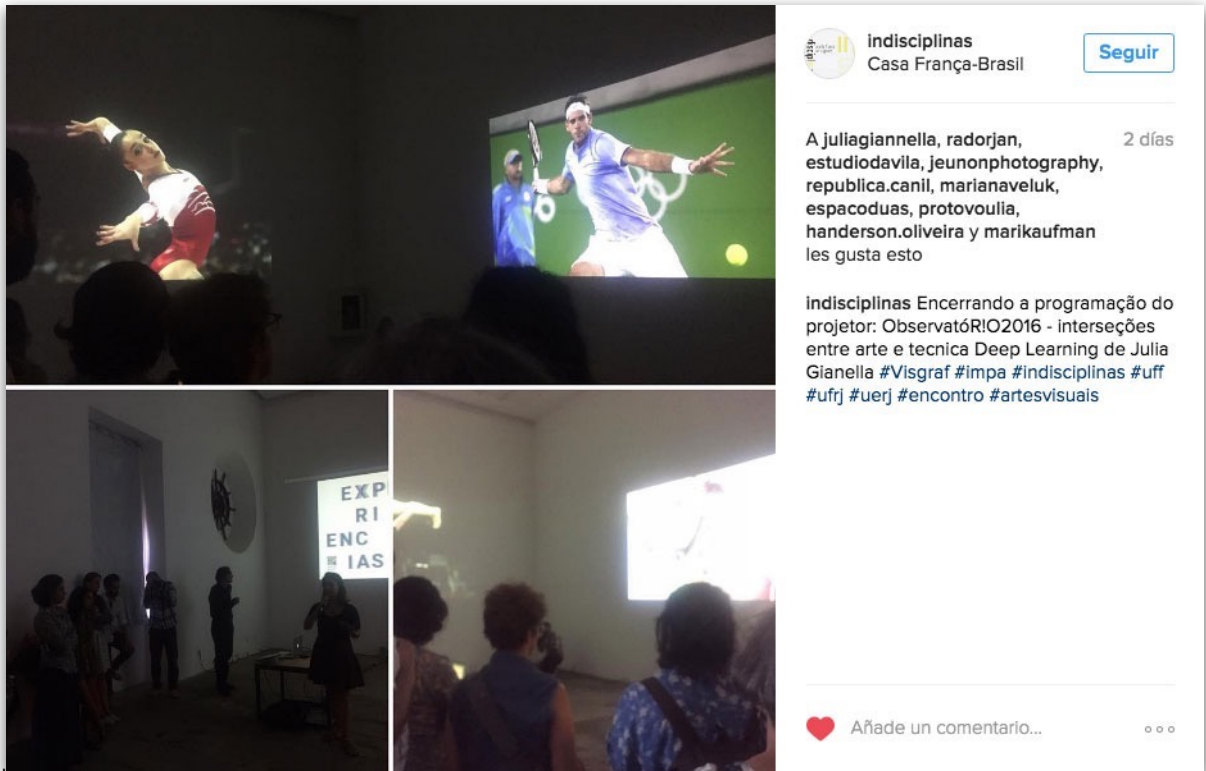

Fig. 36 - The presentation's poster

Fig. 37 The organization of the event published a photo of our presentation on Instagram [55].

3. FUTURE WORK

Even though OBSERVATÓR!O2016 has been intensively explored, this report suggests possibilities of further investigation, specially those involving Deep Learning for ad hoc image analysis and synthesis.

Since just a very early stage user experience and interface design evaluation was possible due to the reality and scope of the project, future iterations of OBSERVATOR!O2016's website could improve it.

Finally, the process and results of OBSERVATÓR!O2016 are expected be presented in at least two more conferences. First, Luiz Velho will lay out a seminar [56] at IMPA on November 30th in which the experiences in deep learning and Rio-2016 images will be presented. Second, Julia Giannella and Luiz Velho were invited to present a conference talk about the project at *Campus Party Brasil* [57], which will be hold in São Paulo on February, 2017. Further information will be announced on VISGRAF website [58].

Julia Giannella is author and designer on OBSERVATOR!O2016. She is a Ph.D. candidate in Design at PPDESDI-UERJ and research assistant at VISGRAF Lab. Interested on new nedia research and creative development, especially involving aspects on information design, data visualization, UI-UX and computer vision.

Luiz Velho is supervisor on OBSERVATOR!O2016's, full Professor at IMPA and leader of VISGRAF Lab. He holds a doctorate from University of Toronto and a master's degree from MIT Media Lab.

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