Two cases of algorithmic biases: Youtube's polarization and Pornhub's heteronormativity.

Tracking Exposed

Contents

A tool for passive scraping — **tracking.exposed**

FilterTube — How to measure the filter bubble on Youtube

Heteronormativity and algorithms on PornHub — **PorNorm**

What's next? — Discussion on future developments

Let's talk about algorithms

Algorithms are the technological solution to the information overload.

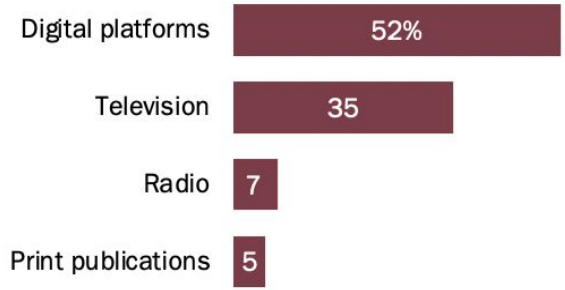
Unfortunately, they can also end up reinforcing the **preexisting beliefs** of the person who programmed them.

Those intrinsically embedded assertions, called *bias*, do have an impact on the dissemination of ideas and culture.

For example, the spreading of online news (and other contents like porn) consumption is increasing year after year;
Algorithmic mediation is a crucial issue for our democracy.

Roughly half of Americans prefer to get news on a digital platform; about a third prefer TV

% of U.S. adults who prefer ____ for getting news



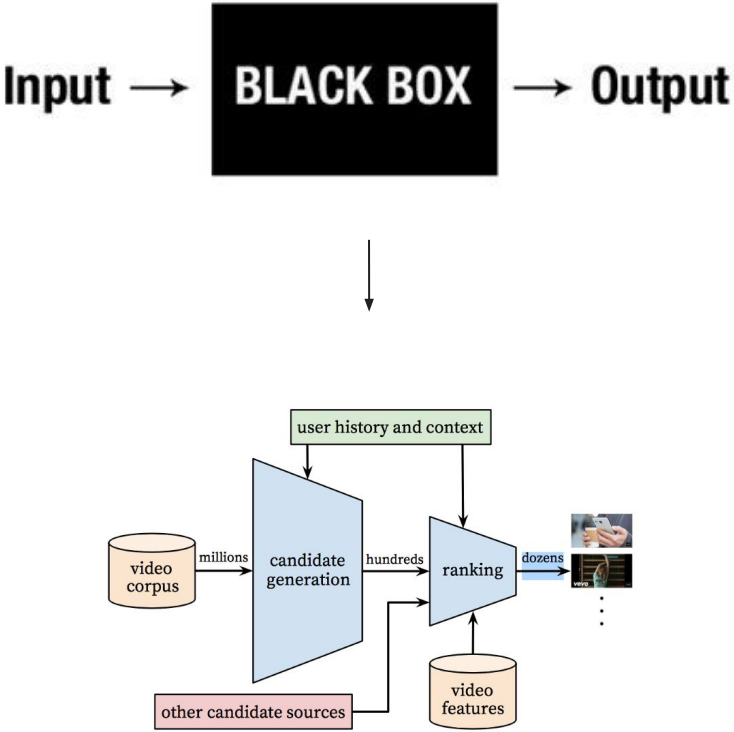
Note: Digital platforms includes respondents who said they prefer news websites or apps, social media, search, or podcasts.
Source: Survey of U.S. adults conducted Aug. 31-Sept. 7, 2020.

PEW RESEARCH CENTER

52% of US adults consume news through Digital Platform,
23% of U.S. adults regularly getting news on Youtube.

70% of the watch time is from YouTube's suggested videos. (Youtube, 2018)

Pew Research Center survey (Shearer and Mitchell, 2020)



“The Black Box Society: The Secret Algorithms That Control Money and Information” (Pasquale., 2015)

“Deep Neural Networks for YouTube Recommendations” (Covington et Al., 2016)

We are a no-profit, free software **project aimed to analyze evidence of algorithm personalization.**

Sponsored and collaborating with (past|present):

Our browser extensions:

Facebook
Tracking Exposed

Pornhub
Tracking Exposed

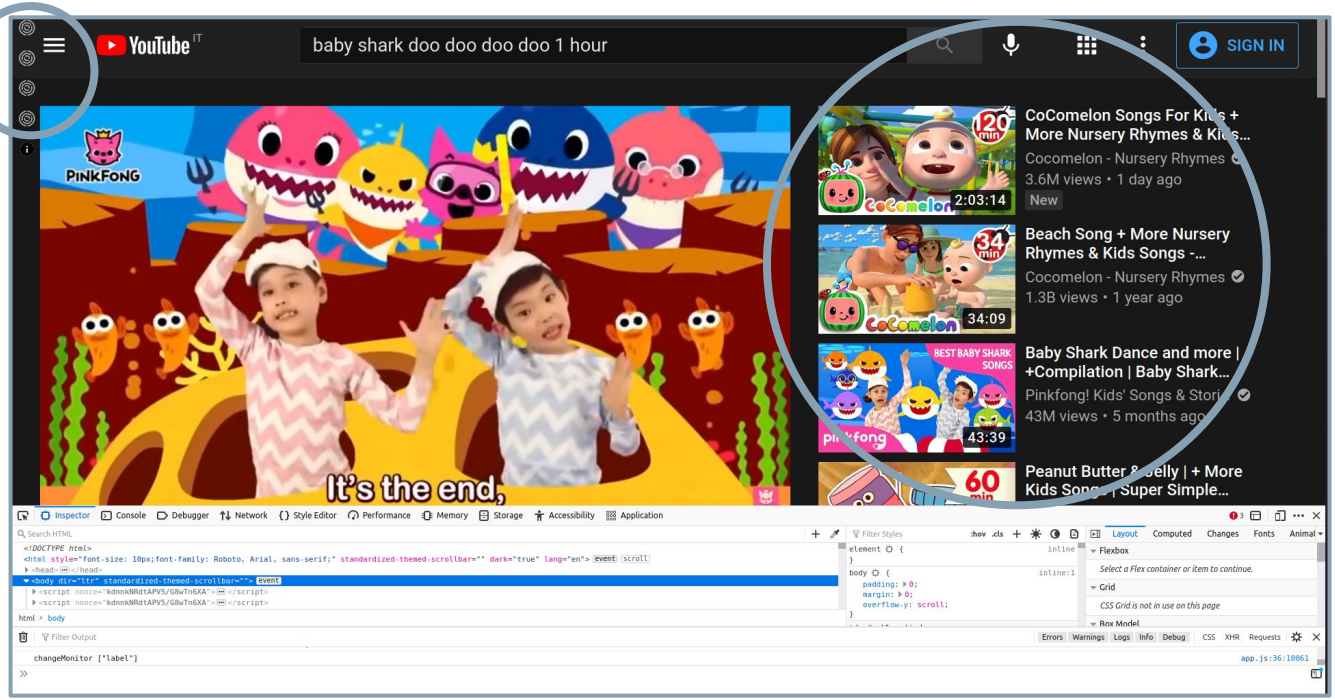
Youtube
Tracking Exposed

amazon
Tracking Exposed

How contribution and collection works

Browser extension parse the HTML (JavaScript)

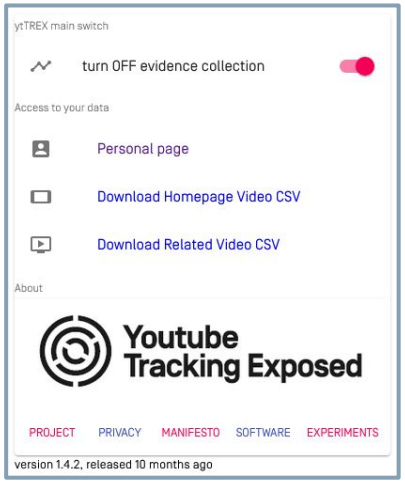
Recommendations/evidences



Software released under AGPL-3 Free license.

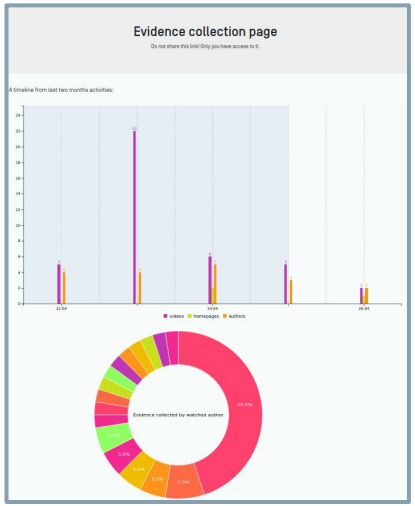
https://github.com/tracking-exposed

Personal page:



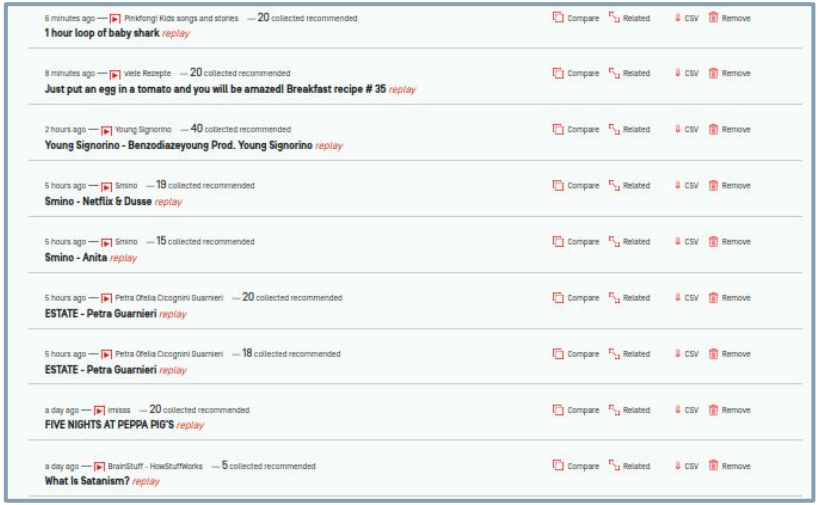
From the extension pop-up you access to a personal page via an authentication token:

https://youtube.tracking.exposed/personal/#59M4Qyevek5dGH4GJyqymK5T81XrdRsdDSks1bZUquUsE6pQ

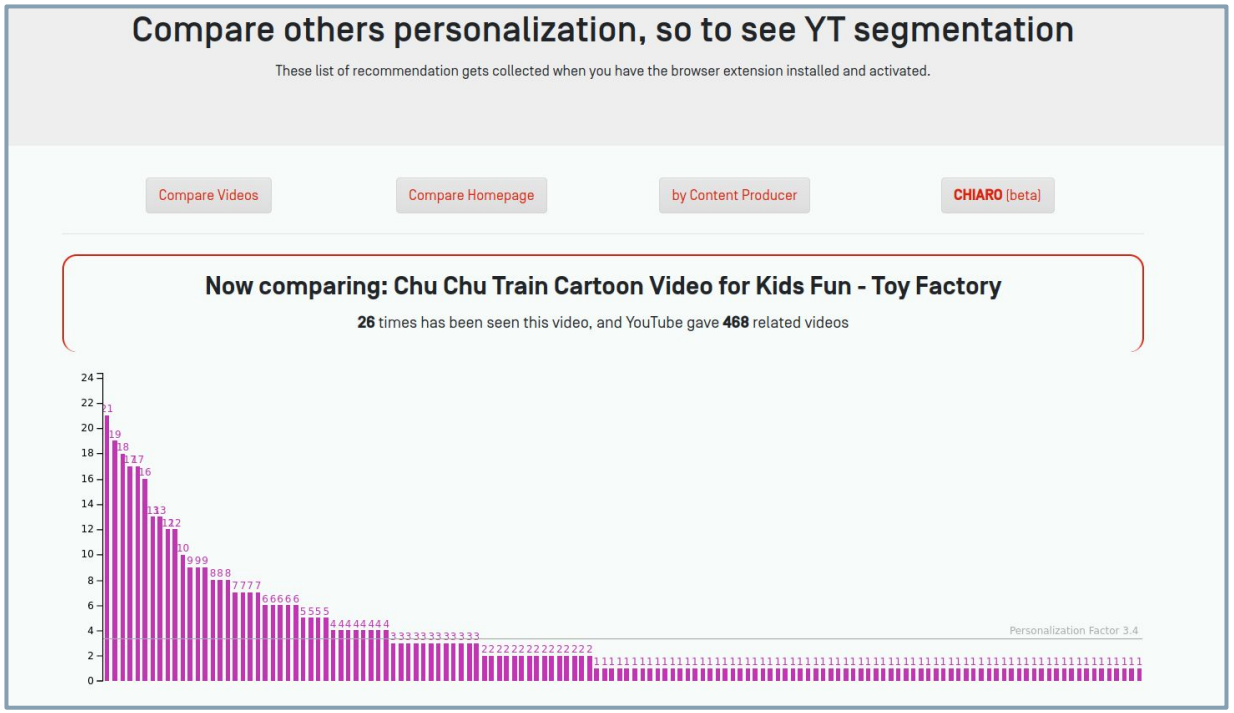


Auto-generated graphs

List of evidences

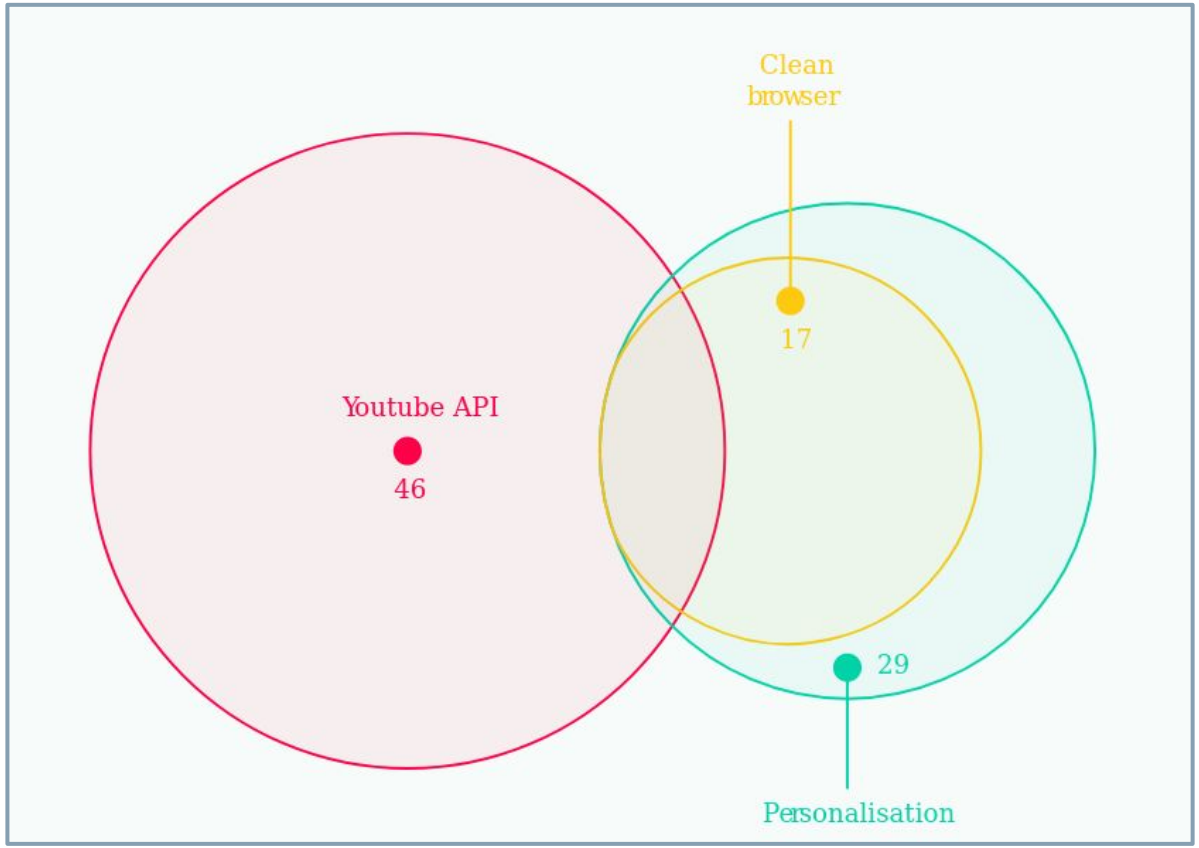


Compare the personalization



Users and researchers can compare the personalization seen on a specific video with auto-generated graphs and datafiles

Why you can't trust API



Controlled experiments
(socks puppets audit)

Researchers design an experiment, they keep under control as many variables as possible, sometimes they use bots.

Collective observations
(crowdsourced audit)

People of the web perform the same actions on the platform, recording evidence about the algorithm with TREX

"Auditing Algorithms: Research Methods for Detecting Discrimination on Internet Platforms" (Sandvig et al., 2014)

Links to previous researches:

Facebook:

- Italian elections
- Dutch elections, a new crowdsourced approach.

Youtube:

- Personalization on Youtube
- YouTube Tracking Exposed: Investigating Brexit polarization
- Covid and misinformation in non English language (pre-print).
- FilterTube: Investigating echo chambers, filter bubbles and polarization on YouTube

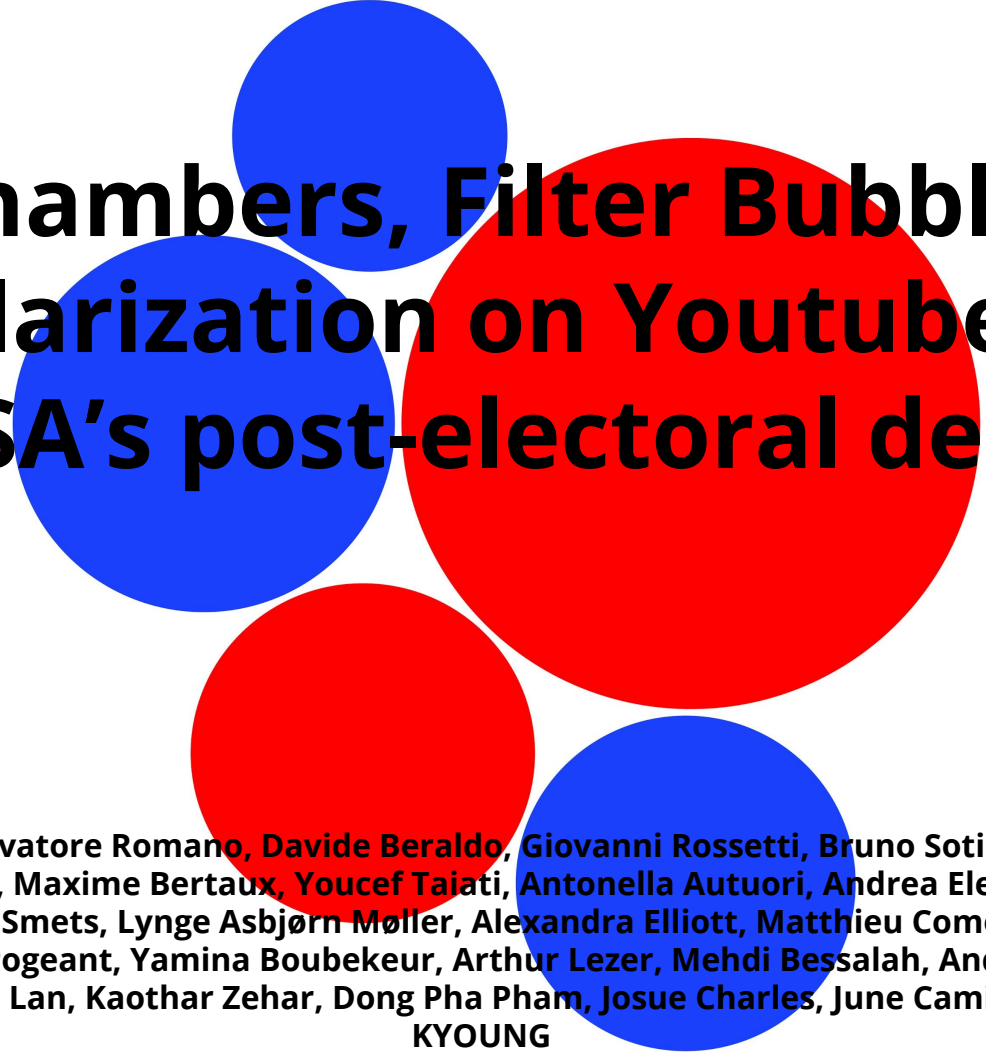
Pornhub:

- Collective observation / a bit of algorithm reversing.
- Heteronormativity and Pornography: an Algorithmic Analysis of PornHub (coming soon)

Amazon:

- Price discrimination research(es).

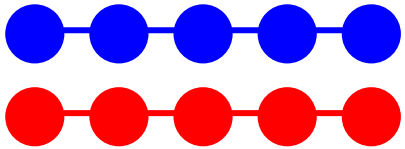
Echo Chambers, Filter Bubble and Polarization on Youtube: the USA's post-electoral debate



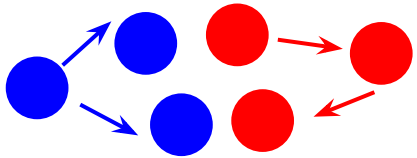
Salvatore Romano, Davide Beraldo, Giovanni Rossetti, Bruno Sotic, Paul Grua, Armand Bazin, Maxime Bertaux, Youcef Taiati, Antonella Autuori, Andrea Elena Febres Medina, Wen Li, Inga Luchs, Annelien Smets, Lynge Asbjørn Møller, Alexandra Elliott, Matthieu Comoy, Ali El Amrani, Eirini Nikopoulou, Nicolas Pogeant, Yamina Boubekeur, Arthur Lezer, Mehdi Bessalah, Andrea Angulo Granda, Tcheutga Corine, Lisa Lan, Kaothar Zehar, Dong Pha Pham, Josue Charles, June Camille Ménard, Minhee KYOUNG

Theoretical framework

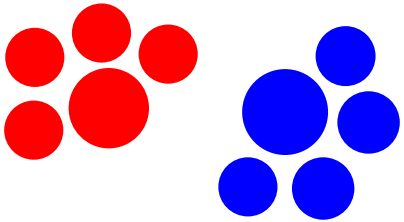
Echo Chamber → The political ideology of the subject and the consequent watching choices. Based on ideological affinity, are created by users (Dubois ’18).



Filter bubble → Direct effect of algorithmic personalization, based on the users’ behavior (Eli Pariser ’11).

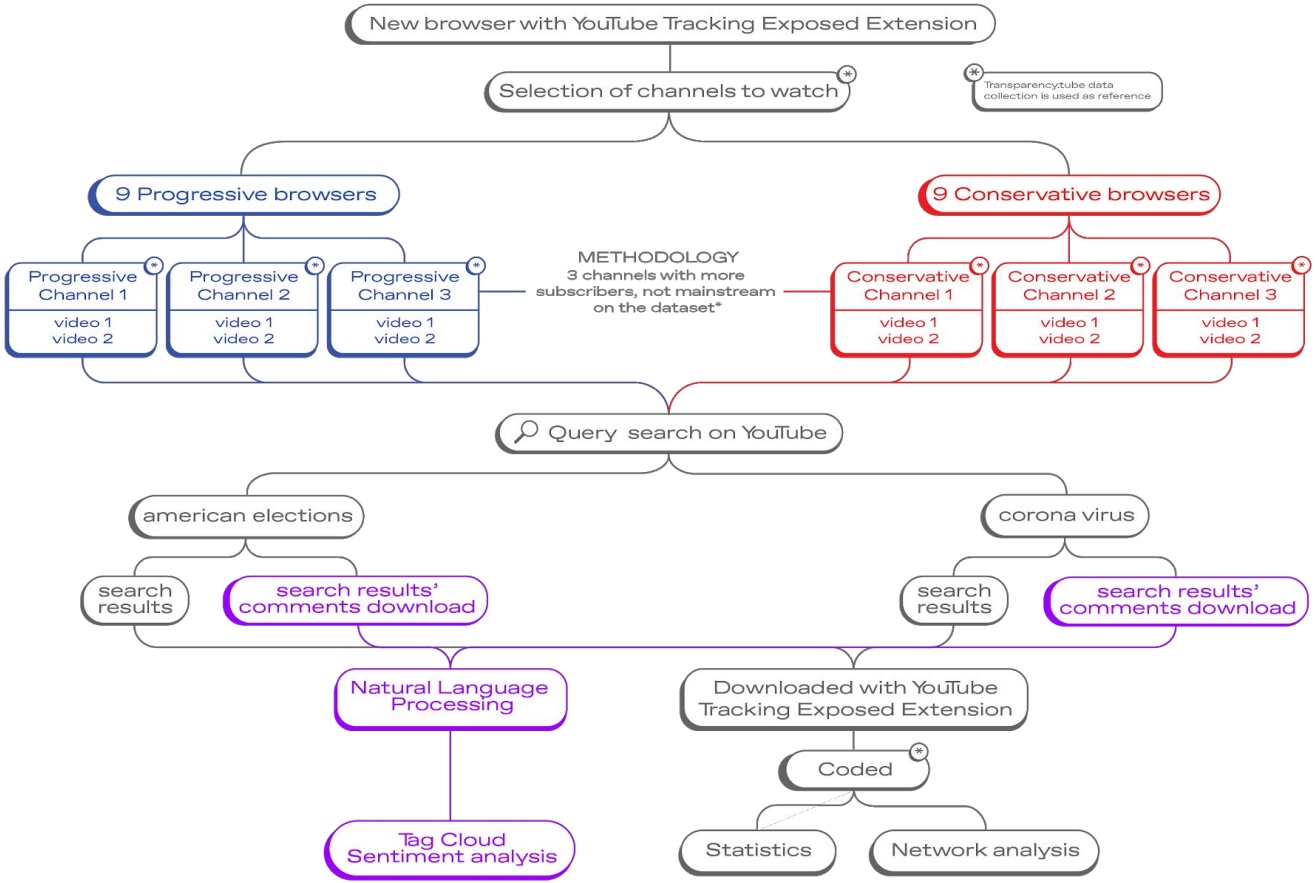


Polarization → Process of increased segregation into distinct social groups, separated along racial, economic, political, religious or other lines (Gallacher & Heerdink ‘19).



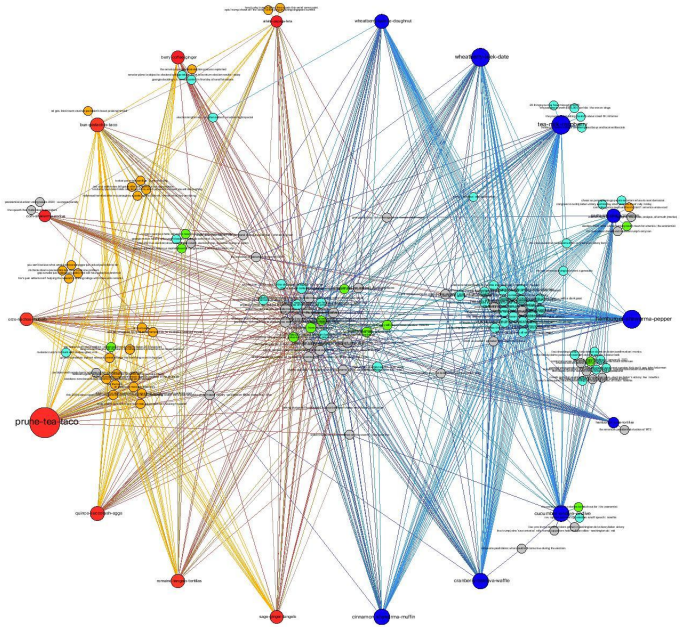
Methodology

[Transparency.tube]



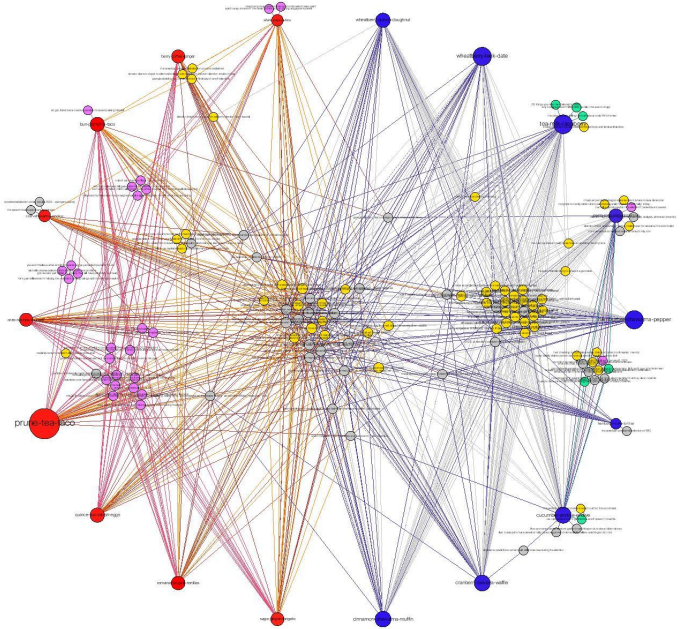
Search results according to *political orientation* and *media type*

AMERICAN ELECTIONS_TITLE_ORIENTATION_FIRST 20 TOP VIDEOS



BIDEN PSEUDO
TRUMP PSEUDO
LEFT
RIGHT
CENTER
UNCLASSIFIED CHANNEL

AMERICAN ELECTIONS_TITLE_MEDIA_FIRST 20 TOP VIDEOS



BIDEN PSEUDO
TRUMP PSEUDO
YOUTUBE
MAINSTREAM MEDIA
MISSING LINK MEDIA
UNCLASSIFIED

Heteronormativity and Pornography: an Algorithmic Analysis of PornHub

Ilir Rama, Lucia Bainotti, Alessandro Gandini, Giulia Giorgi, Silvia Semenzin, Claudio Agosti, Giulia Corona, Salvatore Romano

Popular pornographic websites are deemed to reinforce a male, white and heterosexual point of view, and thus contribute to foster hegemonic masculinity, the sexualization of minorities, and a heteronormative porn culture.

(Burke 2016. Fritz et al. 2020. Saunders 2020.)

Algorithms contribute to manage content visibility and can reiterate the gender bias coded into them, reifying a specific view of the world due to their social embeddedness.

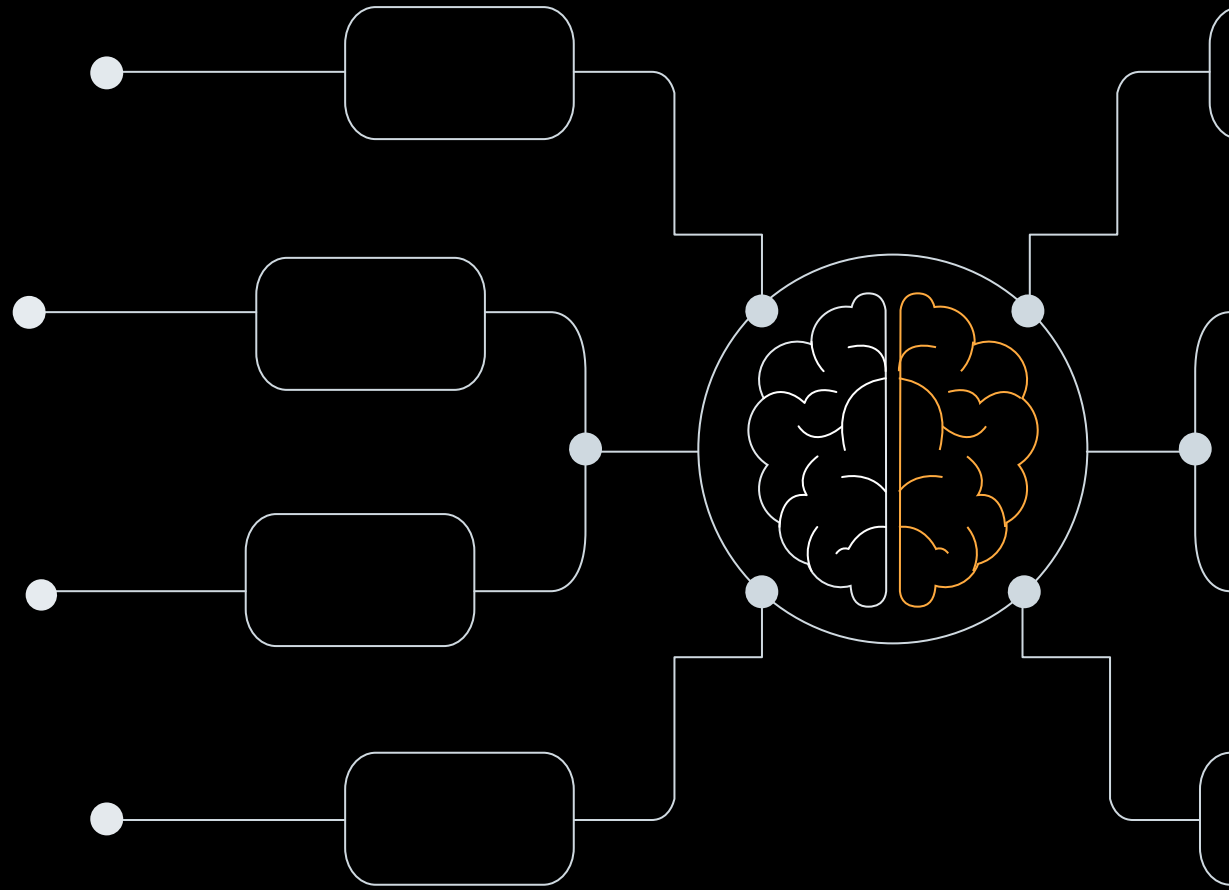
(Bucher 2012. Noble 2018)

Methodology

10 different profiles

20 homepages collected per day

1 week



Account sign-up choice:

How do you like it?

Tell us about yourself and what turns you on so we can provide you with the content that suits your tastes.

I am a:

None	Male	Female
Couple	Same Sex Couple (Female)	Same Sex Couple (Male)
Trans Woman	Trans Man	Other
Non-Binary		

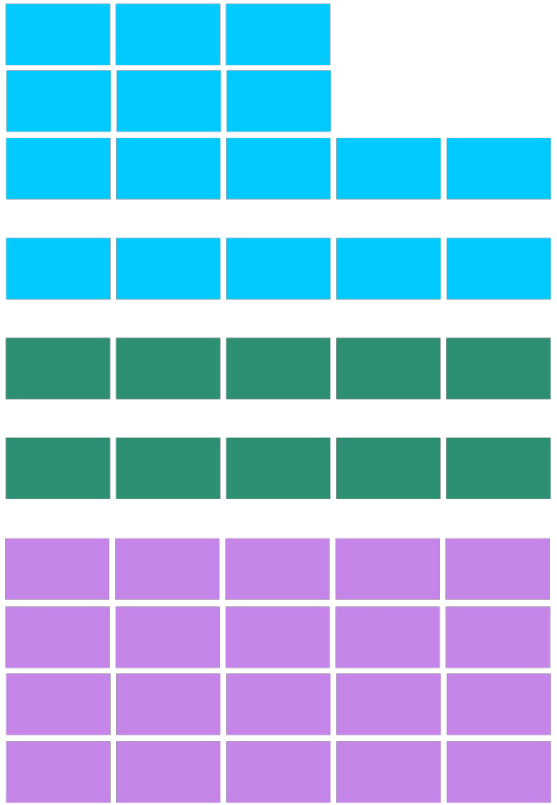
I like:

Girls	Guys	Guys and Girls

Pornhub NETWORK
Pornhub
HOME
VIDEOS

Homepage collection

Pornhub's Homepage



Sections

Hot Porn Videos in [Your Country]

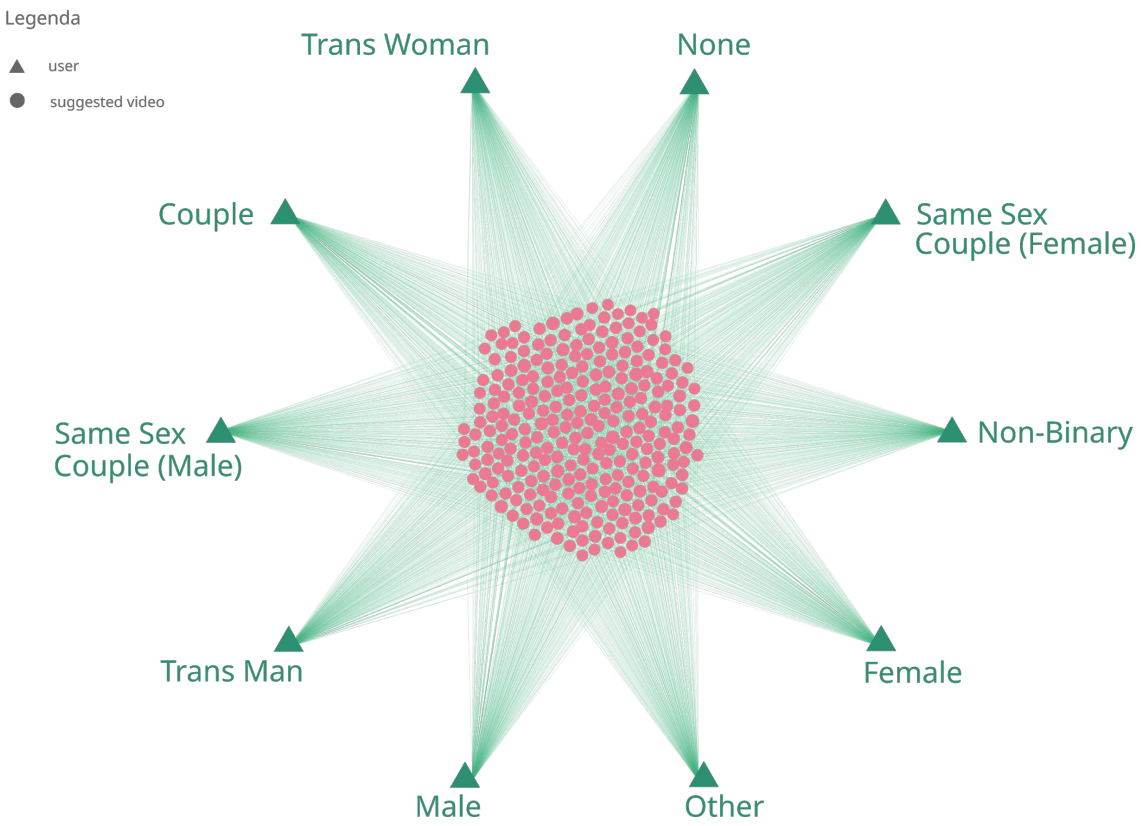
Most Viewed Videos in [Your Country]

Recommended for You

Recommended Category for You - [Category]

Recently Featured
XXX Videos

Shared sections

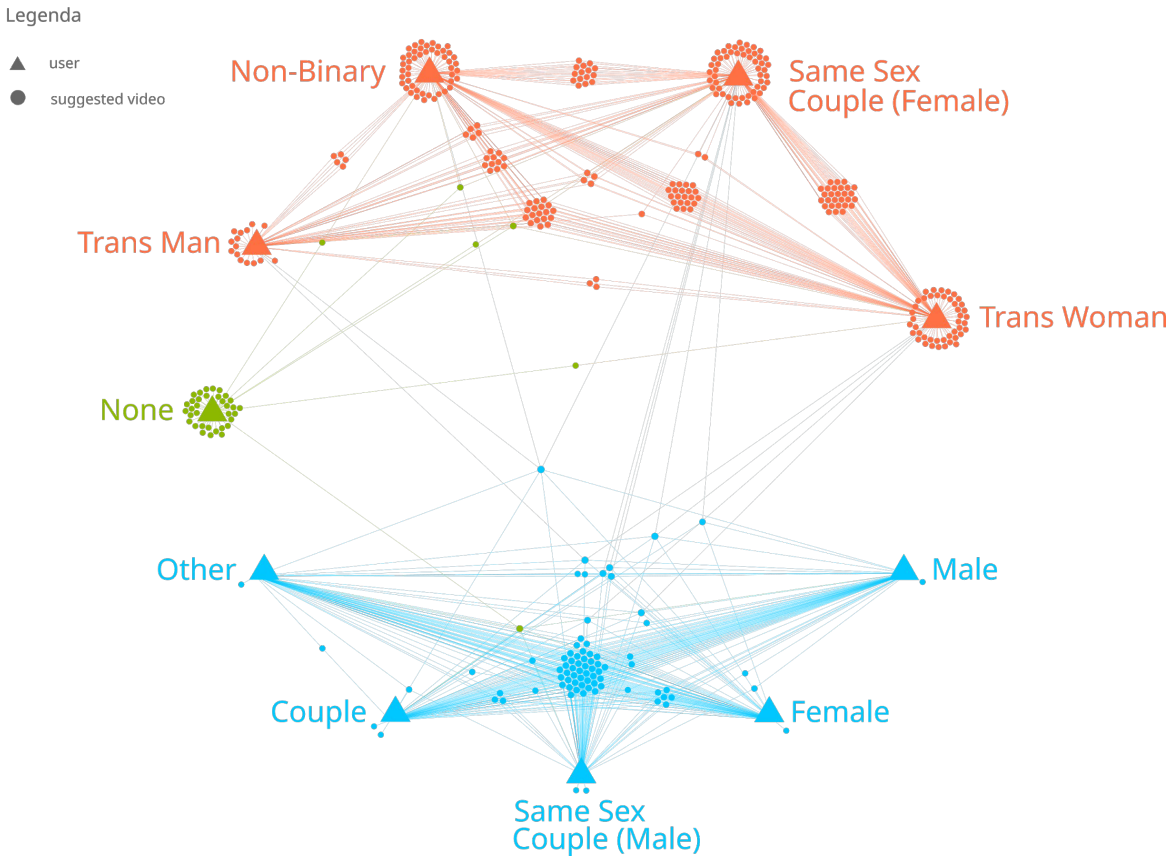


Videos suggested in shared sections:

- **Hot Porn Videos in Your Country**
- **Most Viewed Videos in Your Country**
- **Recently Featured XXX Videos**

All the users' profiles received the same videos.

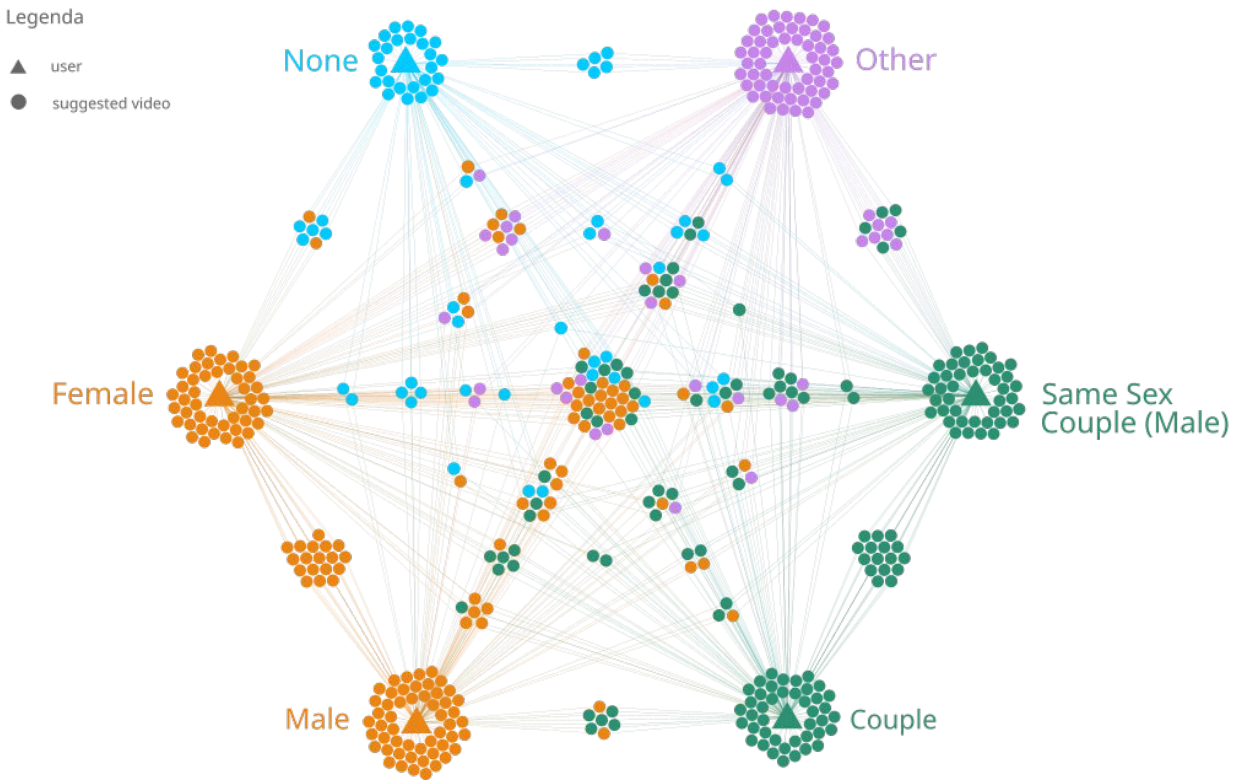
Recommended for you



Videos in **Recommended for You** based on users' profiles.

Two heteronormated clusters emerge clearly.
The gender *None* was the more divergent in personalization.

Recommended Category for you



Videos in **Recommended Category** for You based on users' profiles.

Not all the profiles had the Recommended Category for you section. Some clusters are still visible.

Conclusions

The lack of **awareness and empowerment** in internet users has a massive impact on their ability to truly benefit from digital innovation and often creates the **foundation for their exploitation**.

Conclusions

Those **bias** is not a technological problem, therefore the solution cannot be only technological. We have to deconstruct social **stereotypes** and their algorithmic expressions.

Tracking Exposed is just one of the **many steps** we need to take in order to create a way out of Surveillance Capitalism

Thank you!

info@tracking.exposed