Issues in Ethical Data Management

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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
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.

lower prices offered to buyers who live in more affluent neighborhoods

https://www.wsj.com/articles/SB10001424127887323777204578189391813881534
Online job ads

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

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.

Various ethical aspects

• 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
  • Security and privacy
  • Ethical issues

In data sciences, we have learnt to do
Now, it is the time to do it properly

Serge Abiteboul 7 Paris, November 2017
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
Verifying fairness

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

<table>
<thead>
<tr>
<th>gender</th>
<th>grad school admissions</th>
<th></th>
<th></th>
</tr>
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<tbody>
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<td></td>
<td>admitted</td>
<td>1512</td>
<td>3715</td>
</tr>
<tr>
<td></td>
<td>denied</td>
<td>2809</td>
<td>4727</td>
</tr>
</tbody>
</table>

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.
Verifying transparency Google Ads Settings

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

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

+ ADD NEW INTEREST

WHERE DID THESE COME FROM?
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
On line data analysis

• 2013: A tweet from The Associated Press Twitter account claiming the White House had been bombed
• the Dow dropped more than 100 points in two minutes

• Automatic Web scale content monitoring
Conclusion

Many societal and political fights today are related to computer science/data
The issues are clearly not only technical

Time to work on it
E.g.,
  Time to change the way we manage personal data?
  Time to change the web?