TECNOLOGIES FOR INFORMATION SYSTEMS

Ethics in Data Science

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The promise of Big Data: what about ethics?

- 5Vs: volume, velocity, variety, veracity, value
- unprecedented data collection capabilities
- enormous computational power
- massively parallel processing
- 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

Ethics
in Data Management

- As data have an impact on almost every aspect of our lives, it is more and more important to understand the nature of this effect
- With search and recommendation engines, the web can influences our lives to a great extent, e.g. by recommending interesting jobs only to white males, discriminating as an effect of biased data or algorithms
- With statistics used everywhere, it may happen that very critical decisions be taken without taking their ethical consequences into account

.

BUT....

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

from a seminar by J. Stoyanovich

BUT....

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

from a seminar by J. Stoyanovich

BUT....

THE WALL STREET JOURNAL.

Are Workplace Personality Tests Fair?

By LAUREN WEBER and ELIZABETH DWOSKIN
Sept. 29, 2014 10:30 p.m. ET

Growing Use of Tests Sparks Scrutiny Amid Questions of Effectiveness and Workplace Discrimination

Kyle Behm accused Kroger and six other companies of discrimination against the mentally ill through their use of personality tests. TROY STAINS FOR THE WALL STREET JOURNAL

The Equal Employment Opportunity commission is **investigating whether personality tests discriminate against people with disabilities**.

As part of the investigation, officials are trying to determine if the tests **shut out people suffering from mental illnesses** such as depression or bipolar disorder, even if they have the right skills for the job.

http://www.wsj.com/articles/are-workplace-personality-tests-fair-1412044257

from a seminar by J. Stoyanovich

BUT....

Machine Bias

There's software used across the country to predict future criminals. And it's biased against blacks.

by Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, ProPublica

May 23, 2016

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

from a seminar by J. Stoyanovich

The illusion....

Big Data processing is based on algorithms, thus it must be objective!

Unfortunately:

- Algorithms are based on data, and data may contain bias
- Often the algorithms produce opaque processes (e.g. deep neural networks) that *cannot be explained* → AI research area: *EXPLAINABILITY*

→ Technology must be accompanied by *ethical and legal considerations and competence*

Ethics in Data Management: RESPONSIBILITY

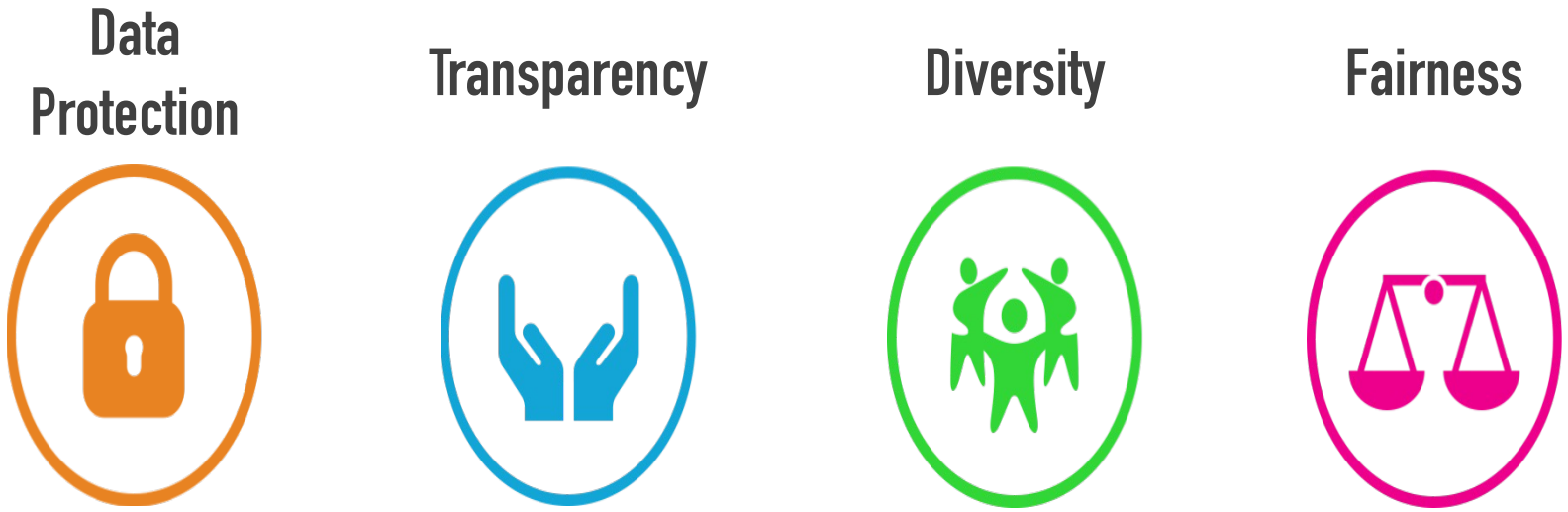
It is up to the data scientists to

- identify which datasets can genuinely help answering some given question
- understand their contents
- choose the most appropriate *knowledge extraction technique* (search, query, or data analysis/AI methods) to obtain a fair result

This sequence of choices may strongly influence the process, *and biased results might be obtained*.

Ethics
in Data Management

- What role should the database and AI communities, and computer engineers in general, play ?
- Should *ethical dimensions* as *data protection*, *fairness*, *diversity*, *transparency* become fundamental issues that can drive new ideas, and should they be enforced in all processes?



Data protection

- Traditional knowledge extraction systems, including database systems, search engines, data warehouses, etc., hardly pay specific attention to ethically sensitive aspects of knowledge extraction processes and their outcomes.
- Such aspects are now becoming prominent, especially with regard to the protection of human rights and their consequences in normative ethics. These demands are broadly reflected into codes of ethics for companies and computer professionals, and also in legally binding regulations such as the EU General Data Protection Regulation (GDPR):

https://www.eugdpr.org/

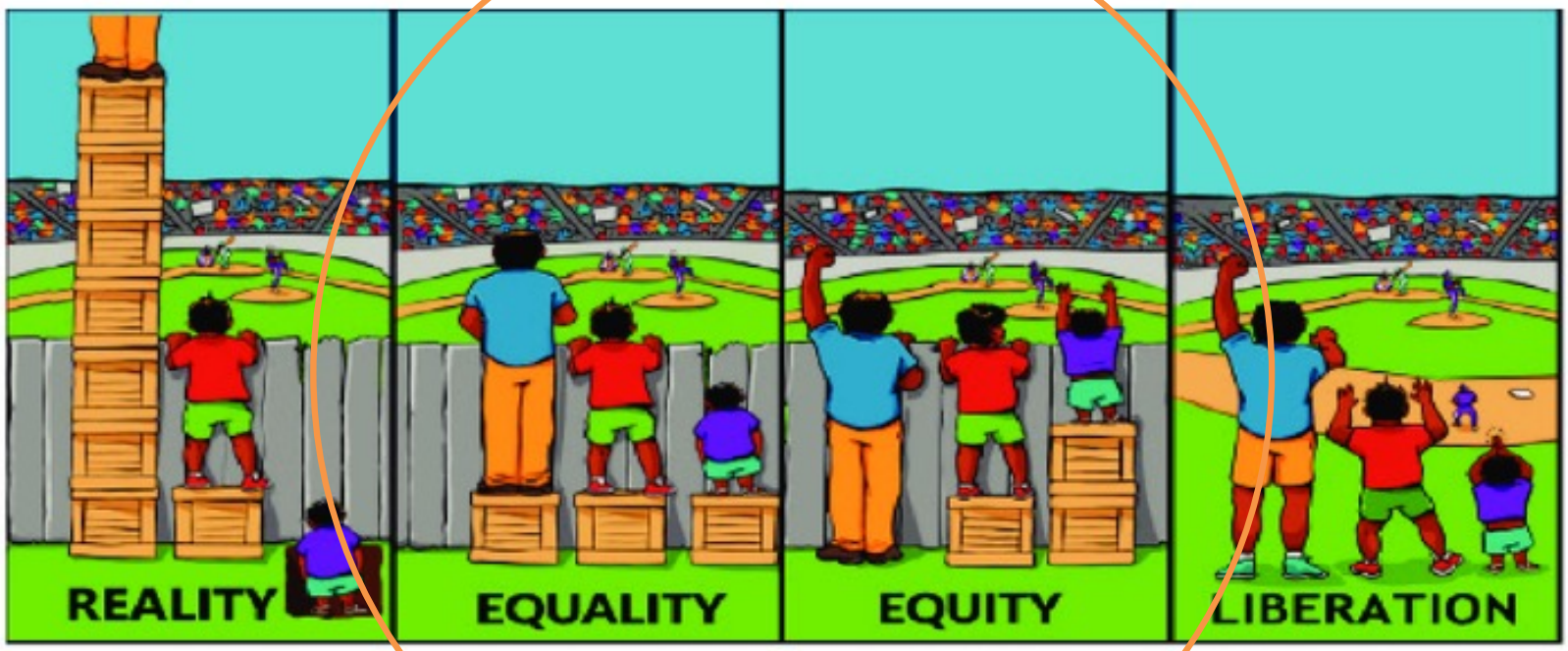
- GDPR unifies data protection laws across all European Union members, defining a comprehensive set of rights for EU citizens, describing the requirements for companies and organizations for collecting, storing, processing and managing personal data.
- Following a 2-year post-adoption grace period, the GDPR has become fully enforceable throughout the European Union in May 2018.

Fairness

Fairness of data is defined as the lack of bias

- Recently its importance has been acknowledged e.g. due to the unsettling consequences of training systems with biased data (e.g. in the examples seen above)
- Various “categories” of fairness have been defined, e.g. equality vs. equity

Many interpretations of the notion of fairness



The difference between the terms equality, equity, and liberation, illustrated; © Interaction Institute for Social Change | Artist: Angus Maguire

(H. Jagadish)

Transparency

Transparency is the ability to interpret the information extraction process in order to verify which aspects of the data determine its results. In this context, transparency metrics can use the notions of

- *data provenance*, describing where the original data come from;
- *explanation*, describing how a result has been obtained.
- Transparency may conflict with Data Protection

Diversity

Diversity is the degree to which *different kinds of objects* are represented in a dataset. Several metrics of diversity are proposed.

- Ensuring diversity at the beginning of the information extraction process may be useful for enforcing fairness at the end.
- The diversity dimension may conflict with data quality needs, that prioritize the use of few, high-reputation sources.

Ethics and Data Quality

- Data quality is a typical ethical requirement: *we could never trust a piece of information* if it did not have the typical data quality properties.
- Yet, we can also assert the opposite: that *data should conform to a high ethical standard*, for it to be considered of good quality.
- Hence, the satisfaction of the ethical requirements is actually necessary to assert the quality of a result
- It is the responsibility of the system designer, and of the person/company that ordered the job, to ensure that the (necessary) ethical properties are satisfied.

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