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# YouTube as a visual digital intermediary in global climate communication

*YouTube, climate change communication, digital platforms, global, computer vision*

## Extended Abstract

How climate change is communicated helps shape public support for efforts to address its causes and consequences. Yet it is notoriously challenging to engage citizens on climate issues, which are often perceived as abstract and remote in time and place. Strategic recommendations emphasise the value of narratives that bring the issue close to home and make it relevant to the audience at hand. Nevertheless, observers describe an ingrained "green ghetto" in which the same type of speakers dominate, and uphold communication repertoires with stories, sources and styles that reinforce the notion of climate change as a distant problem. Still, a recurring expectation is that increasingly complex media ecologies will contribute to dissolving such dominance by providing conditions conducive to fresh voices and repertoires [3].

This work addresses what platforms do as digital intermediaries in online climate discourse, and what the implications are for how the issue is articulated to differently situated global publics. Climate information is now not only journalistically and editorially, but also algorithmically curated. How platforms present things matter, and algorithmic performance is neither impassive nor neutral. Yet, we know little about the role of search engines and social media platforms in public discourse on climate change. As digital intermediaries [2], platforms mediate flows of information, communication and connection between communicators and audiences. In the light of the "green ghetto", it is important not only how they articulate the issue in general, but whether they also set differing conditions with respect to giving visibility to "relevant" (eg. local) voices, sources, motifs or repertoires for different audiences, including those beyond the global North.

Our empirical aim is therefore to understand how a major visual platform, YouTube, articulates climate change to audiences searching for information on the issue around the world. We ask two questions: (1) What is the character of top rankings with respect to diversity of voice and content? (2) Is the relationship between ranking character and relevance to context evenly distributed across the world?

**Method.** The data was collected from the YouTube Search API in May 2021. The collection retrieved search results by "relevance" for "climate change" for 232 countries in their official languages. Since we wanted to capture platform-level processes rather than what a specific user actually sees, we followed earlier work in selecting the depersonalised API approach to target search results that are as close as possible to a baseline search [4]. As a search key we used "climate change", as a mainstream and neutral keyword on YouTube [1], in the official languages of each respective country region. Since we assume that algorithmic performance encompasses the heterogeneous agencies of platform, creators, and publics, we probe both platform and creator-side elements. We pursue API-based large-scale observation to analyse the platform side [4], and examine the relationship between channels and visual contents to probe the creator side. We analyse diversity of voice with respect to concentration and composition of channels. To assess if diversification of voice brings diversification and (local) relevance of content, we draw on computational image analysis (with both pre- and custom-trained deep

neural networks) to assess the persistence of classic distancing visual themes: arctic landscapes devoid of people, showing polar bears, icebergs, or ice cliffs in water.

**Selected results.** With respect to the first question, YouTube articulates "climate change" with some diversity of voice but persistence in distancing themes. In global combined results, the issue is defined by professional media and user-led channels. Media organisations are prevalent, with a higher fraction of videos in the top results than other channel types. Videos posted by user-led channels are not far behind, and generate more engagement in terms of views, comments and likes. Strikingly, while actors such as science organisations remain scarce, videos posted by other actor types fresh to conventional climate communication — digitally native popular science groups and online education actors — are significantly more amplified and generate more engagement than all other categories, although with more limited prevalence. What is more, the iconic arctic themes continue to be part of the story. At least 17% of the search results show the classic visual themes of polar bears or empty arctic landscapes, and these are significantly more present in the videos posted by the freshly visible actors.

With respect to the second question, the analysis suggests that top rankings on the issue vary in relevance to local context around the world. Large-scale observation over time suggests that YouTube does not strongly prioritise variety on this issue. Repeating data collection (on the same day, the day after, three months later) showed limited variability in the top results. At the same time, search results organized by language of query stand out as internally coherent and distinct. This suggests that groups of linguistically related but geographically disparate audiences (as defined by the ISO code of their IP address), are exposed to similar results as each other but not their geographic neighbours. Meanwhile, YouTube of the distinct language groups articulates the issue differently in terms of both composition of channels and persistence of distancing visual themes. For example, professional media and the arctic themes are virtually absent in the Portuguese group, but strongly characterise the Arabic group (Table 1). This highlights the need to look beyond the (anglophone and global North) contexts in which climate communication is typically studied, traditionally and online, and to consider differentiated articulations and conditions not only across, but also within, platforms.

# References

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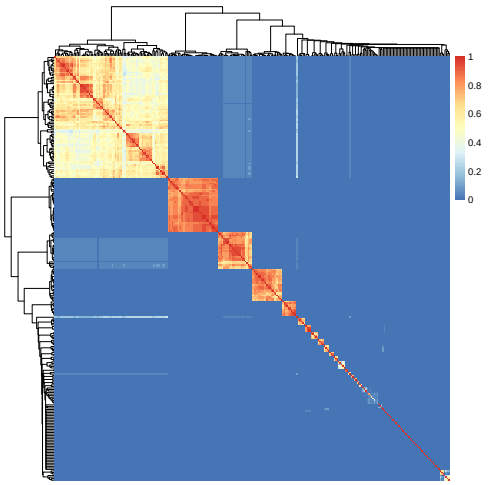


Figure 1: Overlapping between top-20 videos retrieved by different YouTube API queries varying country and language. The clusters correspond to queries in different countries with the same language, with the five largest clusters (from the top-left corner) corresponding to English (79 countries), French (35), Arabic (24), Spanish (21), and Portuguese (10).

Table 1: Composition and content of all top search results (top) and only for searches in Arabic Portuguese. %res: fraction of search results. #chan: number of distinct channels. #vid: number of distinct videos. #views: avg number of views per video. %arctic: fraction of videos showing polar bears, icebergs or ice cliffs in water without people. Only the top 4 categories are shown. Concentration ranges between 0 and 1, with higher values indicating that most search results are produced by one or a few types of channels. The data shows (1) how climate change is globally mainly shaped by professional media organisations and user-led channels, (2) the global prevalence of distant visual themes, (3) the especially high prevalence for new and digitally-native actors, (4) how specific contexts defined by search language can look very different from the global (or English) view in terms of both categories shaping the issue, variety of such categories, and prevalence of distant visual themes.

| Category | %res | #chan | #vid | #views | %arctic |
|---|---|---|---|---|---|
| Prof. media org. | 0.37 | 343 | 503 | 117219 | 0.21 |
| User-led channel | 0.20 | 256 | 299 | 147232 | 0.20 |
| No description | 0.09 | 253 | 292 | 16613 | 0.12 |
| Pop. science groups | 0.08 | 48 | 61 | 381619 | 0.28 |
| All search results. Prevalence of arctic content: .17 | | | | | |
| Prof. media org. | 0.66 | 15 | 27 | 88671 | 0.26 |
| Pop .science groups | 0.15 | 4 | 5 | 2418898 | 0.40 |
| User-led channel | 0.10 | 3 | 3 | 5768 | 0.00 |
| (Inter)govern. org. | 0.06 | 2 | 2 | 5916 | 0.50 |
| Arabic. Concentration: .61. Prevalence of arctic content: .30 | | | | | |
| (Inter)govern. org. | 0.29 | 9 | 9 | 70981 | 0.00 |
| Civil society | 0.24 | 6 | 7 | 76446 | 0.00 |
| Online education | 0.14 | 3 | 3 | 25844 | 0.00 |
| User-led channel | 0.10 | 3 | 3 | 19003 | 0.00 |
| Portuguese. Concentration: .34. Prevalence of arctic content: .02 | | | | | |