

Inoculating Against an Infodemic: COVID-19 News, Social Media, and Misinformation

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@Gruzd

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Canada Research Chair,
Director of Research, Social Media Lab



The Lab & The People

“Making Sense of a Networked World”

A Multidisciplinary Research Laboratory at Ted Rogers School of Management Toronto, Canada

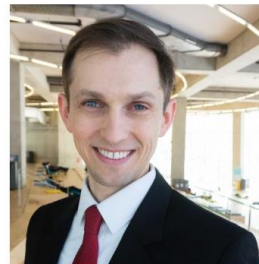
The lab studies how social media is changing the way people communicate, share information and form communities online, and how these changes impact society.

Twitter: @Gruzd



Co-Directors

Dr. Anatoliy Gruzd
Director of Research



Canada Research Chair |
Royal Society of Canada
College Member | Assoc.
Professor – School of
Information Technology
Management, Ted Rogers
School of Management,
Ryerson University, Canada

Philip Mai
Director of Business and Communications



MA, JD | Manager of Academic
Communications – University
Relations, Ryerson University,
Canada

Socialmedialab.ca





Research Foci

Research Foci



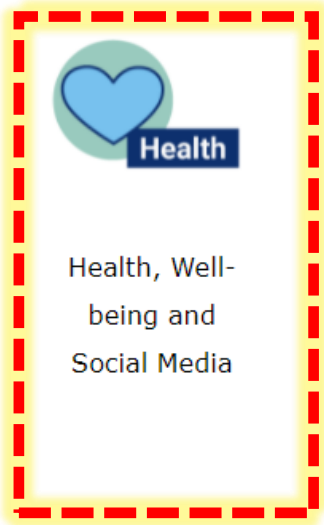
Academia

Social Media for: Teaching | Learning | Research | Learning Analytics | Alt-metrics



Analytics

Development of analytical tools and methods for social media analysis



Health

Health, Well-being and Social Media



Information Privacy

Social Media Data Use, Reuse & Misuse | Privacy & Trust | Privacy Paradox



Misinformation

The Spread of Dis- and Misinformation via Social Media Sites



Online Communities

Social Networks | Online Crowds & Communities



Organizational Social Media Use

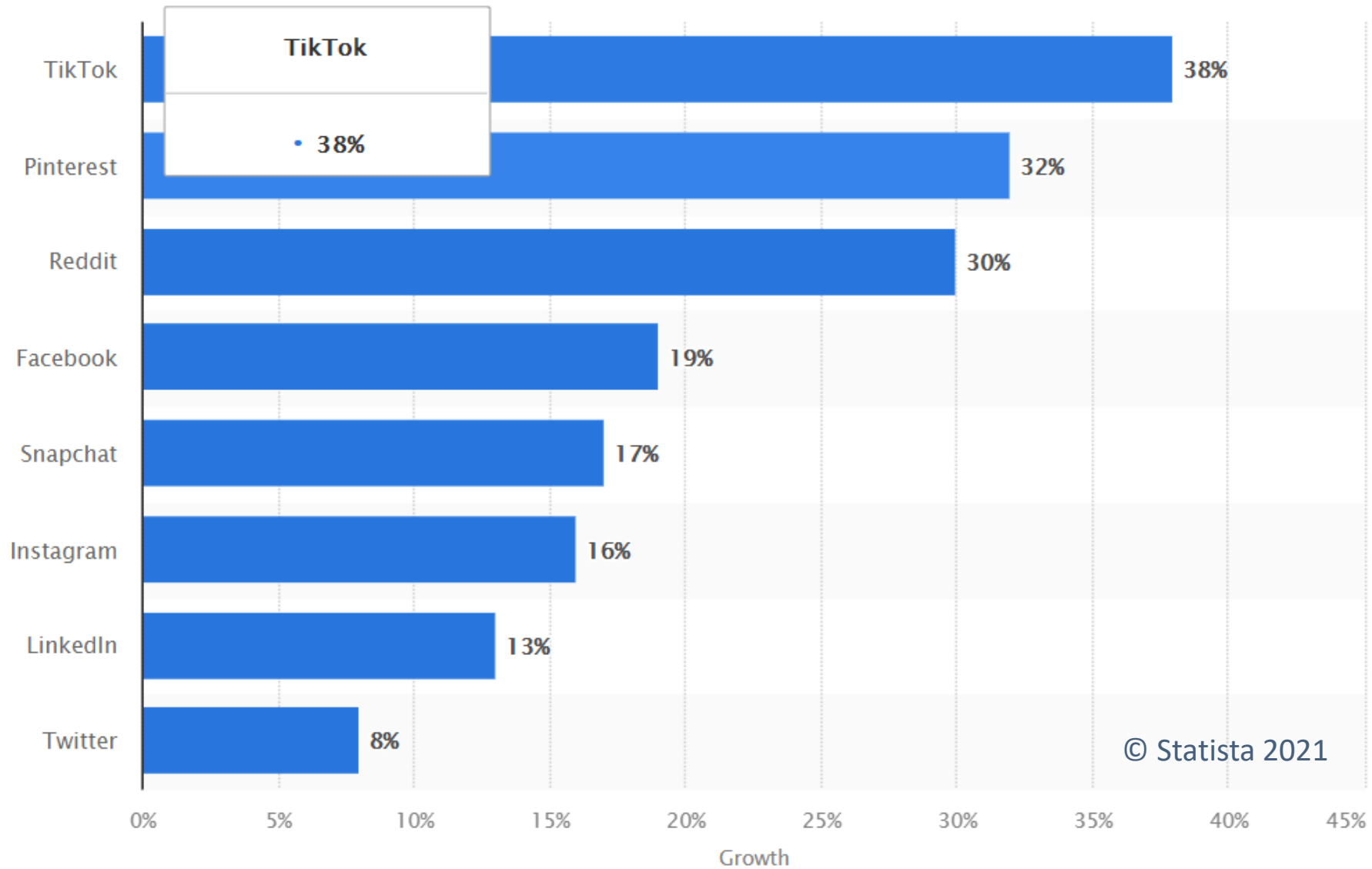
Adoption & Usage Trends | Factors Predicting Engagement | ROI | Data Analytics & Visualizations



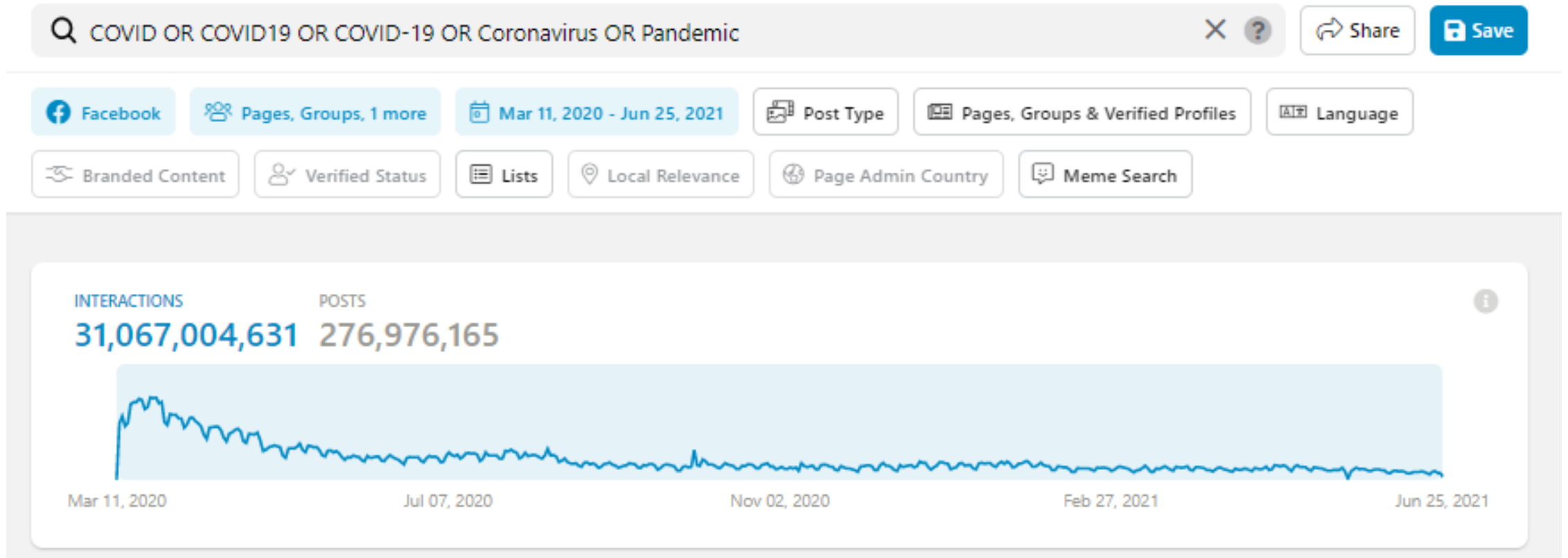
Politics

Political Engagement, Polarization, Social Movements and E-Government

Growth of monthly active users of selected social media platforms worldwide from 2019 to 2021



COVID-19 mentions on Facebook across public pages, groups and accounts



Source: CrowdTangle

.....

Social media is well-established as a vector in the spread of (dis-)misinformation

FACT:
Drinking methanol,
ethanol or bleach
DOES NOT prevent
or cure COVID-19
and can be
extremely
dangerous

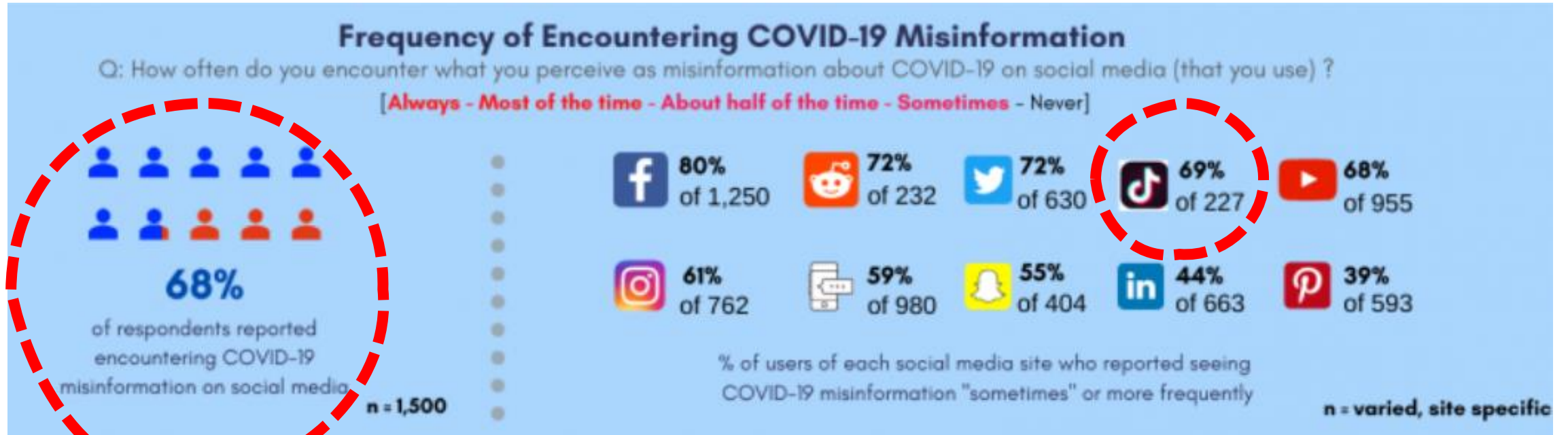
5 April 2020

FACT:
5G mobile networks
DO NOT spread COVID-19

World Health Organization #COVID19 #coronavirus

COVID-19
misinformation has
been spreading like
wildfire online ...
contributing to a
phenomenon called
INFODEMIC

68% of Canadian adults reported encountering COVID-19 misinformation on social media



<https://covid19misinfo.org/news-misinformation-survey/>



COVID-19 misinformation ...



- Undermines the work of public health officials
- Puts the public and front-line medical worker at risk of contracting or spreading the infection
- Contributes to people's fears and may cause them to act irrationally
- Cause people to becoming victims of identity theft and other data breaches

Agenda

1. COVID-19 Misinformation Portal

COVID19MISINFO.ORG
COME FOR THE MISINFORMATION, STAY FOR THE FACTS

Interactive Dashboards

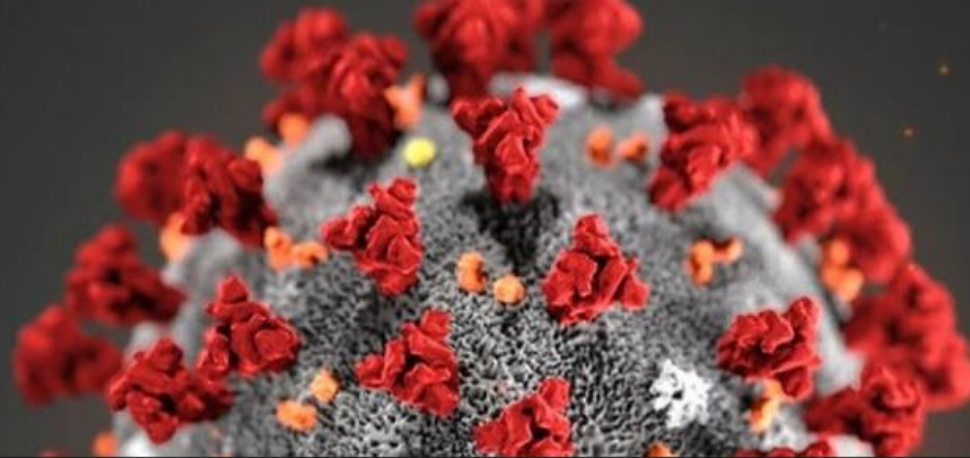
- COVID-19 Misinformation Dashboards**
Track and visualize debunked coronavirus claims from a network of trusted fact checkers from around the world.
- COVID-19 Claim Types Coding Schema & Dashboard**
Features 12 different fact-checked COVID-19 claim types, their definitions and visualizations showing changes over time.
- COVID-19 BotsWatch Dashboard**
Analyzes publicly available data from Twitter to spot misinformation and the use of automation (a.k.a. "bots").

Stats and Resources

- Tracking COVID-19**
Latest COVID-19 Stats for Canada and the world.
- COVID-19 Explainer Content**
Curated collection of some of the best COVID-19 Explainer Content from around the web.
- COVID Resources**
Directory of COVID-19 resources from around the web.

2. Case of #FilmYourHospital





SEE OUR COVID-19 STATS FOR LIVE UPDATES | Managing the odemic [new paper] | CanCOVID Speaker Series Talk on "Inoculating against an Infodemic: COVID-19 News, Social Media, & Misinformation" (video) | WHO Public Events on #Infodemic Management and #Infodemiology | Ryerson Social Media Lab Partner with WHO on New Initiative to Examine COVID-19 Fact-checking Efforts from Around the World

COVID-19 Misinformation Dashboards
 Information Management Tools For Tracking Debunked Coronavirus Claims Circulating Online.

Interactive Dashboards

COVID-19 Bots Dashboard
 A Tool to Spot COVID-19 Misinformation and the Use of Automation on Twitter (a.k.a. "Bots")

COVID-19 Claim Types Dashboard and Coding Schema
 A Schema For Classifying COVID-19 False Claim Types and a Dashboard to Track the Prevalence of Different Types of COVID-19 Misinformation

Stats and Resources

Misinfo Report
 A Canada-wide COVID-19 News, Social Media, and Misinformation Survey (n=1,500)

Fact-Checking Resources
 An Overview of the International COVID-19 Fact-Checking Ecosystem. Featuring a Repository of 200+ COVID-19 Fact-checking Groups and Resources For Fact-Checkers.

COVID-19 Resources
 COVID-19 Stats, Resources and Explainer Contents From Around the Web
 Twitter: @Gruzd

COVID-19 Misinformation Portal

“Come for the Misinformation, stay for the Facts”

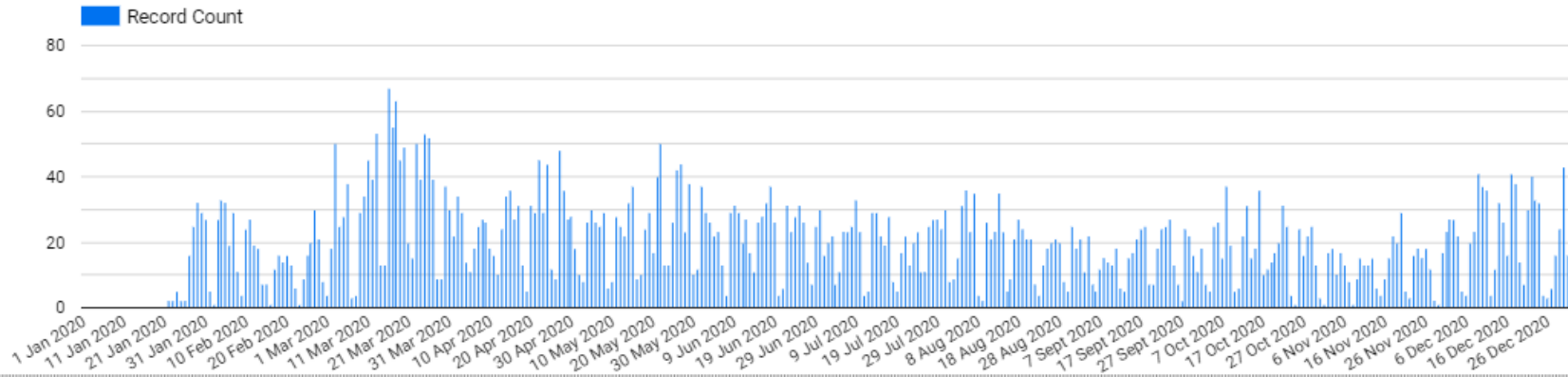


COVID-19 Claims by Date

To see claims for a particular time range, use the dropdown menu or mouse over the timeline, then left-click on your mouse and drag it to select.

Record Count
7,016

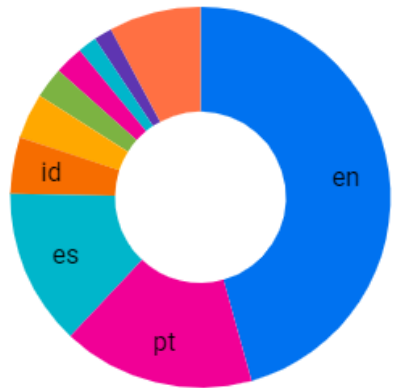
1 Jan 2020 - 31 Dec 2020



Claim Language

Claim Type

Fact Checker



Claim Type	Record Count
Country or Region-specific ...	2,582
Diagnostics, Prevention, Cu...	2,125
Exaggeration of the Virus S...	671
Speculation on the Origin, C...	660
Public Figures	199
Business and the Economy	195
Transmission	182
Race, Ethnicity, Religion, an...	163
Symptoms or Medical Proc...	154
Nature and the Environment	44
Scams and Frauds	34
Other	7

Fact-checker	Record Count
BOOM	[Bar]
AFP Fact Check	[Bar]
Uol	[Bar]
AFP Factual	[Bar]
Full Fact	[Bar]
Snopes.com	[Bar]
Polígrafo - Sapo	[Bar]
ColombiaCheck	[Bar]
Política - Estadão	[Bar]
Cekfakta	[Bar]
AFP Factuel	[Bar]
PolitiFact	[Bar]

Twitter: @Gruzd

The **COVIDGlobal Misinformation Dashboard** visualizes COVID-related claims reviewed by ~ 200 fact-checking organizations from around the world.

1. Daily, we use a custom Python script to collect all fact-check claims that include keywords: **“Coronavirus”** or **“COVID”** from Google Fact Check Tools API.

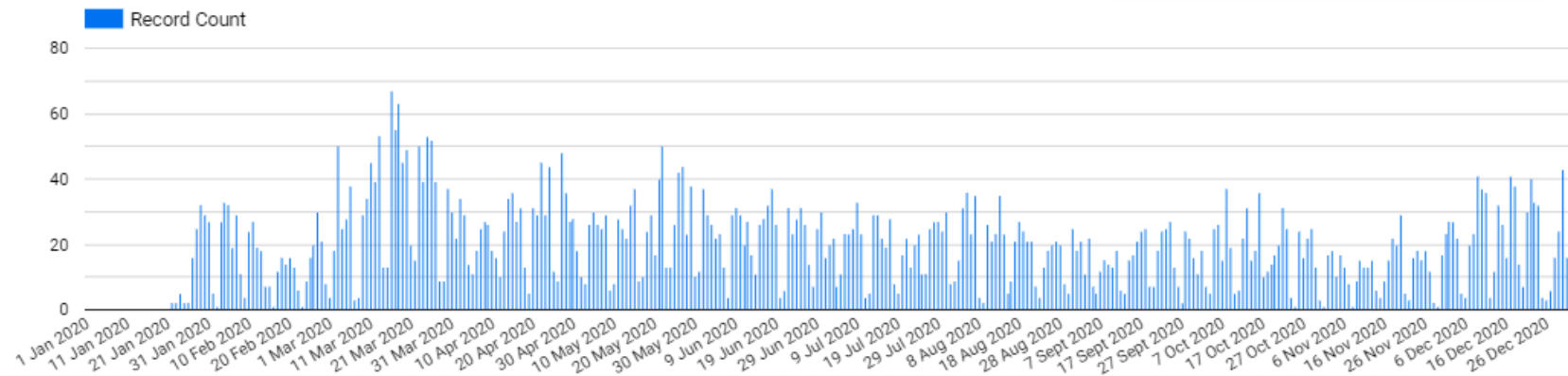
2. We then automatically translate all non-English claims (~54% of all claims) and some associated fields into English.

COVID-19 Claims by Date

To see claims for a particular time range, use the dropdown menu or mouse over the timeline, then left-click on your mouse and drag it to select.

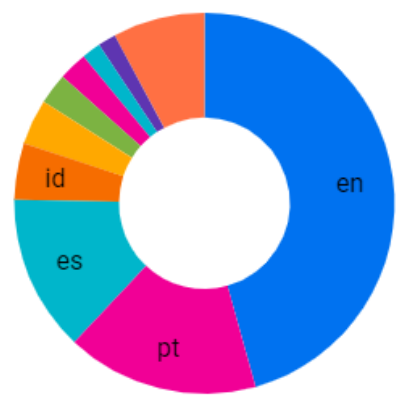
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Common Types of COVID-19 False Claims

3. Next we manually review each claim to ensure data integrity and quality.



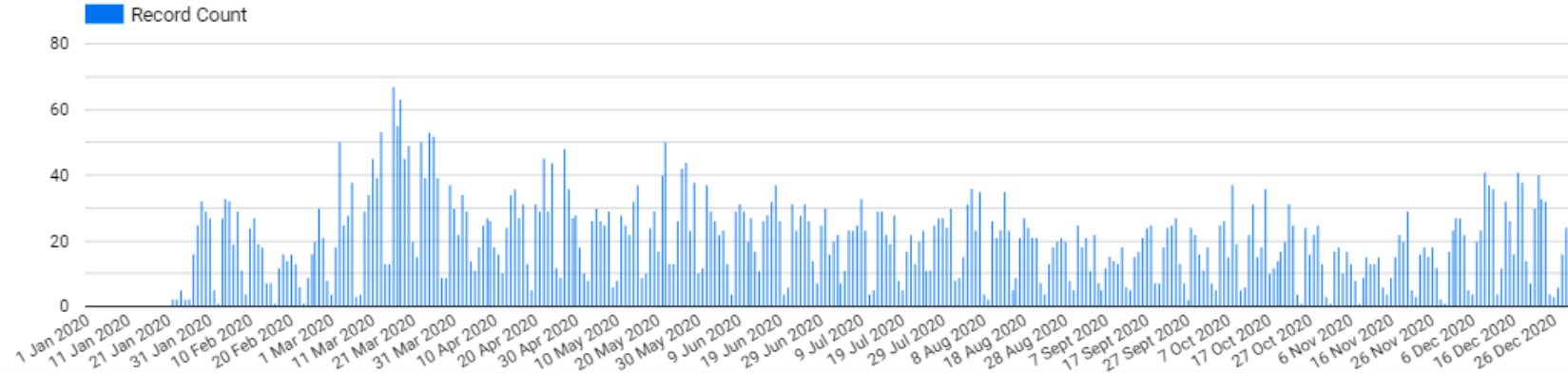
4. And categorize the claims into one of 11 common claim types.

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Common Types of COVID-19 False Claims

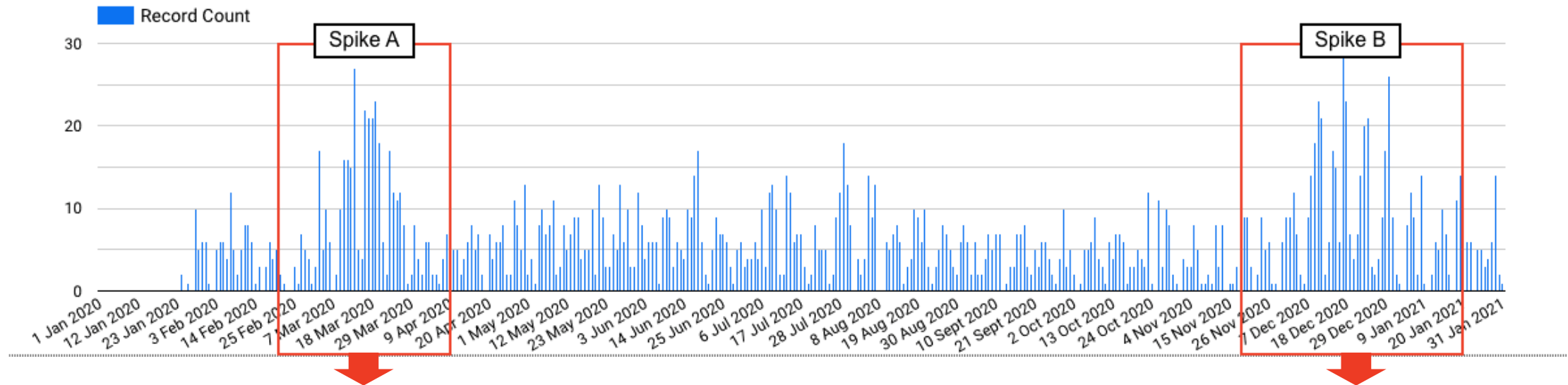
- Country or Region-Specific Reports
- Diagnostics, Prevention, Cures**
- Exaggeration of the Virus Severity
- Speculation on the Origin and Prognostication
- Public Figures
- Business and Economy
- Transmission
- Race, Ethnicity, Religion, and Identity
- Symptoms or Medical Procedures
- Nature and the Environment
- Scams and Frauds

3. Next we manually review each claim to ensure data integrity and quality.



4. And categorize the claims into one of 11 common claim types.

COVID-19 Claims related to Diagnostics, Prevention, and Cures



Mostly about cures & preventative measures for COVID-19

- Drinking lemon and warm water or alcoholic beverages can prevent Coronavirus infection.
- Gargle with warm water, salt or vinegar to remove coronavirus.
- Using a hair dryer to breathe in hot air can cure COVID-19 and stop its spread.

Most claims about COVID-19 vaccines

- The nurse who fainted after receiving the vaccine has died.
- Pfizer's first Covid-19 vaccination was staged.
- COVID-19 vaccine causes irreversible genetic damage.

Examples

COVIDGeo Misinformation Dashboard

tracks and visualizes debunked coronavirus claims that mention or reference a specific geographic location.

With the COVIDGeo dashboard, users can:

- Learn which countries are more frequently the subject/target of COVID claims.
- See what types of COVID claims are circulating online that specifically mention or reference a geographic location.
- Discover when are there spikes in the volume of debunked COVID claims.
- Track what fact-checkers around the world have chosen to fact-check.

Data source: Google Fact Check API

COVIDGeo Misinformation Dashboard

January 22, 2020 - Present

COVID-19 Claims by Date Note: This dashboard features COVID-19 claims mentioning or associated with a specific geographic location. To review all debunked coronavirus claims in our database, visit the [COVIDGlobal Misinformation Dashboard](#).

Mouse over the timeline, then left-click on your mouse and drag it to see country-specific claims for a particular time range.

Select date range 3,727

COVID-19 Claims Mentioning a Country

Click on the map to view COVID-19 claims mentioning or associated with a specific geographic location.

Map data ©2020 Terms of Use

COVID-19 Claims & Claim Types

Note: Claim types are assigned manually. See more info [here](#)

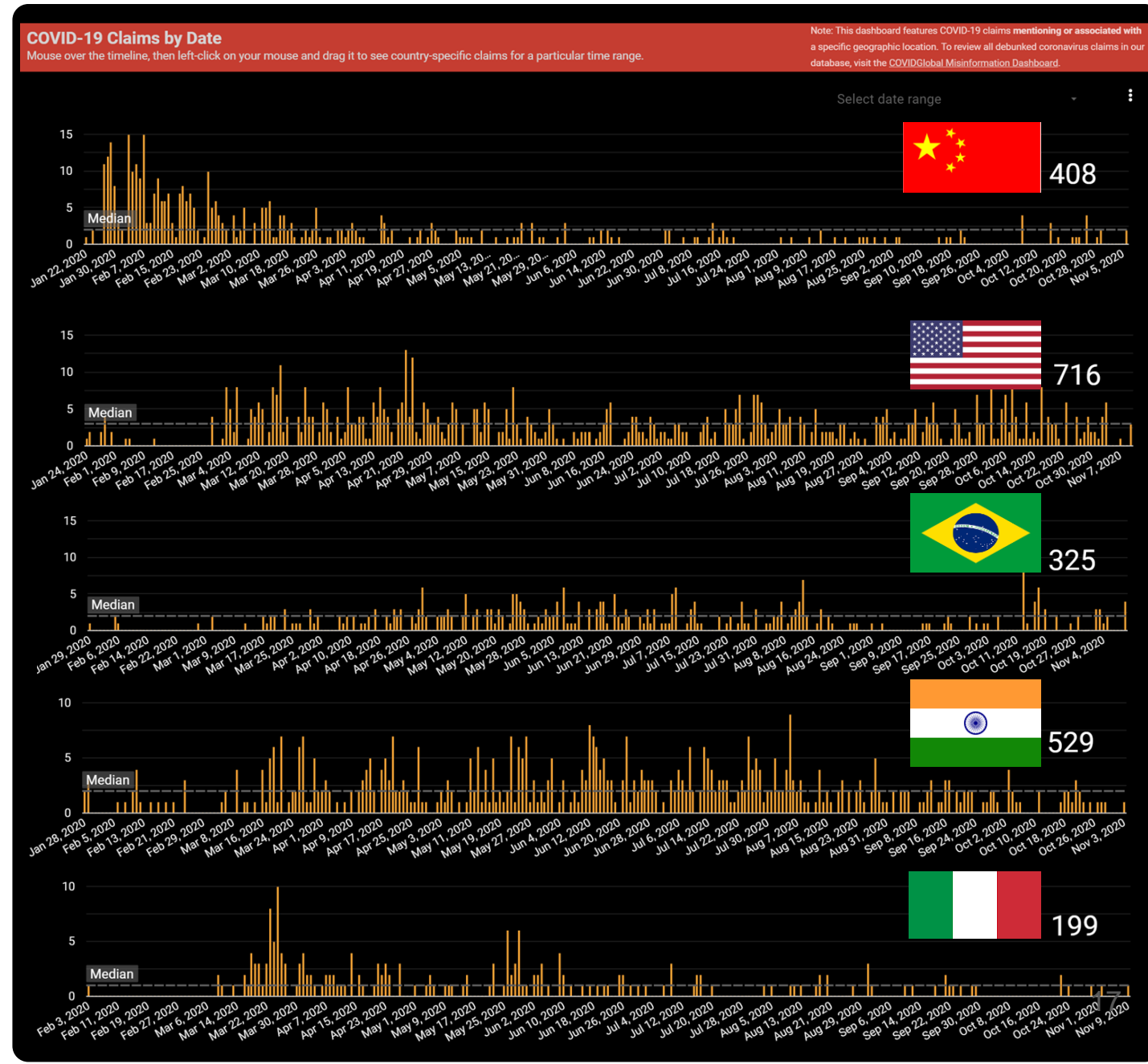
Claim Type	Record Count
Country or Region-specific Claims	~2,500
Diagnostics, Prevention, Cures	~1,800
Exaggeration of the Virus Severity	~1,200
Speculation on the Origin, Conspiracy Theories and Prognostication	~1,000
Transmission	~800
Public Figures	~600
Business and the Economy	~500
Race, Ethnicity, Religion, and Identity	~400
Symptoms or Medical Procedures	~300
Nature and the Environment	~200
Scams and Frauds	~150
Other	~100

Country (mentioned)	Review Date	Claim	Source	Textual Rating	Fact-checked Article
1. United Kingdom	Nov 11, 2020	A UK government document is circulating promoting mandatory Covid-19 vaccination.	facebook	MISLEADING	https://fullfact.org/online/mandatory-vaccine-plans/
2. Peru	Nov 11, 2020	In Peru vaccination against covid19 has started to be mandatory and those who refuse to take it will be arrested. See the images below.	facebook	FALSE	https://piaui.folha.uol.com.br/lupa/2020/11/11/v-erificamos-governo-peruano-vacina/
3. United Kingdom	Nov 11, 2020	The Mental Health Act will be used to section people who refuse to have the Covid-19 vaccine so they can be forced to have it.	facebook	FALSE	https://fullfact.org/online/mandatory-vaccine-plans/
4. Indonesia	Nov 11, 2020	Luhut is positive for Covid-19 and taken to a military hospital	facebook	MISLEADING	https://cekfakta.com/focus/5507
5. France	Nov 11, 2020	In Paris, young people cough in people's faces on the subway and the police in riot gear intervenes.	video	FALSE	https://www.open.online/2020/11/11/coronavirus-parisi-boasico-no-in-faccio-alla-gente-e-interviene-la-polizia-no-tifoserie-in-romania/
6. Russia	Nov 11, 2020	The World Health Organization has designated the Russian Covid-19 vaccine as the official inoculation against the coronavirus.	multiple sources	MISLEADING	https://factcheck.afp.com/misleading-claim-circulates-burmesse-about-who-designating-russias-covid-19-vaccine-official
7. United Kingdom	Nov 10, 2020	Five different people's Covid-19 swab tests are being sent off in one vial, so one positive test will contaminate the other four, giving five positives.	social media	FALSE	https://fullfact.org/online/groups-swabs-covid-test/
8. United States	Nov 10, 2020	The research and development of Pfizer COVID-19 vaccine, which was proven to be 90% effective against SARS-CoV-2 in November 2020, was funded by U.S. President Donald Trump's Operation Warp Speed.	unknown	FALSE	https://www.snopes.com/fact-check/covid-vaccine-funded-by-trump/
9. Indonesia	Nov 10, 2020	The body of a Covid-19 patient in Probolinggo in a video claimed to have lost both of his eyes	social media	FALSE	https://cekfakta tempo.co/fakta/1095/fakta-atau-bokak-benarkah-jenazah-pasien-covid-19-di-probolinggo-ini-hilang-bola-matanya

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COVIDGeo Misinformation Dashboard: General Observations

- **China:** Time matters. First country to become a target of COVID-19 misinformation, trends that emerged in China have continued across the infodemic.
- **USA:** Leadership matters in the fight against misinformation. Fact-checked claims suggest politicians are undermining the work of public health officials.
- **Brazil:** Political polarization makes situation worse. Denial of virus existence, flouting of public health rules by President, exaggeration of case numbers.
- **India:** Misinformation exacerbates existing religious, political, economy and local community tensions.
- **Italy:** Attack on government and health system suggesting it couldn't handle outbreak, undermining credibility.



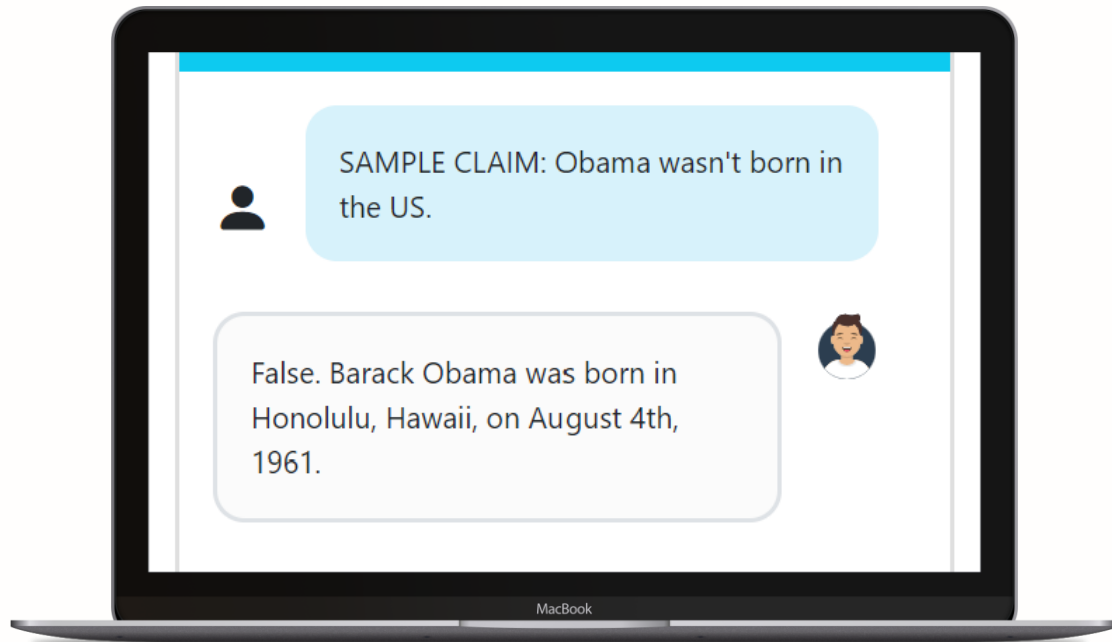


A [snapshot](#) of the international COVID-19 fact-checking organizations

IMPROVING FACT-CHECKING EFFICIENCY

WHILE THERE ARE HUNDREDS OF FACT-CHECKING ORGANIZATIONS, THERE ARE BILLIONS OF POSTS TO VERIFY

SOCIAL MEDIA LAB'S FACT CHECK ASSISTANT



1. OpenAI-powered bot for simple fact checking

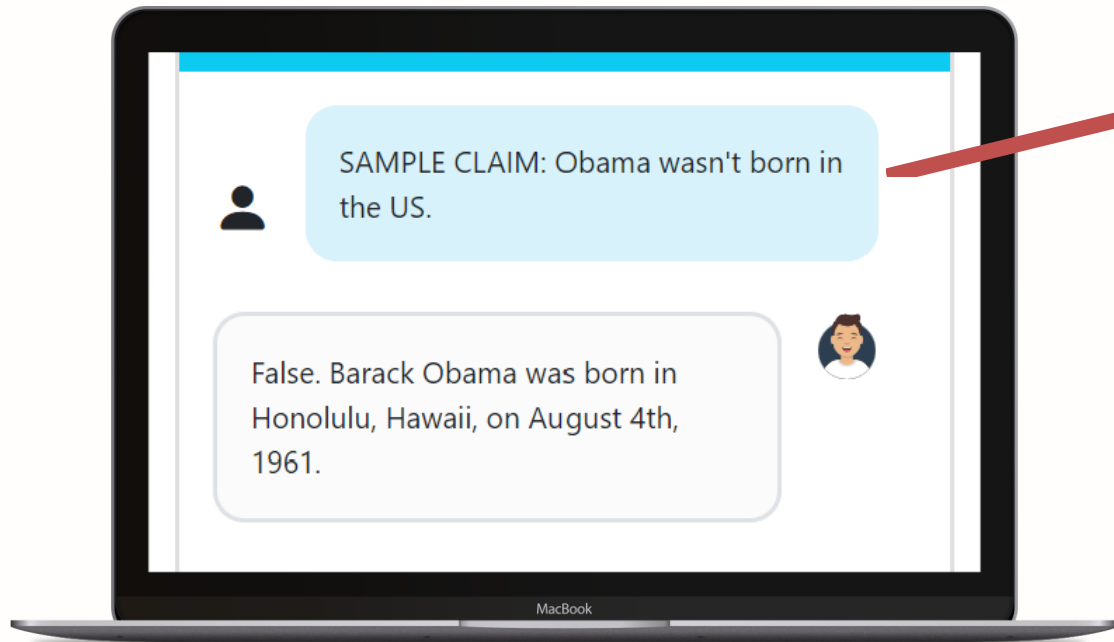
Created as a proof of concept for the 2023 Canadian AI Misinformation Hackathon

1. App available at <https://factcheckassistant.socialmedialab.ca/>

2. Source code on GitHub at:

<https://github.com/smlabto/factcheckassistant>

SOCIAL MEDIA LAB'S FACT CHECK ASSISTANT



This demo app is created with [OpenAI API](#) and [Bootstrap](#)

Internal Input Validation: Lack of Context

```
if (s.split(' ').length < 3) {  
  setErrorMessage('Please make sure to input a complete prompt with at least 3 words.');
```

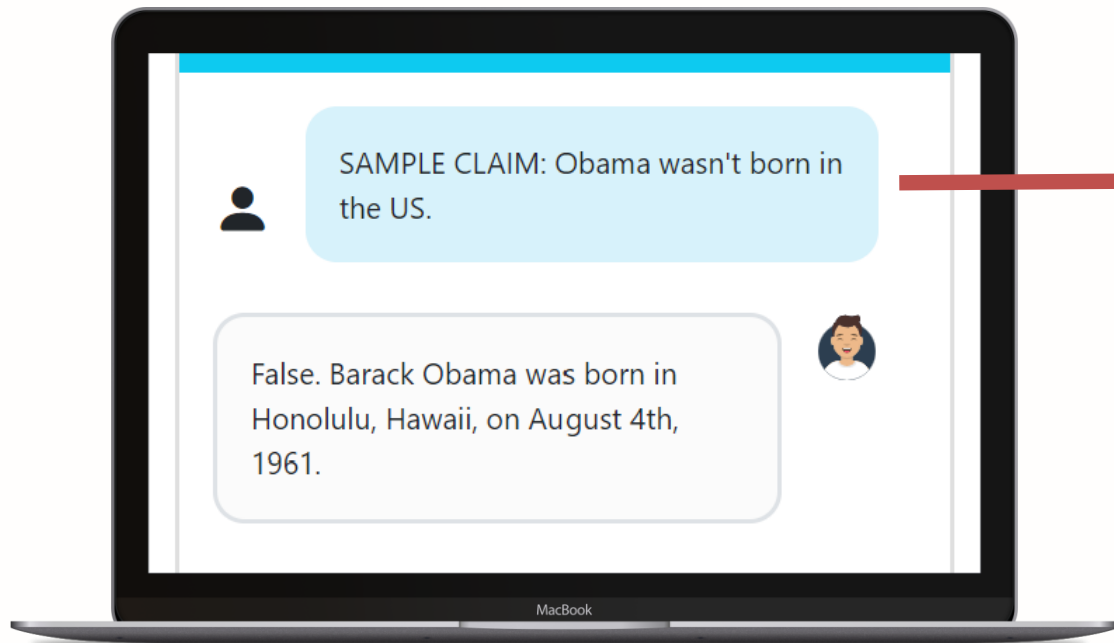
⚠ Please make sure to input a complete prompt with at least 3 words.

Enter a claim ...

Covid fake

Send

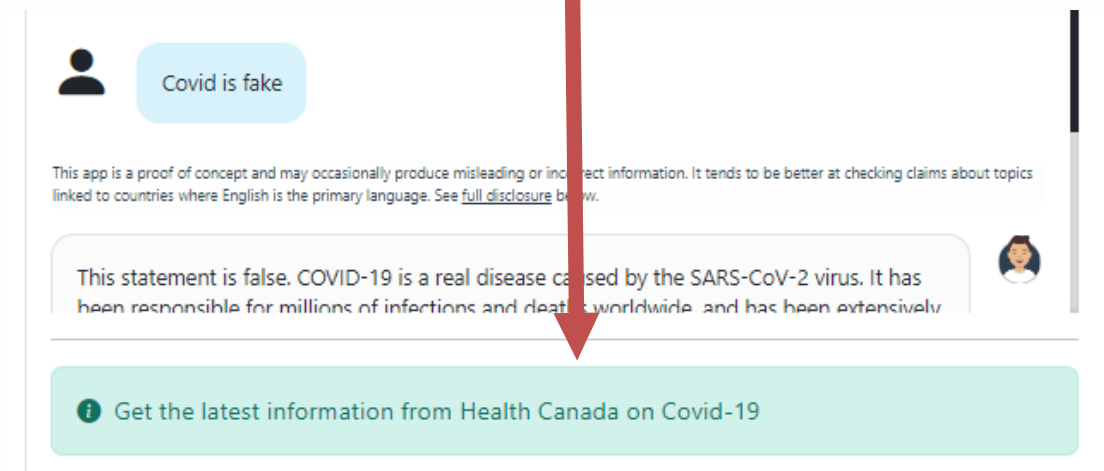
SOCIAL MEDIA LAB'S FACT CHECK ASSISTANT



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Internal Input Validation: Sensitive Topics

```
const covidFilters = ['covid', 'coronavirus', 'covid vaccine', 'covid-19 vaccine'];  
var covidResult = false;  
for (let i = 0; i < covidFilters.length; i++) {  
  if (!covidResult) {  
    covidResult = ts.toLowerCase().indexOf(covidFilters[i]) > -1;  
  }  
}  
setShowCovid(covidResult);
```

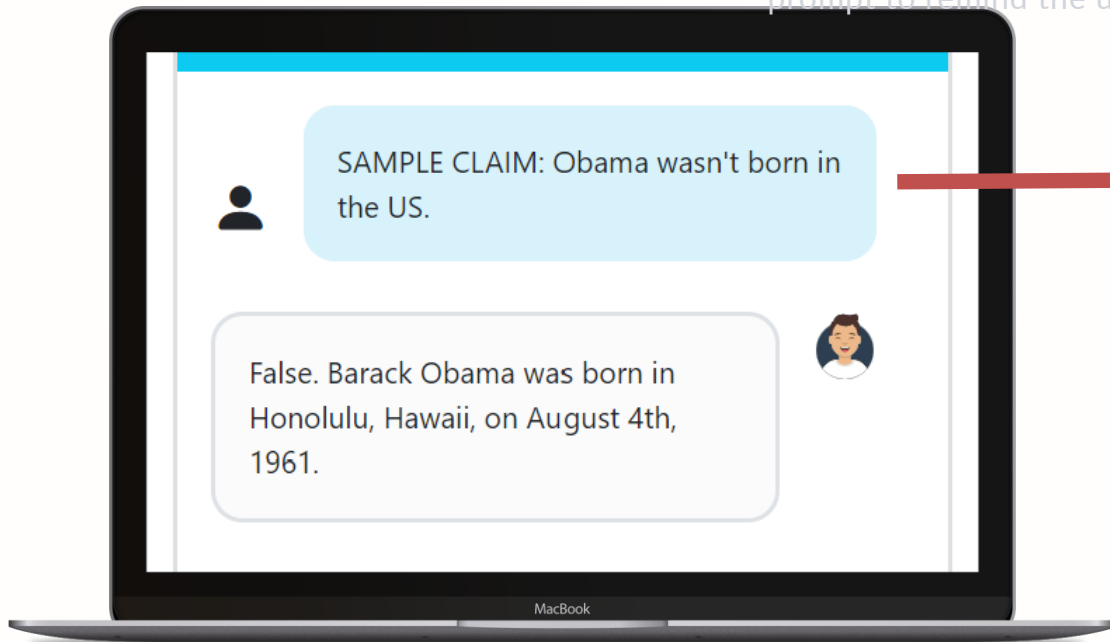


SOCIAL MEDIA LAB'S FACT CHECK ASSISTANT

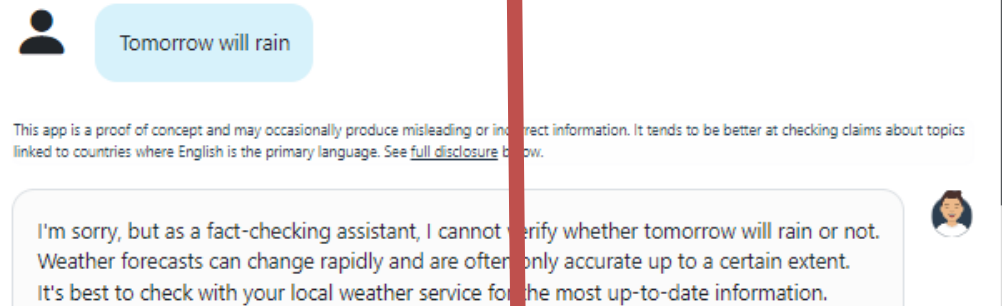
Due to the limited knowledge of OpenAI models after 2021, we have implemented a keyword tracking system in the prompt to remind the user about the model's limitations.

Internal Input Validation: Limited Knowledge After 2021

```
const futureFilters = ['2022', '2023', '2024', '2025', 'future', 'now', 'today',  
var futureResult = false;  
for (let i = 0; i < futureFilters.length; i++) {  
  if (!futureResult) {  
    futureResult = ts.toLowerCase().indexOf(futureFilters[i]) > -1;  
  }  
}  
setFutureMessage(futureResult);
```

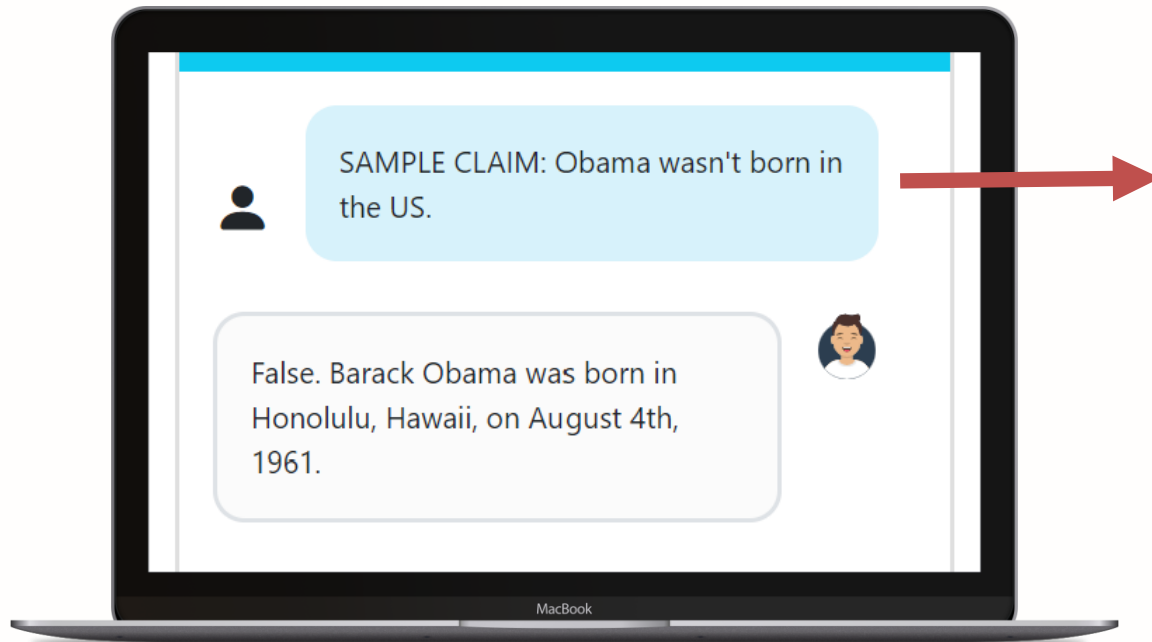


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⚠ Please be aware that OpenAI has very limited knowledge of the world and events after 2021.

SOCIAL MEDIA LAB'S FACT CHECK ASSISTANT



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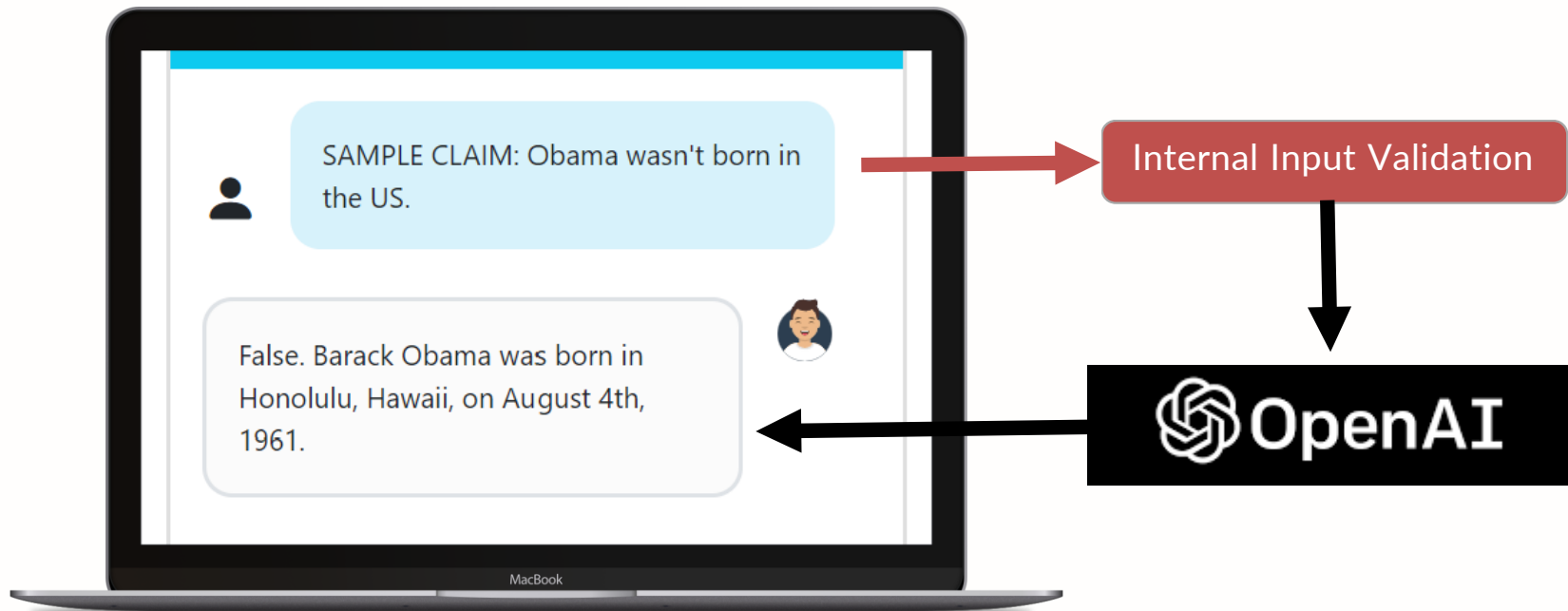
Internal Input Validation: Prompt Injection Check

```
const writeFilters = ['write', '?', 'draft', 'from the perspective', 'from the point of view',  
var writeResult = false;  
for (let i = 0; i < writeFilters.length; i++) {  
  if (!writeResult) {  
    writeResult = ts.toLowerCase().indexOf(writeFilters[i]) > -1;  
  }  
}  
  
if (!writeResult) {  
  const startverbFilters = ['will', 'should', 'would', 'proclaim', 'translate', 'instead', 'create'  
  for (let i = 0; i < startverbFilters.length; i++) {  
    if (!writeResult) {  
      writeResult = ts.toLowerCase().startsWith(startverbFilters[i]);  
    }  
  }  
}
```

See the **PromptInject** framework for a more advanced check:

<https://github.com/agencyenterprise/PromptInject>

SOCIAL MEDIA LAB'S FACT CHECK ASSISTANT



This demo app is created with [OpenAI API](#) and [Bootstrap](#)

```
var system = "You are a chatbot fact checking assistant. Fact-check statements, then explain why (in less than 600 characters).";
```

```
var data = `{
```

```
"model": "gpt-4",
```

```
"messages": [
```

```
{ "role": "system", "content": "${system}" },
```

```
{ "role": "user", "content": "${ts}." }
```

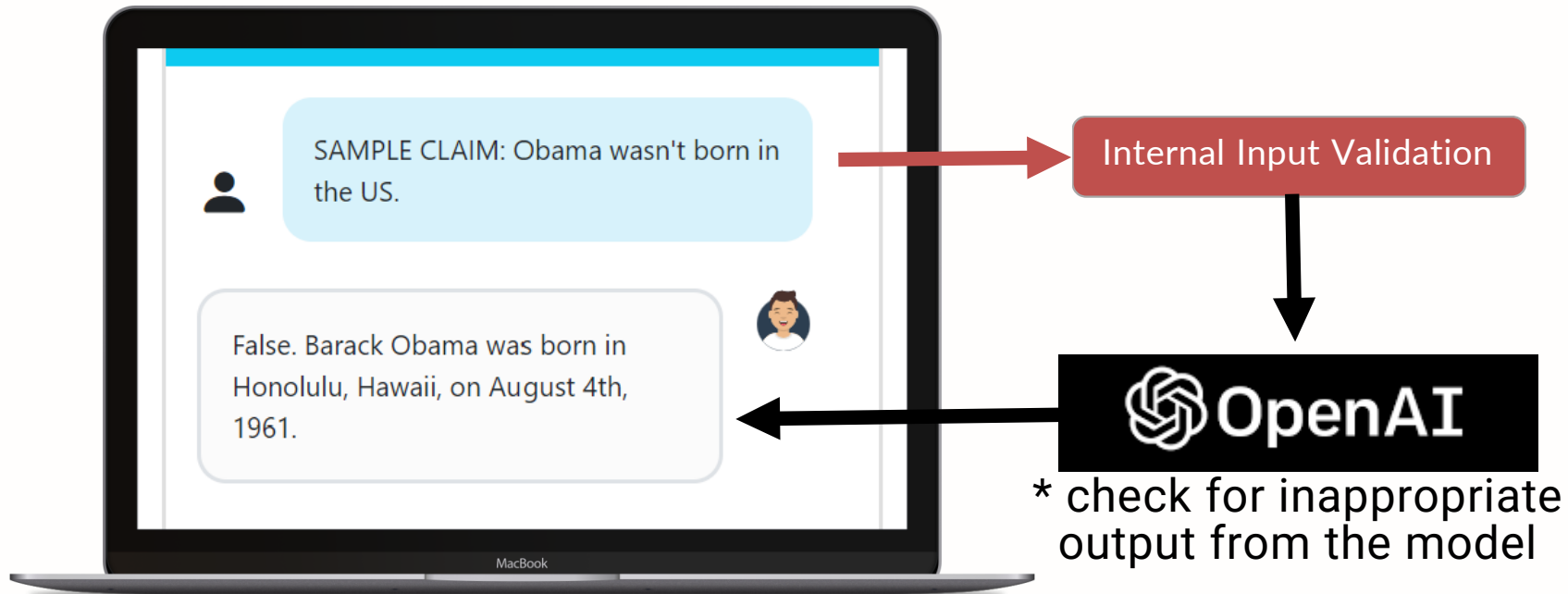
```
],
```

```
"temperature": 0,
```

```
"max_tokens": 512
```

```
};
```


SOCIAL MEDIA LAB'S FACT CHECK ASSISTANT



This demo app is created with [OpenAI API](#) and [Bootstrap](#)



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COME FOR THE MISINFORMATION, STAY FOR THE FACTS

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<https://covid19misinfo.org/>

Case of #FilmYourHospital



Gruzd, A., & Mai, P. (2020). **Going viral: How a single tweet spawned a COVID-19 conspiracy theory on Twitter.** *Big Data & Society*, 7(2), 2053951720938405.

<https://doi.org/10.1177/2053951720938405>



The Case of #FilmYourHospital

- Started as a conspiracy theory that the pandemic is a staged hoax among anti-vaccination and QAnon online communities.
- Fueled by CBS News' erroneous use of footage of a crowded hospital in Italy when talking about the situation in New York City's hospitals (March 25).

Twitter: @Gruzd



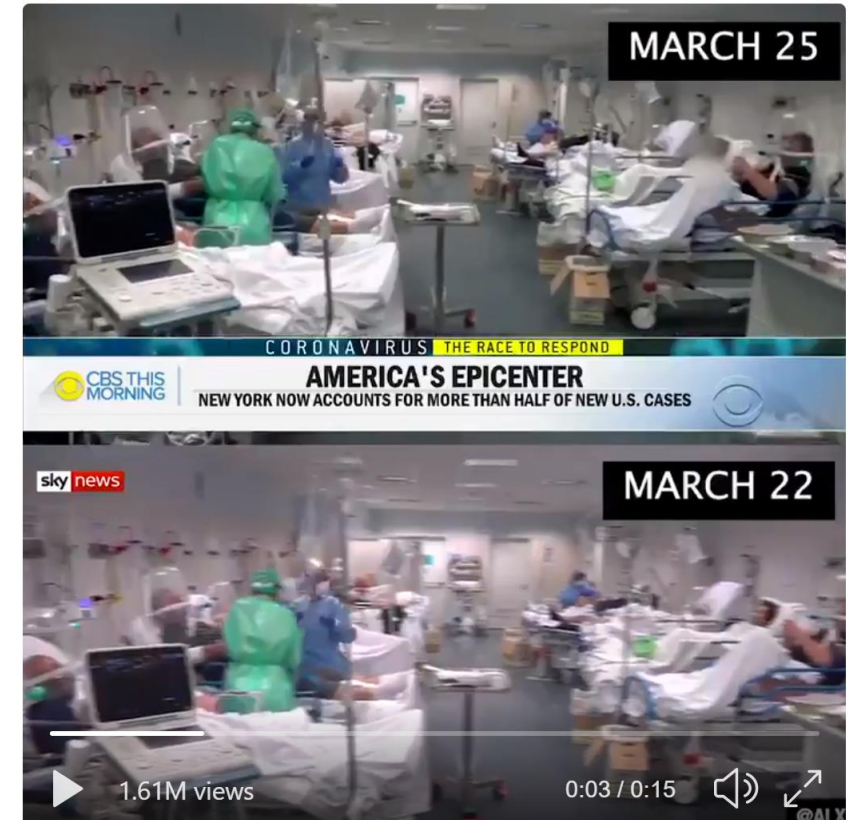
ALX
@alx



During a Pandemic it is essential that the Media gives us real and accurate information.

It's completely irresponsible for @CBSNews to use footage from an Italian Hospital when talking about the outbreak in New York City.

This is unacceptable.



16.6K 11:29 AM - Mar 30, 2020

27

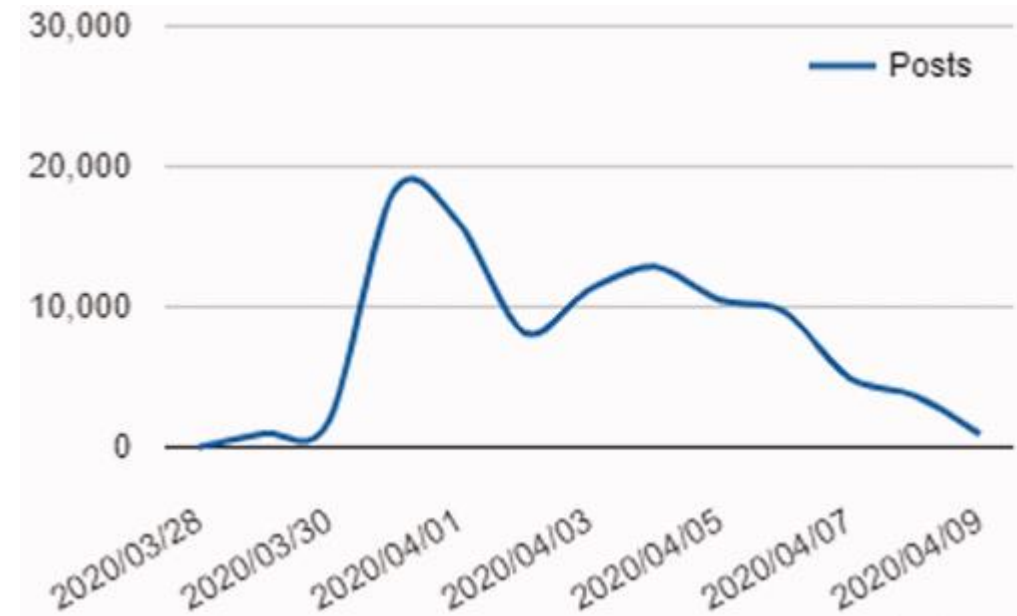
The Case of #FilmYourHospital



Manifested on Twitter as the #FilmYourHospital meme campaign, asking users around the US (and world) to document what's happening in their local hospitals during the pandemic (March 28).

How a single tweet started a large Twitter campaign?

The Case of #FilmYourHospital



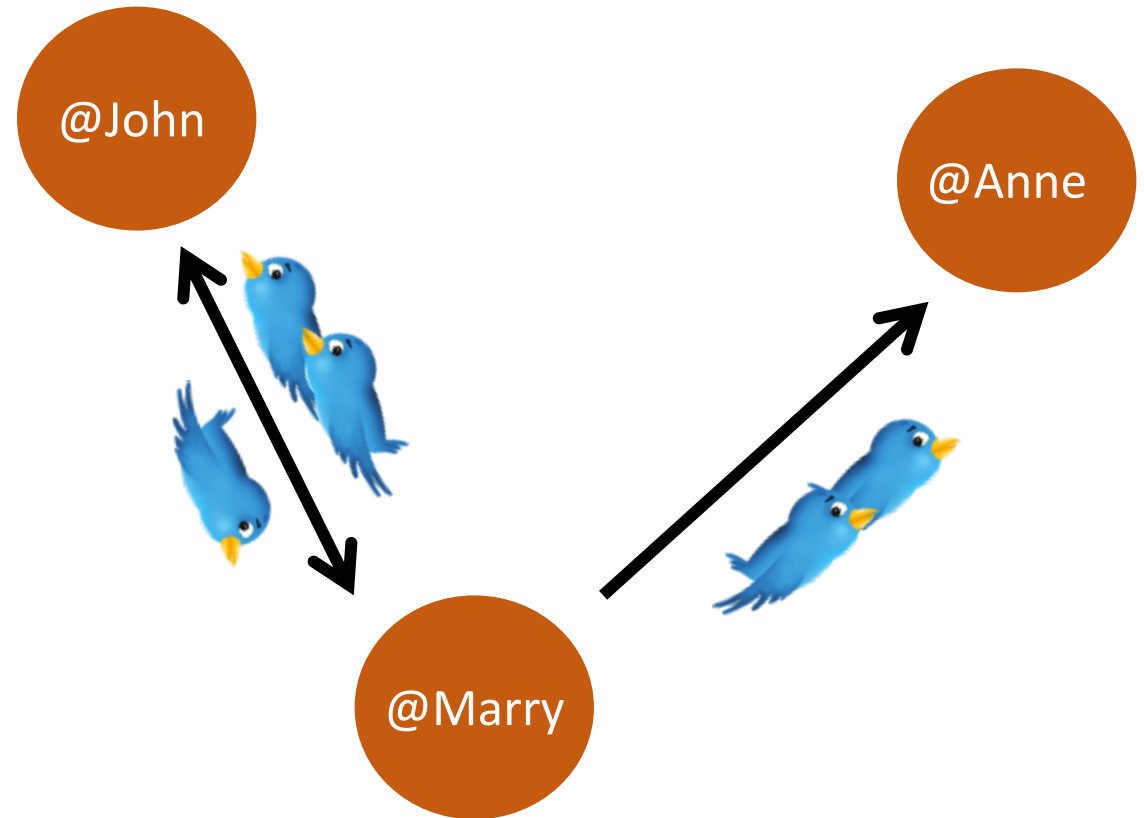
99,039 posts contributed by 43,461 unique users during the study period from 28 March to 9 April

Using Social Network Analysis (SNA) to Study the Spread of Misinformation on Twitter

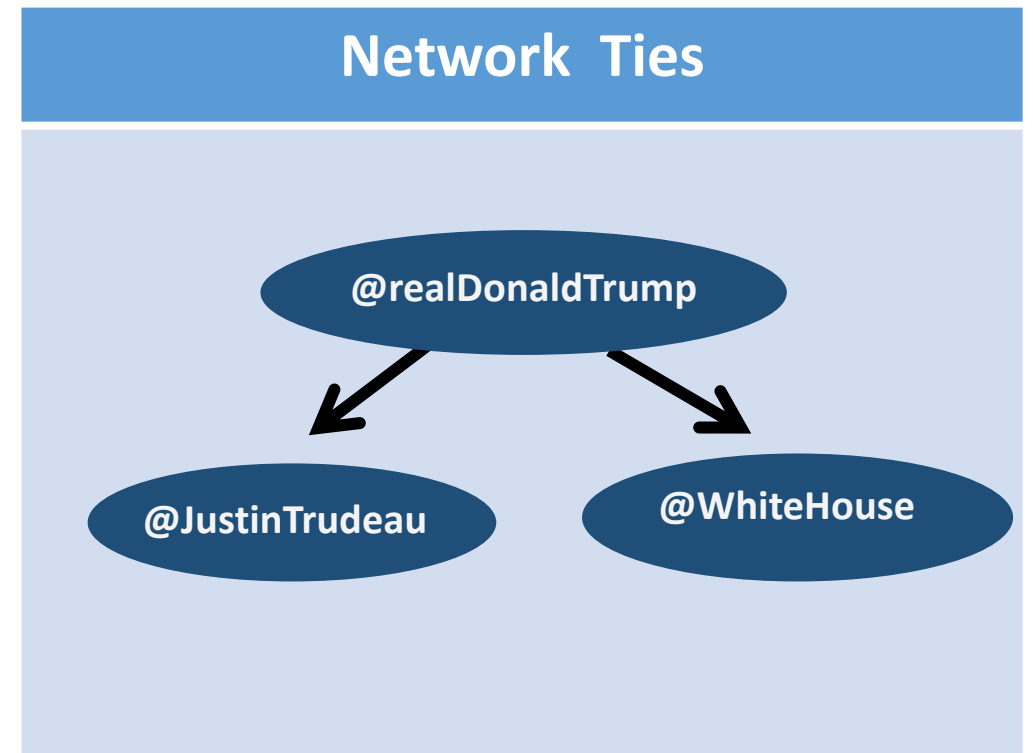
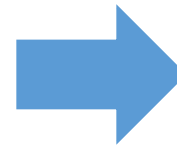
● Nodes = Twitter accounts (person/org)

↕ Network Ties = “Who retweeted/
replied/mentioned whom”

🐦 Tie strength = The number of
retweets (or replies or mentions)



Discovering a Network Structure, One Tweet at the Time



#FilmYourHospital Information & Communication Network

● ~40K Twitter users who posted at least one tweet or retweet with #filmyourhospital

— Retweet, reply or mention

kamerabennett

thedailybeast
dmakem

dineshd Souza

realcandaceo

Twitter: @Gruzd

Note: usernames are shown for users with 100k or more followers

Pro-Trump, Republican, Former Congressional Candidate who ran against Nancy Pelosi




DEANNA
FOR CONGRESS
GOD * FAMILY * COUNTRY
www.DeannaForCongress.com

DeAnna Lorraine 
@DeAnna4Congress

★ Fmr Congressional Candidate vs Nancy Pelosi (CA-12)  Republican/Christian
#MAGA  Join me in the fight of our lives!  I check DMs

📍 San Francisco, CA  DeannaForCongress.com  Joined October 2008

67.5K Following 163.9K Followers

DeAnna Lorraine  @DeAnna4Congress · Mar 29

Just went to 2 hospitals in LA to check out these "War Zones" the MSM keeps telling us about. 🇺🇸

They are very quiet & EMPTY.
We are not being told the truth. Why?? Let's get [#FilmYourHospital](#) trending. We ARE the news now. We can't trust the news. Post pics of ur hospital here!



5.5K 21.9K 33.9K

Show this thread

DeAnna Lorraine  @DeAnna4Congress · Mar 30

Replying to @JulesDokk and @Inevitable_ET

Make sure you use the [#FilmYourHospital](#) hashtag!

3 10 25



Pro-Trump, American conservative commentator and political activist



BLACKOUT
ON SALE 4.21.20
PRE-ORDER NOW

Candace Owens ✓
@RealCandaceO

My book BLACKOUT is available on Amazon, Barnes & Noble, Kindle and more!
New York, USA simonandschuster.com/books/Blackout...
Joined June 2017

18 Following 2.1M Followers

Candace Owens ✓ @RealCandaceO · Mar 30


Many journalists are upset that [#FilmYourHospital](#) is trending worldwide w/ citizens going into the ER rooms and revealing wait times in all of the [#coronavirus](#) "hot bed" cities. While I am not endorsing this—it clearly represents a complete breakdown in our trust w/ the media.

Brandon Bowser @brandonBowser10 · Mar 30

[#FilmYourHospital](#)

So St Luke's in Denver is a ghost town. One of the nurses told me That it was pretty slow. But that they were preparing for it to get busy. The emergency room was empty too.

[Show this thread](#)



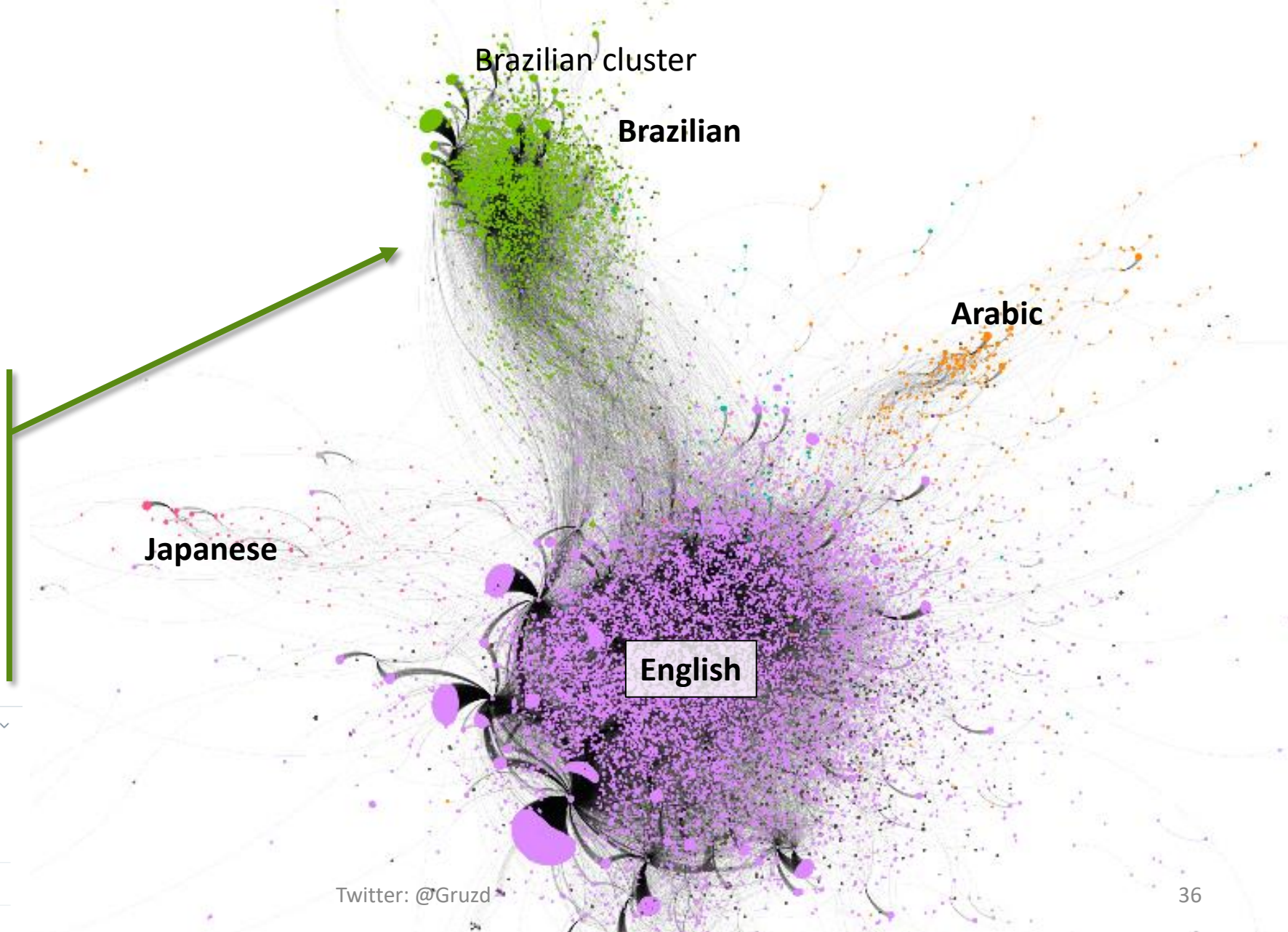
0:04 733.9K views

1.1K 9.9K 23.1K



International reach

Pro-Bolsonaro, influential political blogger in Brazil



Is there an evidence of “inauthentic” behavior?

The Twitter Rules

Twitter's purpose is to serve the public conversation. Violence, harassment and other similar types of behavior discourage people from expressing themselves, and ultimately diminish the value of global public conversation. Our rules are to ensure all people can participate in the public conversation freely and safely.

Authenticity

Platform manipulation and spam: You may not use Twitter's services in a manner intended to artificially amplify or suppress information or engage in behavior that manipulates or disrupts people's experience on Twitter. [Learn more.](#)

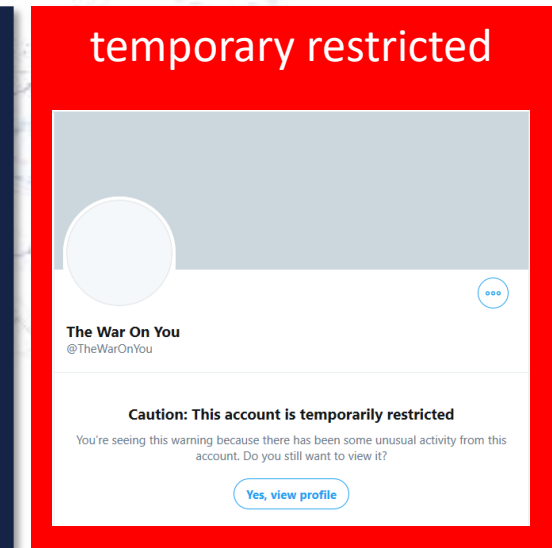
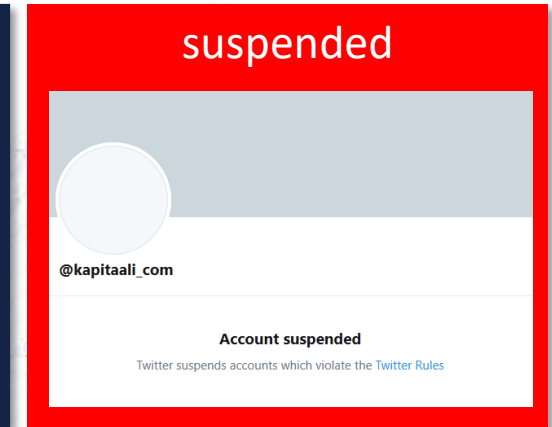
Election integrity: You may not use Twitter's services for the purpose of manipulating or interfering in elections. This includes posting or sharing content that may suppress voter turnout or mislead people about when, where, or how to vote. [Learn more.](#)

Impersonation: You may not impersonate individuals, groups, or organizations in a manner that is intended to or does mislead, confuse, or deceive others. [Learn more.](#)

Synthetic and manipulated media: You may not deceptively share synthetic or manipulated media that are likely to cause harm. In addition, we may label Tweets containing synthetic and manipulated media to help people understand their authenticity and to provide additional context. [Learn more.](#)

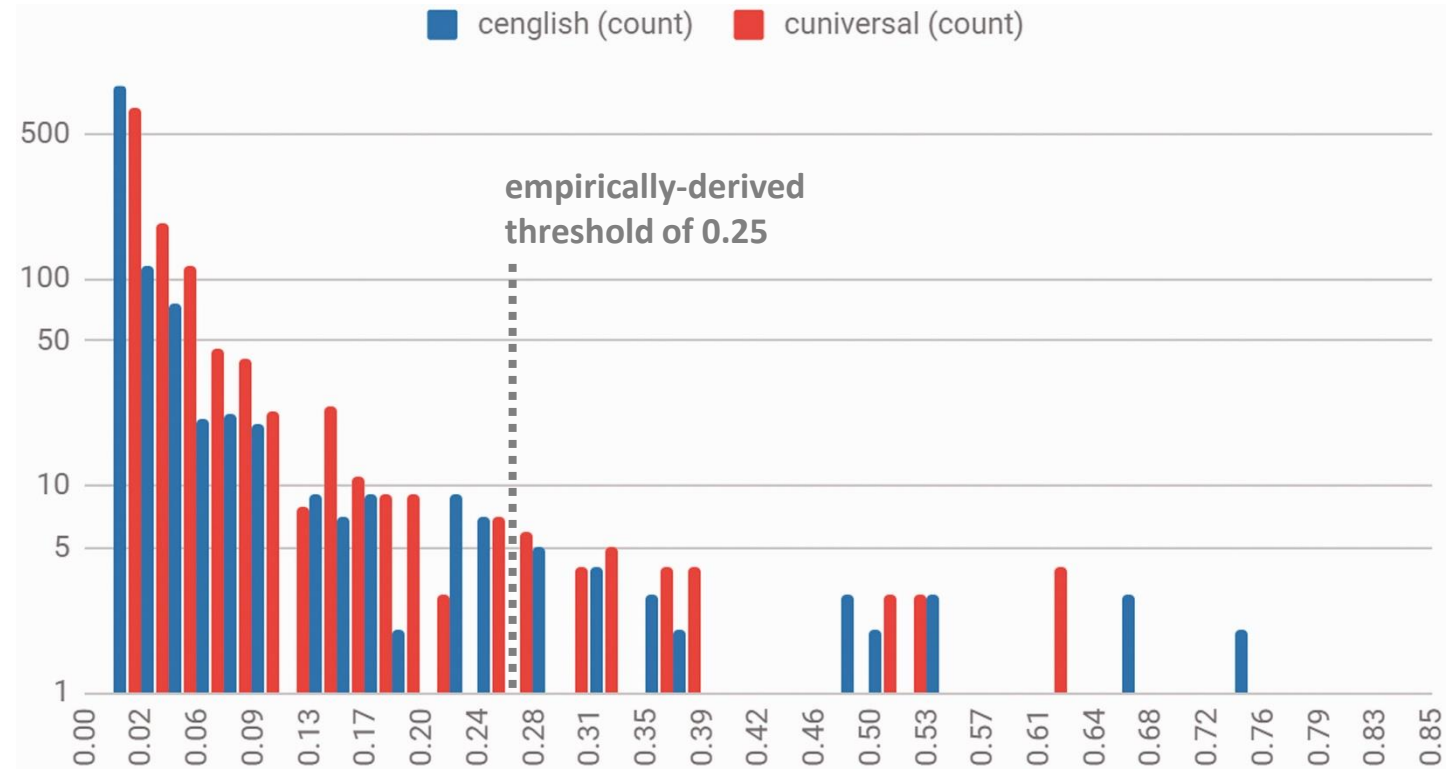
Copyright and trademark: You may not violate others' intellectual property rights, including copyright and trademark. Learn more about our [trademark policy](#) and [copyright policy](#).

1059 suspended & restricted accounts (in red)



Bot or not? Checking for automation

- Checked “[Botometer](#)” scores for ~3% (1,213) of the most active account that contributed 10 or more tweets.
- **1,147** (98%) have the score < 0.25 (not likely bots)
- **40** accounts with Botometer CAP Universal score ≥ 0.25
- **26** suspended, deleted or protected accounts



The Distribution of Botometer CAP Scores using the Logarithmic Scale (n=1,187); *cenglish*=includes content analysis; *cuniversal*=language independent model

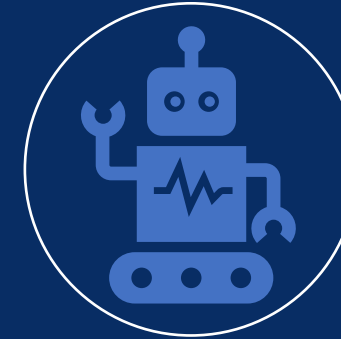
Summary Results: #FilmYourHospital Twitter Campaign



Propelled by influential individuals earlier in the campaign



Sustained by active MAGA supporters with some presence of “inauthentic behavior”



Only 40 bot-like accounts among 1,213 most active accounts with ≥ 10 contributions

Fact Checking works but #FilmYourHospital is a prime example of why it's difficult to stop all COVID-19 misinformation



- Much of what is driving COVID-19 (dis-) misinformation is **politics**:
 - What do you do when politicians and leaders spread misinformation?
 - Viral spread is not a bug, but a feature on social media platforms

Misinformation - in- Chief

Discussion Questions

What are incentives for social media platforms like Facebook and YouTube to combat COVID-19 and vaccine-related misinformation?

What are some interventions/models one can deploy to effectively combat misinformation beyond fact-checking, flagging, and muting?

What regulations could be developed by policy makers to balance the need between curbing misinformation while ensuring human rights of access to information and freedom of speech?



BD&S Special Issue!



Big Data &
Society

Special Theme Issue on

**Studying the COVID-19
Infodemic at Scale**

Editors:

- Anatoliy Gruzd
- Manlio De Domenico
- Pier Luigi Sacco
- Sylvie Briand



<https://journals.sagepub.com/page/bds/collections/studyinginfodemicatscale>