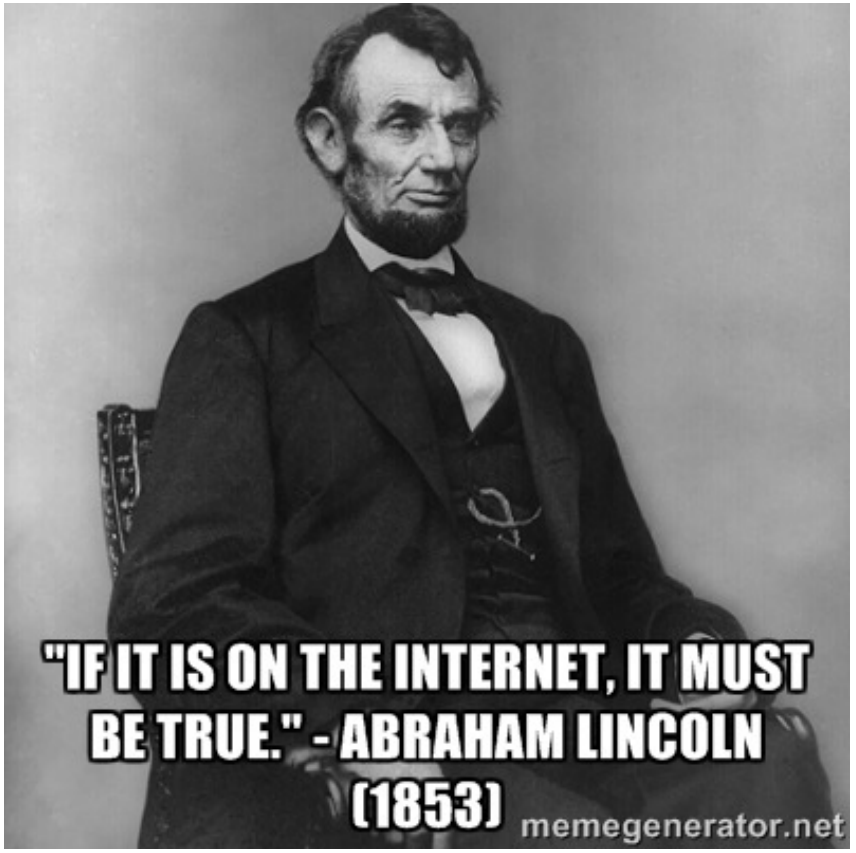
Valeurs et données

Serge Abiteboul

Arcep, Inria, ENS



Promises and risks of data science

- Improve people's lives, e.g., recommendation
- Accelerate scientific discovery, e.g., medicine
- Boost innovation, e.g., autonomous cars
- Transform society, e.g., open government
- Optimize business, e.g., advertisement targeting

Growing resentment

- Against bad behaviors: racism, terrorist sites, pedophilia, identity theft, cyberbullying, cybercrime
- Against companies: intrusive marketing, cryptic personalization and business decisions
- Against governments: NSA and its European counterparts

Increasing awareness of the dissymmetry between what these systems know about a person, and what the person actually knows

Éthique

- Ces nouvelles technologies (en particulier l'analyse de données massives) prennent une place considérable dans la vie de la cité
- **Elles doivent donc**

  respecter les valeurs de la cité

  avoir un comportement éthique

Exemples

Online price discrimination

THE WALL STREET JOURNAL.

WHAT THEY KNOW

Websites Vary Prices, Deals Based on Users' Information

By JENNIFER VALENTINO-DEVRIES, JEREMY SINGER-VINE and ASHKAN SOLTANI

December 24, 2012

It was the same Swingline stapler, on the same Staples.com website. But for Kim Wamble, the price was $15.79, while the price on Trude Frizzell's screen, just a few miles away, was $14.29.

A key difference: where Staples seemed to think they were located.

WHAT PRICE WOULD YOU SEE?

lower prices offered to buyers who live in more affluent neighborhoods

https://www.wsj.com/articles/SB10001424127887323777204578189391813881534

Online job ads

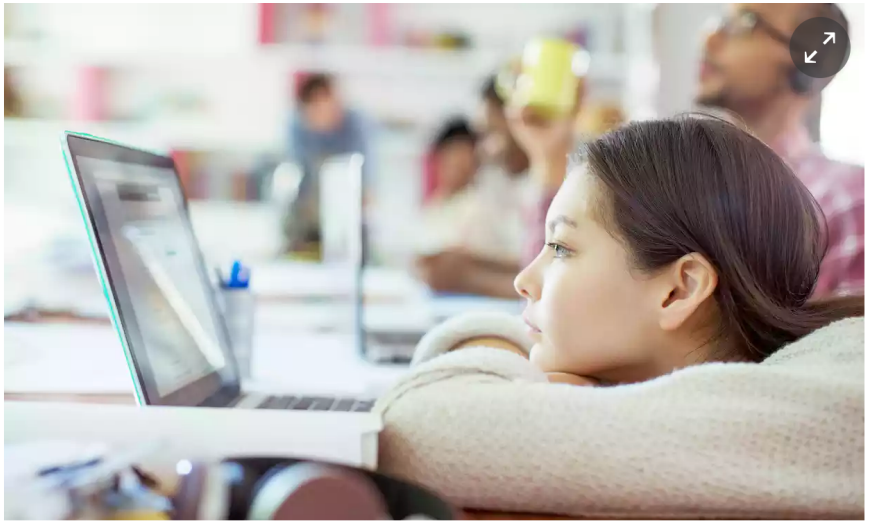
theguardian

Samuel Gibbs

Wednesday 8 July 2015 11.29 BST

Women less likely to be shown ads for high-paid jobs on Google, study shows

Automated testing and analysis of company's advertising system reveals male job seekers are shown far more adverts for high-paying executive jobs



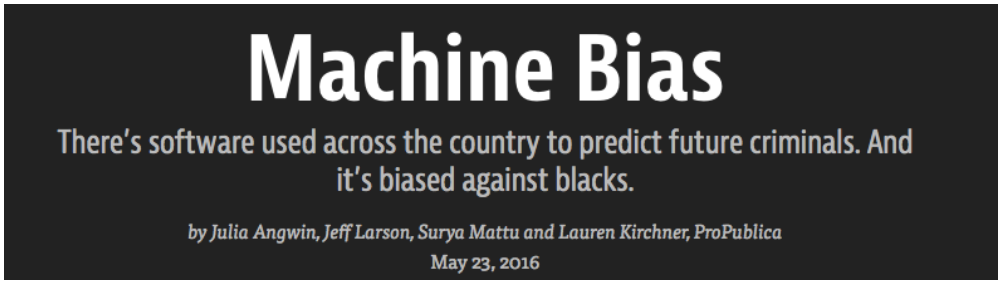
One experiment showed that Google displayed adverts for a career coaching service for executive jobs 1,852 times to the male group and only 318 times to the female group. Photograph: Alamy

The AdFisher tool simulated job seekers that did not differ in browsing behavior, preferences or demographic characteristics, except in gender.

One experiment showed that Google displayed ads for a career coaching service for "$200k+" executive jobs **1,852 times to the male group and only 318 times to the female group**. Another experiment, in July 2014, showed a similar trend but was not statistically significant.

https://www.theguardian.com/technology/2015/jul/08/women-less-likely-ads-high-paid-jobs-google-study

Racial bias in criminal sentencing



A commercial tool COMPAS automatically predicts some categories of future crime to assist in bail and sentencing decisions. It is used in courts in the US.

The tool correctly predicts recidivism **61% of the time.**

Blacks are almost twice as likely as whites to be labeled a higher risk but not actually re-offend.

The tool makes **the opposite mistake among whites**: They are much more likely than blacks to be labeled lower risk but go on to commit other crimes.

https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing

Google antitrust case

theguardian

European commission announces antitrust charges against Google

Inquiry will focus on accusations that internet search and tech multinational has unfairly used its products to oust competitors

Sam Thielman in New York

@samthielman

Wednesday 15 April 2015 07.27 EDT

Ruth Porat replaces Patrick Pichette as Google's chief finance officer. Photograph: Georges Gobet/AFP/Getty Images

The European Union accused Google on Wednesday of cheating competitors by distorting Internet search results in favour of its Google Shopping service and also launched an antitrust probe into its Android mobile operating system.

Lack of diversity in Social networks such as FB and Twitter

Cambridge Analytica

The 'Filter Bubble' Explains Why Trump Won and You Didn't See It Coming

By **Drake Baer**

Photo: Mark Wilson/Getty Images

Donald Trump's victory is blindsiding, like stepping into a crosswalk and getting slammed into by a delivery guy cycling the wrong way down a one-way street. This is because, as media scholars understand it, we increasingly live in a "filter bubble": The information we take in is so personalized that we're blind to other perspectives. It simultaneously explains why Trumpism has flourished and why so many of us are insulated from it.

What is common to all these?

- Not a problem of performance or reliability
- Various ethical issues
  - Fairness: justice, staplers case
  - Neutrality: Google search
  - Transparency: Google Ads setting
  - Diversity: filter bubble
  - Privacy
  - Explicability
  - Accountability
  - Loyalty
  - Truth
  - …

Future challenges in data management

An opinion:

- In the past, the field was driven by
  - Company data
  - Data model & performance & reliability
- In the future
  - **Personal and social data**
  - **Ethical issues:** fake news, privacy, information bubble…

Ethics: concepts and principles that guide us in determining what behavior helps or harms us

Thesis : We have made tremendous progress on how to do things in data management and analysis; now is time to learn how to do that properly

Note : also security

1. Fairness
2. Transparency
3. Diversity
4. Privacy
5. Neutrality

DATA ANALYSIS

Data analysis: Fairness

- Origins of bias
  - data collection
    - E.g., a crime dataset in which some cities are under-represented
  - data analysis

    E.g., search engine skewing recommendations in favor of advertising customers
- The bias may be unexpected
  - Staplers more expensive for low income families
- The bias may even be illegal
  - Less advantageous financial products to members of minority groups

The issue is well-known in science

  - Scientists are expected to explain how data was obtained, which analysis was carried on it

Fairness and bias

- It is not easy to specify “fairness”
- Bias depends on context: e.g., search engine
  - If I ask for a pizza…
  - If a child asks a query...
  - Bias for the advantage of the user
  - We don’t expect bias for the company of the search engine

Effect on sub-populations

Simpson's paradox
disparate impact at the full population level disappears or reverses when looking at sub-populations!

		grad school admissions	
		admitted	denied
gender	F	1512	2809
	M	3715	4727

positive outcomes

35% of women

44% of men

UC Berkeley 1973: women applied to more competitive departments, with low rates of admission among qualified applicants.

Data analysis: Diversity

- Relevance ranking (for recommendation)

  is typically based on popularity

  - Ignores less common information (in the tail) that constitutes in fact the overwhelming majority
  - Lack of diversity can lead to discrimination, exclusion.
- Examples
  - on-line dating platform like Match.com
  - a crowdsourcing marketplace like Amazon Mechanical Turk
  - or a funding platform like Kickstarter

The rich get richer, the poor get poorer

Data analysis: Transparency

- Example: lack of transparency in Facebook data processing
  - In general, unreadable End-user license agreement
- Users want to control what is recorded about them, and how that information is used
- Transparency facilitates verification that a service performs as it should, as is promised
- Also allows a data provider to verify that data are well used as it has specified.

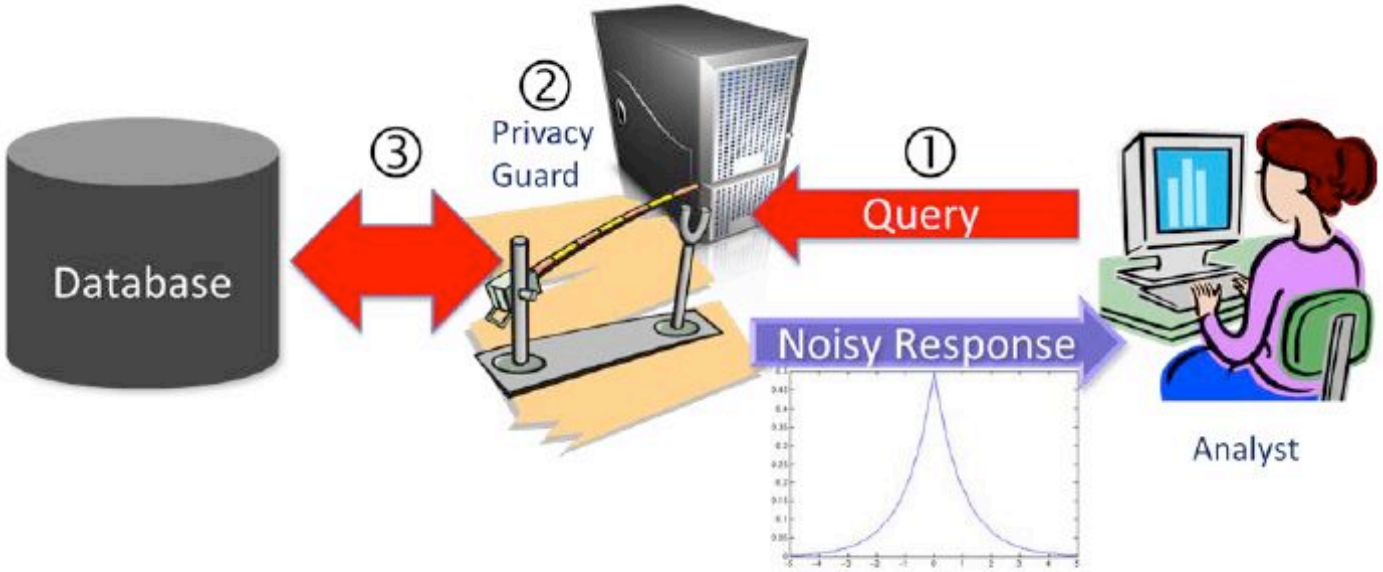
Privacy in data analysis

- When publishing statistics,

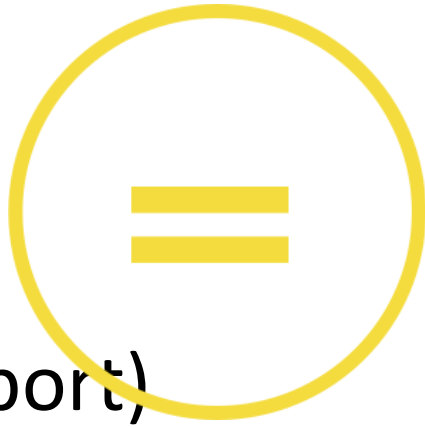
  protect individuals
- Anonymization
- Differential privacy

Already studied a lot

Many open issues



Neutrality



Net and platform neutrality (CNNum report)

- net neutrality - the network is transporting data with no bias based on source, destination, content …
- platform neutrality - big internet platforms should not discriminate in favor of their own services
- Related to fairness and diversity, verified with transparency tools

Issues: Verifying these properties

- Tools to collect data and analyze it responsibly
- Tools to verify that some analysis was performed responsibly
- Easier if responsibility is taken into account as early as possible, *responsibility by design*
- To check the behavior of a program, one can
  - Analyze its code ≈ proof of mathematical theorems
  - Analyze its effect ≈ study of phenomena (such as climate or the human heart)

Verification: code analysis

- Possible if open-source - otherwise auditing
- Easier with open-source
  - not sufficient: bug in the SSL library of Debian
  - Weak secrecy of keys for 2 years
- Specify properties that should be verified
- Verification based on static analysis, in the spirit of theorem proving
- Lots of work in different areas
  - security, safety, optimization, privacy
- Little on responsibility

Verification: analysis of effects

- Statistical analysis
  - Detect biases
  - Detect illegal use of protected attributes
- Verify transparency
- Verify “loyalty”
  - The system behaves like it says it does

- Example: Google Ads Settings & AdFisher

Google Ads Settings

Google

Control your Google ads

You can control the ads that are delivered to you based on your Google Account, across devices, by editing these settings. These ads are more likely to be useful and relevant to you.

Your interests

- Action & Adventure Films
- Cooking & Recipes
- History
- Hygiene & Toiletries
- Mobile Phones
- Phone Service Providers
- Reggaeton
- Vehicle Brands
- Cats
- Fitness
- Hybrid & Alternative Vehicles
- Make-Up & Cosmetics
- Parenting
- Recording Industry
- Search Engine Optimization & Marketing

+ ADD NEW INTEREST

WHERE DID THESE COME FROM?

These interests are derived from your activity on Google sites, such as the videos you've watched on YouTube. This does not include Gmail interests, which are used only for ads within Gmail. Learn more

Transparency and accountability

- Analysis by AdFisher
- Doesn't behave how it says
  - Choice of ads is based on more data that it says
    - E.g., protected attributes
    - Eg: males were shown ads for higher-paying jobs significantly more often than females
- Some control on the ads
  - Removing an interest decreases the number of ads related to that interest
  - Eg: cats

Verification: provenance

- Provenance helps verifying the analysis
- Common for scientific data, essential for verifying that data collection and analysis were performed responsibly

Issue: provenance and verification

Issue: reproducibility

Conclusion

Many societal and political issues today are related to personal/social data management

The issues are clearly not only technical

It is time to learn how to do things correctly

le temps des algorithmes

ILS TRANSFORMENT LES SCIENCES, L' INDUSTRIE, LA SOCIÉTÉ... ILS BOULE-VERSENT LES NOTIONS DE TRAVAIL, DE PROPRIÉTÉ, DE GOUVERNEMENT, DE VIE PRIVÉE... ET D'HUMANITÉ. QUI N'A PAS ENTENDU PARLER DES ALGORITHMES ? ILS NOUS FACILITENT LA VIE, MAIS NOUS REDOUTONS ÉGALEMENT QU'ILS NOUS ASSERVISSENT...

serge abiteboul et gilles dowek

[ESSAI LE POMMIER !]

Mars 2017

Janvier 2017

SERGE ABITEBOUL
VALÉRIE PEUGEOT

Terra Data

Qu'allons-nous faire des données numériques ?

Éditions Le Pommier

cité des sciences et de l'industrie

http://binaire.blog.lemonde.fr