

Digital Trace Data

Bamberg Summer Institute in Computational Social
Science

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2019-07-30

Many thanks to Chris Bail for providing material for this lecture

What is digital trace data?

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"[J]ust as the invention of the telescope revolutionized the study of the heavens, so too by rendering the unmeasurable measurable, the technological revolution in mobile, Web, and Internet communications has the potential to revolutionize our understanding of ourselves and how we interact . . . [T]hree hundred years after Alexander Pope argued that the proper study of mankind should lie not in the heavens but in ourselves, we have finally found our telescope. Let the revolution begin."

Duncan Watts (2011, p. 266)

What is digital trace data?

- Social Media Sites
- Web Search Data
- Blogs / Internet Forums
- Administrative Data on Websites
- Internet Archives
- Digitization of Historical Texts/Archives
- Audi-Visual Data

What is digital trace data?

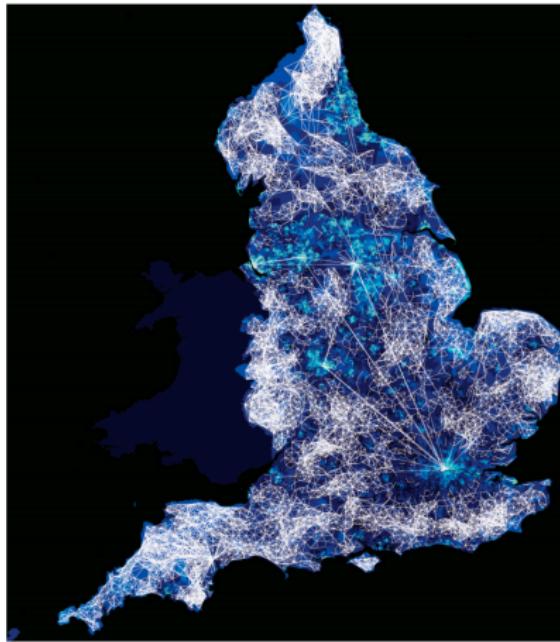


Fig. 1. An image of regional communication diversity and socioeconomic ranking for the UK. We find that communities with diverse communication patterns tend to rank higher (represented from light blue to dark blue) than the regions with more insular communication. This result implies that communication diversity is a key indicator of an economically healthy community. [29] Crown copyright material is reproduced with the permission of the Controller of Her Majesty's Stationery Office]

What is digital trace data?



[https:](https://www.facebook.com/note...)

//www.facebook.com/notes/facebook-engineering/visualizing-friendships/469716398919

What is digital trace data?



Strengths of digital trace data

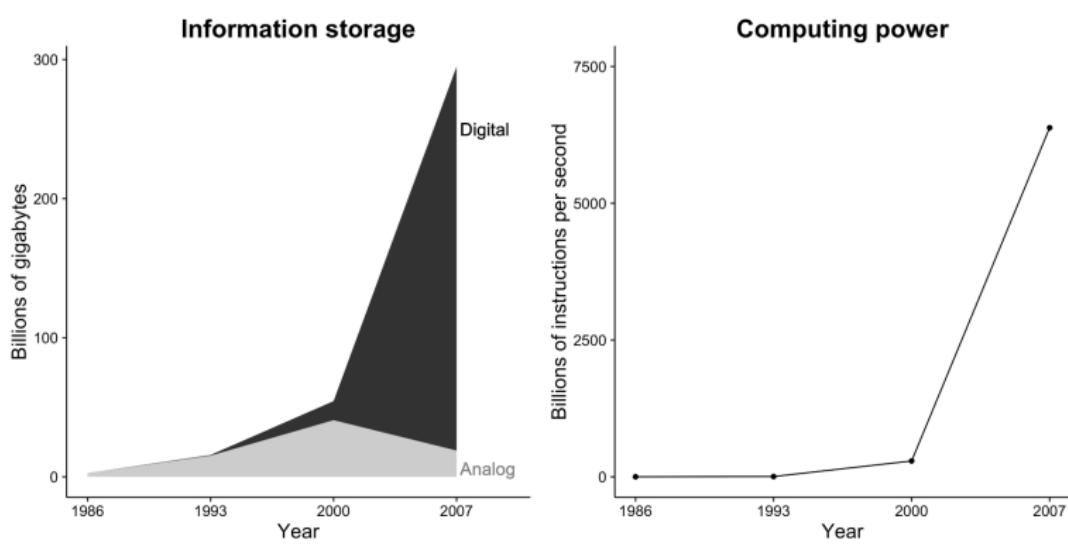


Figure 1.1: Information storage capacity and computing power are increasing dramatically. Further, information storage is now almost exclusively digital. These changes create incredible opportunities for social researchers. Adapted from Hilbert and López (2011), figures 2 and 5.

<https://www.bitbybitbook.com/en/1st-ed/introduction/digital-age/>

Always on

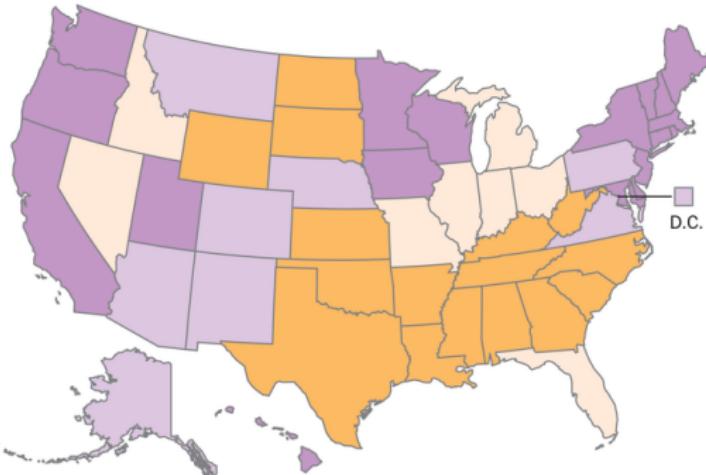
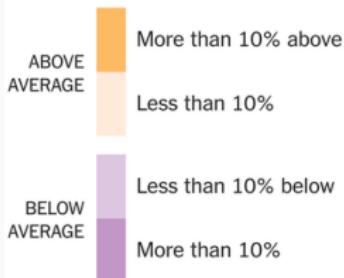


https://en.wikipedia.org/wiki/Egyptian_revolution_of_2011

Non-reactive

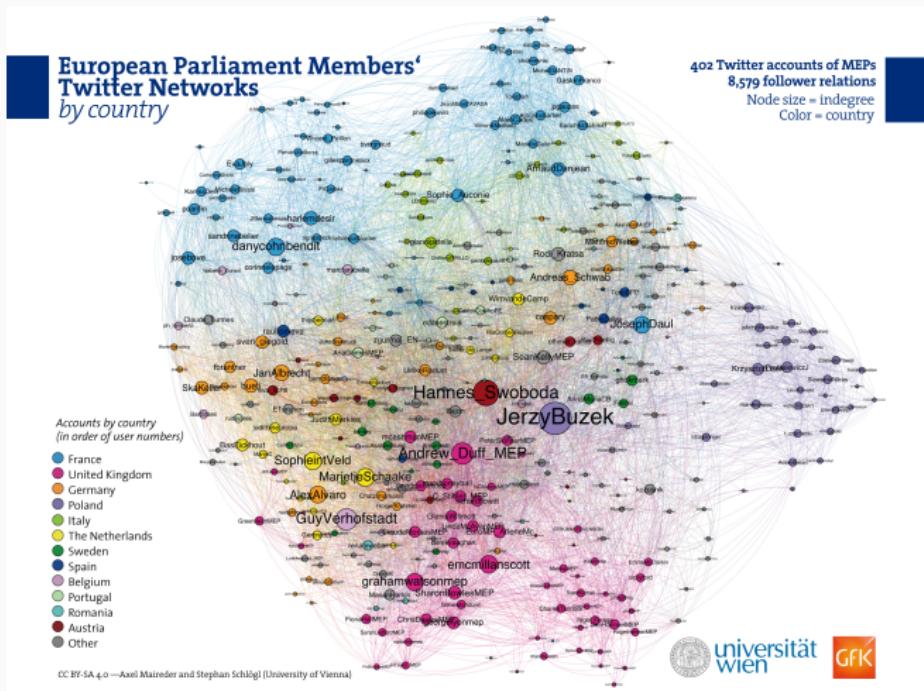
INTEREST IN SELF-INDUCED ABORTION

Google search rate above or below national average for phrases like "home abortion methods," 2011 to 2015.



<https://www.nytimes.com/2016/03/06/opinion/sunday/the-return-of-the-diy-abortion.html>

Captures social relationships



https://homepage.univie.ac.at/axel.maireder/php/wordpress/wp-content/MEPnetwork_country.png

Weaknesses of digital trace data

Incomplete

Like · Comment · Share

 7 people like this.

This comment has been removed. You can [Undo](#) this, Report it as abusive, or Ban [REDACTED].



Write a comment...

Facebook Privacy Settings

Do you know who you're sharing with on Facebook?

Learn more about the different sharing options below.

The diagram consists of four overlapping circles on a blue background. The largest circle is labeled 'Public' at the top. Inside it are four smaller circles: 'Only me' (top-left), 'Lists' (middle-left), 'Friends' (middle-right), and 'Public' (bottom-right). Each circle contains text and icons representing its sharing scope.

- Only me**: Anything shared with this option will only be visible to you. It shows one person icon.
- Lists**: You can share with lists of friends to help keep sensitive information from some people. It shows three person icons: two at the top, one in the middle, and one at the bottom.
- Friends**: This is the most common option, sharing with everyone you've added as a friend. It shows a grid of twelve person icons.
- Public**: This is the least secure privacy setting. It shares information with everyone on Facebook. It shows a grid of twelve person icons.

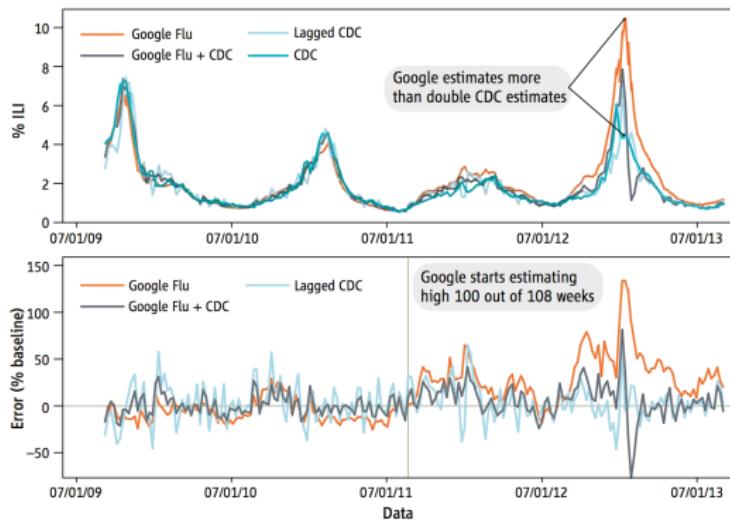
Non-representative

	Age				Gender		Education		
	14-29	30-49	50-64	65+	Men	Women	Low	Mid	High
WhatsApp	79	71	58	18	56	54	34	59	69
Facebook	66	52	34	10	39	39	23	41	52
YouTube	64	50	31	6	41	32	21	36	46
Instagram	37	15	5	1	13	14	3	9	21
Twitter	18	9	5	1	10	5	3	6	11
XING	4	12	5	1	9	3	0,2	4	14
Snapchat	22	5	1	0	6	6	2	3	7
LinkedIn	5	9	5	1	8	2	0,3	3	12
Google+	4	5	3	1	5	1	2	3	5
Other	10	6	2	1	5	4	1	3	7
None	3	10	20	29	18	15	19	19	14

<https://initiatived21.de/pm-sonderstudie-nrw/>



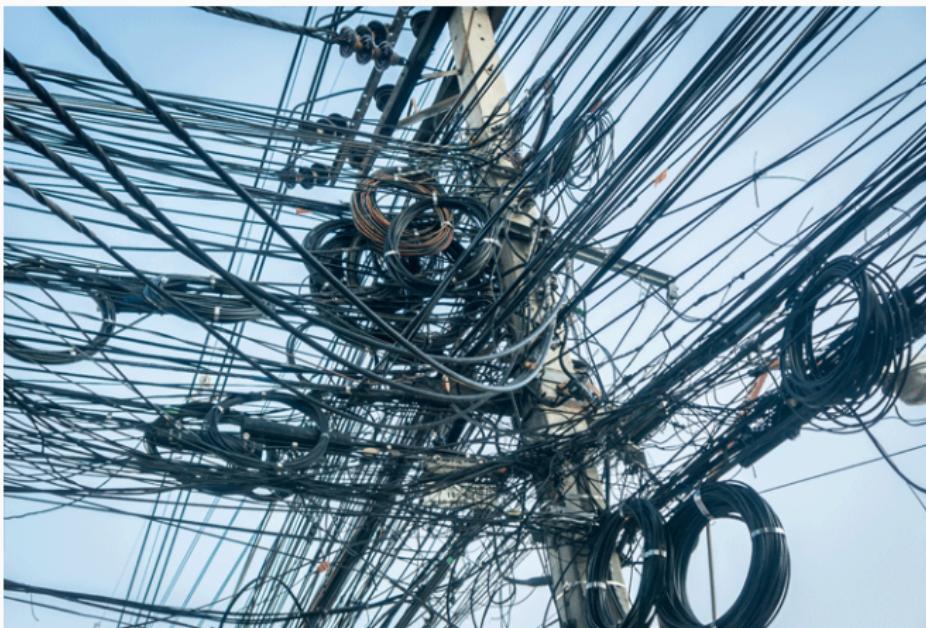
Algorithmically confounded



GFT overestimation. GFT overestimated the prevalence of flu in the 2012–2013 season and overshot the actual level in 2011–2012 by more than 50%. From 21 August 2011 to 1 September 2013, GFT reported overly high flu prevalence 100 out of 108 weeks. (**Top**) Estimates of doctor visits for ILI. “Lagged CDC” incorporates 52-week seasonality variables with lagged CDC data. “Google Flu + CDC” combines GFT, lagged CDC estimates, lagged error of GFT estimates, and 52-week seasonality variables. (**Bottom**) Error [as a percentage $\{(\text{Non-CDC estimate}) - (\text{CDC estimate})\}/(\text{CDC estimate})\}$. Both alternative models have much less error than GFT alone. Mean absolute error (MAE) during the out-of-sample period is 0.486 for GFT, 0.311 for lagged CDC, and 0.232 for combined GFT and CDC. All of these differences are statistically significant at $P < 0.05$. See SM.

<https://dx.doi.org/10.1126/science.1248506>

Unstructured



OKCUPID

Researchers Caused an Uproar By Publishing Data From 70,000 OkCupid Users

Robert Hackett

May 18, 2016



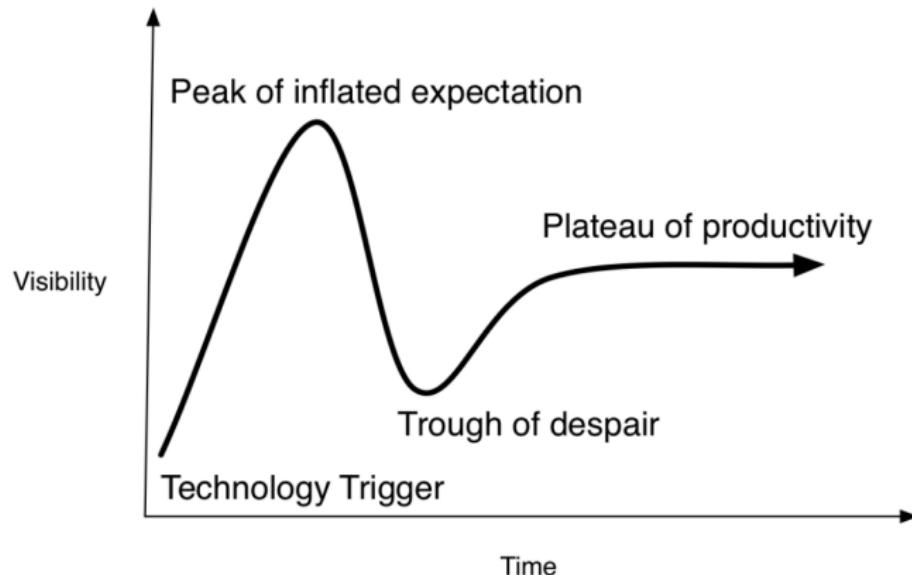
<https://fortune.com/2016/05/18/okcupid-data-research/>

Positivity bias

Your Facebook posts
make you seem real
interesting.....
But remember, dear,
there are people
who know you in
real life.



The future of digital trace data



https://commons.wikimedia.org/wiki/File:Gartner_Hype_Cycle.svg

Questions?