INFS5700

Introduction to Business Analytics

Week 9: Big Data and Algorithm Ethics

(T2 2022)

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Agenda

- Recap on Week 8 topic – Design Thinking

- Topic tips – new aspects of business analytics

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Why Design Thinking?

- Paradigm shift from an 'analytics world' to a 'business universe' perspective

- Human-centred designs and outcome-oriented approach to big data projects and solutions

From analytics world	To business universe
A focus on building predictive models	A focus on business outcomes
Predictive models deliver "automatic" benefits to the business	Predictive models deliver capabilities - business projects deliver benefits
Return on investment (ROI) is king	Broader view of what constitutes a benefit is needed
Analytics business case	Business value case
"Trusting the gods" to deliver benefits from analytics investments	Managing risk to deliver benefits; managing benefit paths beyond completion of the project

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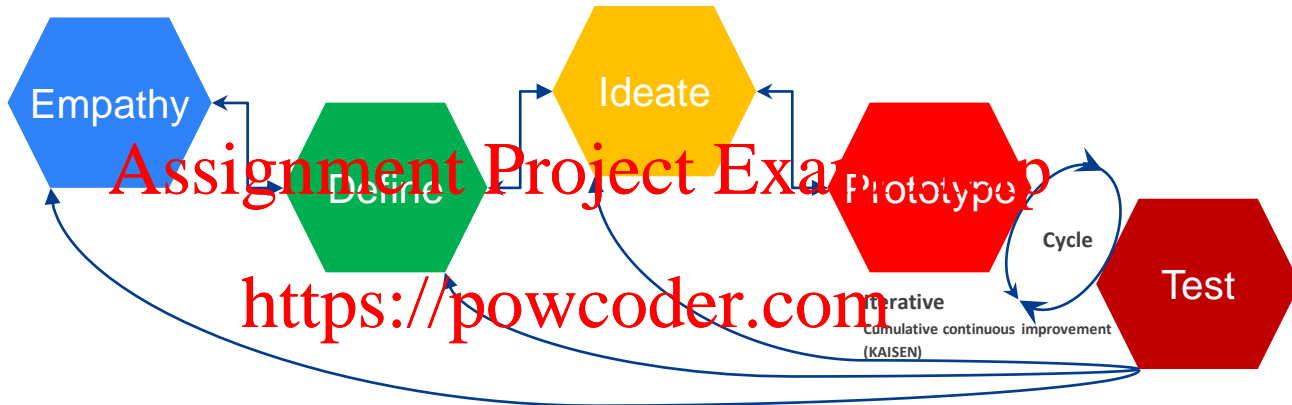
What is Design Thinking?

- Design thinking is a holistic approach that aims for innovation in a similar manner to the way designers would

- Design thinking is an **iterative process** in which we seek to **understand the user, challenge assumptions**, and **redefine problems** in an attempt to **identify alternative strategies and solutions** that might not be instantly apparent with our initial level of understanding

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Design Thinking Process Flow Chart

Empathize

- It is the foundation of a human-centred design process

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- The work you do to understand people, within the context of your design challenge.

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- Your effort to understand the way they do things and why, their physical and emotional needs, how they think about the world, and what is meaningful to them

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Define

- The goal is to identify a grand challenge or problem faced by the focal company/organization

- It should be a guiding statement that focuses on insights and needs of a particular user, or composite character

Ideation

- To generate design solutions pertinent to the challenge statement
- It represents a process of 'going wide' with concepts and outcomes. It is concerned with 'Flaring' rather than focus
- It provides a large repository of diverse ideas that are the source material for building prototypes to test with users

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Persona Development

- To explore the problem in a grounded way, empathising with the customer and thinking about the problem from their perspective (e.g., understanding of user's needs, experiences, behaviours, and goal)

- Creation of archetypes to represent a person's demographics, behaviours, beliefs, motivations, intentions

- It should be developed from perspective of people in the system (i.e., both external users, e.g., customer, or internal users, e.g., staff)

Storyboarding

- It communicates a concept by visualising user interactions. They use the art of the narrative to focus on the experience of using your service/product

- An excellent way of visualizing the business process and understanding the impact on the customer's journey

- An effective way to prototype your service concept

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Prototyping

- After having developed persona and storyboard

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- Prototyping can be developed through software, or build https://powcoder.com., Blue-Tak, paper straws, cardboard, Lego) to give a tangible Add WeChat powcoder

Test

- Stakeholders can interact with prototype and provide feedback on design

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- To help participants empathise more deeply with the problem situation

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Opportunity Canvas

- To document the use case after having elaborated it through design thinking

- It provides a basis for the preparation of a business case and presentation of the analytics use case to senior management for approval and funding

Users & Customers	Problems	Solution Ideas	Solution Use	User Metrics
1			5	
2		Solutions Today	Adoption Strategy	6
	3		7	
	Business Challenge	Budget	Business Benefits and Metrics	
	4	9	8	

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Big Data and Algorithm Ethics

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Why should we care about ethics of business analytics

- Ethics of big data

- Ethics of algorithm

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Framework for big-data ethics

Element	Sample critical question
Identity	'What is the relationship between our offline identity and our online identity?'
Privacy	'Who should control our access to data?'
Ownership	'Who owns data, can rights to it be transferred, and what are the obligations of people who generate and use that data?'
Reputation	'How can we determine what data is trustworthy?'

Framework for big-data ethics (Davis 2012, p.3. Adopted with permission from O'Reilly Media)

Privacy

Sourced from joyoftech.com

'Data is a fingerprint': why you aren't as anonymous as you think online

So-called 'anonymous' data can be easily used to identify everything from our medical records to purchase histories

▲ 'Digital breadcrumbs can be traced back to violate peoples' privacy in ways they never expected.' Photograph: Voisin/Phanie/Rex/Shutterstock

In August 2016, the Australian government released an "anonymised" data set comprising the medical billing records, including every prescription and surgery, of 2.9 million people.

Identity

- At the basic level, big data is transforming the way people, organizations, and government understand and think about Identity (IP)

- At a deeper level, big data analytics has the power to influence individual's capability to define their own identity (now options are limited and shaped based on big data profiling)

Reputation

- Organization can use data to form an opinion, thereby limiting an individual's ability to shape their reputation and how they are perceived to be

- Given the increasing use of big data and analytics in business applications (e.g., jobs, housing, and credit), the effects of damaging someone's online reputation can have deep and far-reaching consequences

Ownership of personal data

- The guiding principles are quite complex and still in development, firms are facing a variety of ethical questions around data ownership

- The complex of ownership stems from the tension between the belief that people should have control over their personal data and the belief that the collectors of information have in effect 'created' the data and thus have control

Ownership of personal data

- The key differentiator between ownership of data and ownership of physical goods

- Makes an analogy that the control and ownership of data is like housing

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Industry Agenda

Rethinking Personal Data:
A New Lens for
Strengthening Trust

Prepared in collaboration with A.T. Kearney

May 2014

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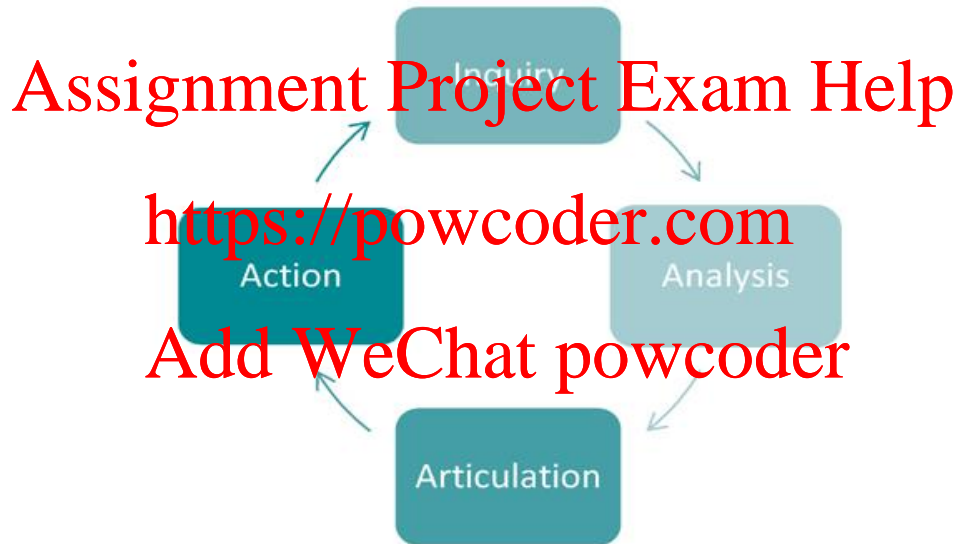
Spectrum of organizational involvement in the creation of data

- Three approaches to collect personal data

- Conflict over data use is at its highest when organizations are deriving insights from data

Volunteered Data | Observed Data | Derived Data

Adopted from the Framework for big-data ethics (Davis 2012)

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Circle of ethical decision-point activities

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Adopted from Davis (2012)

Inquiry

- It is centered on identifying how the organization's core values relate to the use of big data.

- Ethical inquiry is crucial given the potential for heterogeneity of opinions on big data within an organization and the differences in stakeholder motivations and external pressures

Big-data use	• Are people entitled to know how their data is used in the business?
	• Are people entitled to know how their data is analysed and how the results of these analyses drive the business?
	• What data raises the most organizational risk?
	• What is required to determine the risk–benefit ratio of not collecting that data?
Big-data storage	• Are people entitled to know which organization holds their data and what data in particular it holds?
	• Are people entitled to know who within the organization has access to the data?
	• Should other things, such as long-term storage or transfer to third parties, be opt-in or opt-out?
Big-data acquisition	• Are people entitled to know to what third parties the data is transferred (sold, given, released publicly, etc.)?
	• Is it the organization's responsibility to let those people know what these third parties will do with the data? Is it the originating organization's responsibility or a receiving organization further down the data trail?
	• Are details buried in long End-User License Agreements (EULA) that few people will read?
	• Should data collection occur through an opt-in or an opt-out model?
	• Do data-storage practices create a resource that would be of use to powerful negative forces in the world, such as malicious or misguided governmental organizations, organized crime, or nefarious hackers?

Sample questions for inquiring into big-data values (Davis 2012)

Analysis

- To identify whether its interaction with big data can lead to consequences for the four aspects of the framework for big data ethics (i.e., identify, privacy, ownership, and reputation)

- To assess potential impacts the firm has to conduct a thorough analysis of its data-handling practices, focusing on both people and systems

  - ➢ Who has access to data

  - ➢ The trustworthiness of the people being entrusted with that data

  - ➢ What would be the magnitude of the consequences if the firm's data were leaked or exposed (e.g., by hackers or by a disaffected employee)

Articulation

- Assess whether a firm's stated values are aligned with its actions

- Firms is able to identify gaps in its ethical practices by comparing the results of the analysis with the results of the inquiry

- Articulation is completed when the firm has established a document detailing where values and actions fail to align

Action

- Steps taken to close the gaps identified through the articulation of value-action alignment

- Actions need to be based on the organization's core values given the rapid evolution of big data and big-data technologies
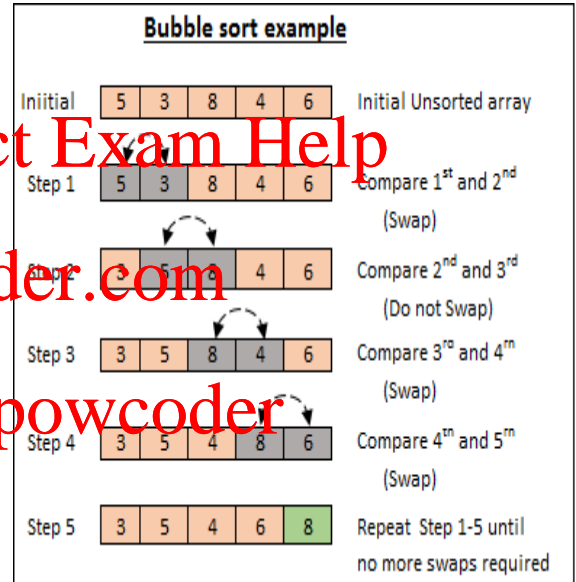
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Ethics of algorithms

- An algorithm is a sequence of steps that a machine follow to accomplish a task

- Algorithms are necessary for gaining insights from data

- As analyst objectives become more complex and prescriptive, algorithms are increasingly taking on the form of a 'black box', a process where the internal working of transforming the data inputs to outputs are completely unknown (e.g., Facebook news feed)

Bubble sort example

Iniitial	5	3	8	4	6	Initial Unsorted array
Step 1	5	3	8	4	6	Compare 1st and 2nd (Swap)
Step 2	3	5	8	4	6	Compare 2nd and 3rd (Do not Swap)
Step 3	3	5	8	4	6	Compare 3rd and 4rn (Swap)
Step 4	3	5	4	8	6	Compare 4th and 5rn (Swap)
Step 5	3	5	4	6	8	Repeat Step 1-5 until no more swaps required

Facebook Announces News Feed Algorithm Update to Put More Emphasis on Original, Quality News Content

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Facebook has announced a new News Feed algorithm update for news content, which will put more emphasis on original reporting, and boost content from news websites that provide information on their journalists, increasing transparency.

The change comes as more people are turning to Facebook for news content - according to Pew Research, around 68% of Americans now get at least some news content from social platforms, with Facebook the leading source. And with many local news outlets being forced to close due to the impacts of the COVID-19 pandemic, the reliance on Facebook for news, especially local updates, is only going to rise.

That makes this News Feed change particularly timely.

As per Facebook:

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The influence of algorithm

- Algorithms are ultimately designed by people, who are far from perfect and filled with a variety of biases in judgment

- Algorithms also rely on data, which can be biased, being based on people's interpretation of what makes good data

- If encoded with biases, the consequences can be far reaching given their wide application in the society (e.g., job matching, loan approval, online dating, and policing)

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Algorithmic Bias? An Empirical Study of Apparent Gender-Based Discrimination in the Display of STEM Career Ads

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Abstract. We explore data from a field test of how an algorithm delivered ads promoting job opportunities in the science, technology, engineering and math fields. This ad was explicitly intended to be gender neutral in its delivery. Empirically, however, fewer women saw the ad than men. This happened because younger women are a prized demographic and are more expensive to show ads to. An algorithm that simply optimizes cost-effectiveness in ad delivery will deliver ads that were intended to be gender neutral in an apparently discriminatory way, because of crowding out. We show that this empirical regularity extends to other major digital platforms.

Keywords: algorithmic bias • online advertising • algorithms • artificial intelligence

Predictive policing algorithms are racist. They need to be dismantled.

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Lack of transparency and biased training data mean these tools are not fit for purpose. If we can't fix them, we should ditch them.

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by **Will Douglas Heaven**

July 17, 2020

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Yeshimabeit Milner was in high school the first time she saw kids she knew getting handcuffed and stuffed into police cars. It was February 29, 2008, and the principal of a nearby school in Miami, with a majority Haitian and African-American population, had put one of his students in a chokehold. The next day several dozen kids staged a peaceful demonstration. It didn't go well.

Managing algorithms

- Be explicit about the algorithm's goal

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- Choose the best data inputs
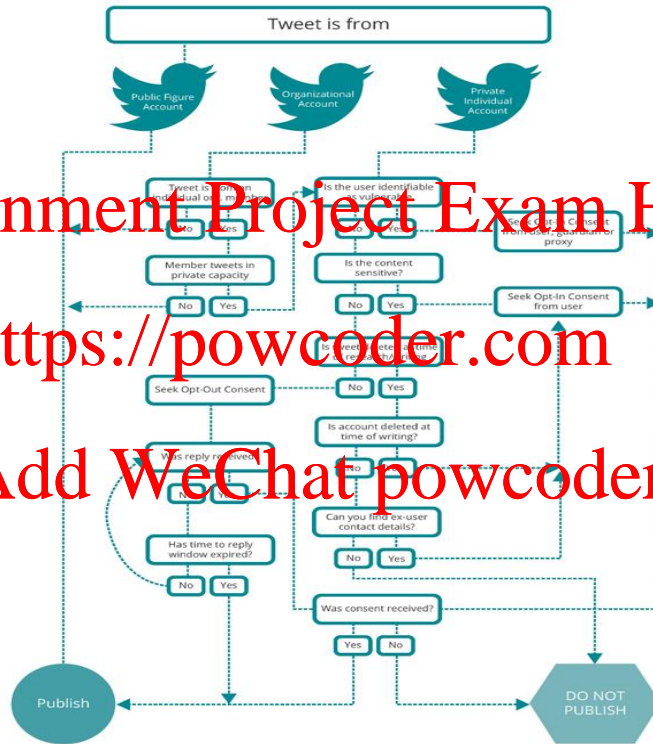
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- Understand the limitations of an algorithm

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Adopted from Luca et al. (2016)

Ethical concerns in social media data

- Private versus public

- Informed consent

- Anonymity

- Risk of harm

Decision flow chart for publication of Tweets

(Adopted from Williams et al., 2017)

Regulation

- A significant and impactful development in the data regulation arena is the European Union's General Data Protection Regulation (GDPR) initiative

- It regulates how organizations collect, store, and process personally identifiable information about EU citizens

- It further provides individuals with rights to explanations – a meaningful explanation of the logic involved in automated decision-making systems, such as customer profiling

Questions?

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