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Google Images, Climate Change, *and the* Disappearance *of* Humans

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ABSTRACT

In this contribution, we present a visual approach to study the development of the online representation of climate change. We collected ranked image lists over a twelve years timespan on Google Image Search, and analyzed them with a two-fold visualization: an image timeline of the top 5 images per year and an area bump chart showing the top 10 tags automatically detected by the computer vision algorithm in the larger dataset of the top 100 results per year.
We can draw two main conclusions from these results. First, the artificial separation between climate change and humans identified in previous studies of climate change imagery is being perpetuated and reinforced on one of the most important digital locations for visual culture: Google Images. Second, that there is a notable homogeneity within the corpus of images, as well as stability over time.

Keywords

Climate change
Visual methodologies
Digital methods
Image timeline
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Google Images, Climate Change, and the Disappearance of Humans

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What does climate change look like on Google Images? And, how has Google's vernacular changed over time? To answer these questions, we zero in on Google Images, unarguably the most important provider of online images. There are hardly any publicly available statistics regarding the popularity of the search engine, however, as far ago as 2010 then Google Vice-President Marissa Mayer claimed that Google Images "garners more than a billion page views per day" (Siegler, 2010). Despite this huge outreach and importance as a 'visual gatekeeper', there is no social scientific analysis of Google Images in the academic literature.

We address this significant gap by looking in greater depth at the visual vernacular of climate change on Google Images: the search engine-specific content and style of images that are used to articulate climate change on the search engine. Search engine research often focuses on a 'snapshot' in time, such as around a critical political event. It is less common, and increasingly more challenging due to data restrictions, to look at changes over longer periods of time. In this project, we attempt to address this issue by looking at changes in images time-stamped between 2008 and 2019 on Google Images. Rather than taking smaller samples suitable for qualitative analysis, we experiment with 'computer vision' as an approach to analyzing images on scale. We use Clarifai's General visual recognition model,[1] containing over 11,000 concepts that are matched with elements within a given image. While this approach loses the specificity and nuance that is the hallmark of 'small n' qualitative analysis, it does provide some insight into macro-level patterns across a large corpus of images (Figure 1).

1 https://www.clarifai.com/models/image-recognition-ai

PROTOCOL

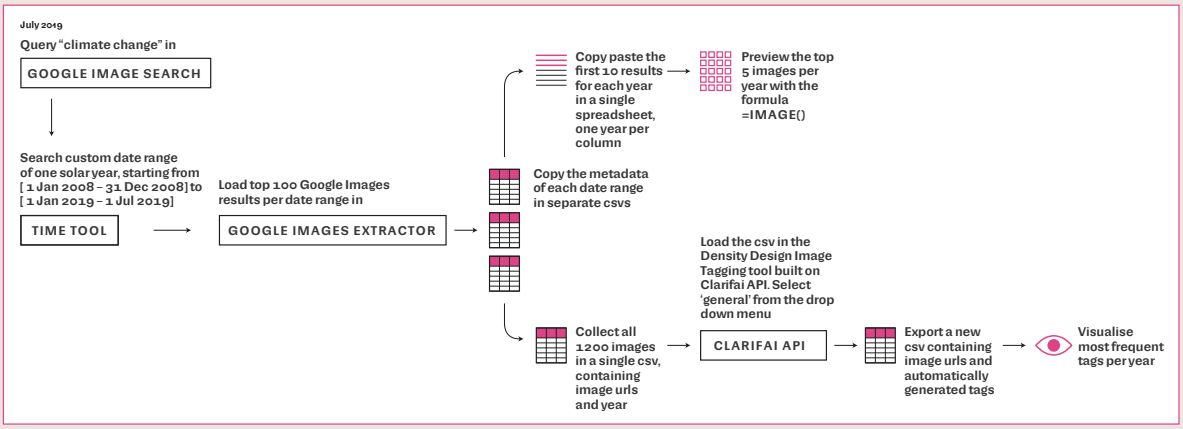

Figure 1: Protocol used to gather and visualize data in this project. Source: The authors.

Here, we provide a two-fold visualization of the Google Images data (Figure 2). We show a 'ranked image timeline' of the top 5 images for each timestamp between 2008-2019. This provides an initial insight into the images that are ranked the highest in search results. For example, we can see numerous images of the Earth, maps, charts, and some landscapes. Next, using Clarifai, we attempt to obtain a more robust analysis of these trends over a much larger corpus: the top 100 images for each year. Using the concepts identified by Clarifai, we can gain an insight into stability or change in the content of images over time. In the figure below, we look at the 10 most frequently identified concepts for each year and plot the frequency and volume of images for each concept in an 'area bump chart' visualization.

Here we see confirmation of some of the characteristics we already identified; for example, 'travel', 'outdoors' and 'landscape' all refer to landscape-style images, while 'illustration', 'desktop' and 'vector' all refer to computer visualization and charts. However, the results also helpfully highlight an *absence* within the image corpus that, by definition, is less easy to observe than the visible content of the images. The concept most frequently assigned to images of climate change provided by Google was 'no person', indicating images determined to be devoid of human life. A glance back at the Google Images tile visualization confirms this to be the case, with the two main kinds of image types both dehumanizing the representations of climate change. This absence of people is noteworthy following the 2015 *Climate Visuals* report that argued for the inclusion of 'real people' in climate images as an antidote to the clichéd iconography of smokestacks and polar bears (Corner et al., 2015). It also marks one of the most high-profile examples of climate change's historical representation as an environmental issue discrete from humans and culture (Doyle, 2016).

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Figure 2: A ranked image timeline showing the top 5 Google Image results per year for the query 'climate change' (top), combined with an area bump chart created with Rawgraph, a web application for the design of static data visualisations (Mauri et al., 2017), showing the top 10 tags automatically detected by the computer vision algorithm in the overall dataset of top 100 Google Images results per year. Images can receive multiple tags; tags are not mutually exclusive. The visualization in its original size is available for download at this link: https://www.dropbox.com/s/vytogpii8t42cfb/Poster%204_PRINT.pdf?dl=0

Two subcategories of 'no person' images are identifiable in the data: scientific maps and charts, and representations of landscapes and nature. Together, these categories go a long way to describing the visual vernacular of climate change in Google. They also reflect two broader and persistent framings of climate change that have been criticized by social scientists: climate change as a primarily technical, scientific issue rather than a social problem, and the artificial separation made between humans and nature. This suggests a significant scope for diversifying and humanizing the visual vernacular of climate change on Google, a critical issue concerning the presentation of a major global issue, on one of the world's most influential digital search engines.

We can draw two main conclusions from these results. First, the artificial separation between climate change and humans, identified in previous studies of climate change imagery, is being perpetuated and reinforced on one of the most important digital locations for visual culture: Google Images. Second, there is a notable homogeneity within the corpus of images, as well as stability over time. There is little evidence of the visual vernacular of climate change evolving over time. This opens up questions for the future regarding how the properties of the search engine are shaping how we see climate change through Google Images. One important aspect of computer vision is visual consistency, the principle that images related to a particular keyword will look alike; for example, one might expect images of bottles to have several common characteristics (Fei-Fei et al., 2004; Huang et al., 2011). While this makes sense for certain search terms, visual consistency also complicates the original objective of the Google search engine to catalog the most important, authoritative sources on the web for any given query (Brin & Page, 1998; Page & Brin, 2004). Visual consistency may be of value for images of objects but it brings unintended consequences for political concepts such as climate change; namely, that a goal of improved accuracy in image search results has also narrowed the visual vernacular of climate change on one of the world's most important sources for imagery. Further research will examine how these dynamics relate to climate change in the popular imagery, and how these are being challenged by new developments in climate politics.

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