Principles and Guidelines in Data Analytics

Tianxiang Zhang u6773547

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Question 1

1.2 The Primacy of the Public Interest

1.2.1 How severe it impacts to public and stakeholders

In the context of this Code, "You should safeguard the interests of your immediate stakeholders, provided that these interests do not conflict with the duty and loyalty you owe to the public." (ACS, 2014) In this case, the social media service provider use "brute force" data analysis without the user's consent, and the misplacement of ads affected the public negatively. Thus, it is against the value, and the value has not been demonstrated in the scenario.

1.2.2 Conflicting issues

Nowadays, special events can make people in a dilemma. For example, the FBI asked Apple to unlock an iPhone, its owner is an aviation student from Saudi Arabia who opened fire and caused three dead at the naval air station in Florida. (Guardian, 2020) Based on the Code, Apple should preserve the confidentiality and privacy of the information of others. (ACS, 2014) However, it is also Apple's responsibility to protect the public interest. At last, Apple provided iCloud data to the FBI.

1.3 The Enhancement of Quality of Life

According to the Code, "You will recognize, in your work, the role that ICT can play to enhance the quality of life of people, particularly the disadvantaged or those with disabilities." However, the social media service provider put inappropriate content on children's screens and push gambling and alcohol ads to reformed gamblers and drinkers, which is an extremely negative effect on the disadvantaged. Thus, it is against the value, and the value has not been demonstrated in the scenario.

1.4 Honesty

"Do not knowingly mislead a client or potential client as to the suitability of a product or service" (ACS, 2014) When "brute force" data analysis result in misplacement of ads, the social media service provider did not notice shareholders the suitability of inferences. So, it is against the value, and the value has not been demonstrated in the scenario.

1.5 Competence

According to the context of this code, "Accept only such work as you believe you are competent to perform." (ACS, 2014) The social media service-provider is not capable of fulfilling the tasks of advertisers. Therefore, it violates the value, and the value did not demonstrate in the scenario.

1.6 Professional Development

In the scenario, it does not describe things of professional development. Thus, the value has not been demonstrated in the scenario.

1.7 Professionalism

The staff and contractors of data analysis and advertising did not demonstrate professionalism and professional knowledge in the scenario. Therefore, it is against the value, and the value has not been demonstrated in the scenario.

Question 2

2.1 Awareness

The 7 US ACM Principle 1 Awareness did not apply in the scenario.

2.1.1 Designers' bias against Data

In the real world, there are many social media companies like Facebook, their designers from the analytic system also made the same mistakes that the social media service-provider did. Designers did not realize that all data should be classified to exclude "fake data", like obfuscated identities, fanciful identities. Through meaningful data integration and analysis, the analytic system can push advertisements in the right placement.

2.1.2 Designers' bias against Users

Because of the "brute force" of data consolidation and analysis and advertisers cannot evaluate the effectiveness of advertisement targeting. Users will receive advertisements that have no connection with them, like spam mails in the real world.

2.2 Potential Harm

2.2.1 Individuals

The data analysis system has not improved people's quality of life but has brought unnecessary interruptions. Pornographic and violent information perhaps appear on the children's screen, which endangers the mental health of children. Alcohol and gambling advertisements are unfriendly to reformed gamblers and drinkers. Over time, people will object to tech companies using their data for big data analysis.

2.2.2 Society

The advertising industry is caught in vicious competition. Rogue advertisements and spam are increasing resulting in a negative effect on people. No company is willing to develop new technologies to eliminate bias.

Question 3

3.1 General

Guide 1.1 Governance is the most relevant and important.

It suggests that build a comprehensive governance framework before, during, and after data acquisition analysis and use activities so that to reduce negative impacts to stakeholders.

3.1.1 Ignoring the comprehensive governance framework

Firstly, the social media service provider applies "brute force" data analytics techniques to projects third-party ads and its promotional materials, if the social media service provider does a risk assessment, it will find "brute force" data analytics will directly affect the interest of users and advertisers, then it will improve its data analytics system to improve the effectiveness of ads push.

Secondly, if the social media service provider uses accountability during the project, advertisers can easily conduct audits of ad targeting effectiveness, and then advertisers can make a new strategy when they are aware of the low quality of data analysis.

3.1.2 Why Governance

According to the segment of General, Expertise is "ensure that all individuals participating in the activities have education, training, and experience with the real-world systems" and Compliance is "ensure that all activities are compliant with all relevant laws and established public policy positions within relevant jurisdictions, and with public standards of behavior", both are based on a comprehensive governance framework and express assignments of accountability. Thus, Governance is most relevant and important in the scenario. (Clarke, 2017)

3.2 Data Acquisition

Guide 2.2 The Data Sources are the most relevant and important.

It recommends that understand each source of data, which includes the purposes, meaning, quality of creating each data item, and quality of data and information at the time of use. (Clarke, 2017)

3.2.1 Understanding each source of data

In the scenario, if the social media service provider followed the guideline to check the source of the data and the quality of the data, it will scrub controversial data with complex identities like partial identities, conflated identities, obfuscated identities, then the final data analysis system will be more accurate, and the displacement of a large proportion of ads will not happen.

3.2.2 Why the Data Sources

Base on the guideline of Data Acquisition which includes Data Sources, Data Merger, Data Scrubbing, Data Security, etc. only when we clear the identity of the data, then we can proceed to the next step, like a merger, scrubbing, etc. Therefore, the Data Sources is the first most significant of Data Acquisition in the scenario.

3.3 Data Analysis

Guide 3.1 Expertise is the most relevant and important.

It guides that all designers and contractors need to have professional qualifications, training in the specific tools, knowing which data relates to the real-world system and a sense of responsibility.

3.3.1 Profession and Accountability

There are two main mistakes to the social media service provider in the scenario. Firstly, using "brute force" data analysis to inferred attributes of online identities is irresponsible to advertisers, which are the most affected stakeholders. Secondly, wrong ad pushing affects users. If all designers and contractors have sufficient expertise and accountability for their analyses, stakeholders will not negatively affect the scenario.

3.3.2 Why Expertise

In the segment of Data Analysis, other guidelines are explained how to efficiently process data and use tools and how relates data to the real-world system. However, in this scenario, designers and contractors need to understand the first and foremost thing which is profession and accountability. Thus, Expertise is the most relevant and important.

3.4 Use of the Inferences

Guide 4.10 Precipitate Actions is the most relevant and important.

It suggests that do not take actions based on inferences from data analysis because stakeholders have a reasonable opportunity to understand and to contest the proposed action if they think they impacted negatively by the action.

3.4.1 Considering negative impacts on stakeholders

Firstly, the social media service project third party ads and it is promotional based on inferences from data analysis, this behavior directly affects the interest of users. Secondly, advertisers do not aware of the low quality of inferences. However, users and advertisers have a reasonable opportunity to contest the proposed action. It is not an emergency so that the social media service can not refuse the reasonable opportunity. Thus, the most significant thing is that ensure stringent safeguards, mitigation measures, and controls are designed for the social media service provider on the scenario. (Clarke, 2017)

3.4.2 Why Precipitate Actions

In the Use of the Inferences, 4.1 - 4.7 are procedures of use of the inferences, all of them are details for how not negative affect stakeholders during the action. However, Precipitate Actions provides an effective framework for 4.1 - 4.7 so that Precipitate Actions is the most relevant and important. (Clarke, 2017)

Question 4

Guideline 4.7 Breathing Space has been disregarded in the scenario.

4.1 Why Breathing Space important

The basic business logic is the social media service provider provides an online social platform to users so that it can collect lots of data. Advertisers cooperate with it for pushing ads by its online platform. So, the chain of interest is advertisers to service providers to users. If the social media service provider does not give a breathing space to stakeholders, and it does not stop action when stakeholders think they affect negatively. In the scenario, advertisers do not know the low quality of data and inferences and users do not know why they receive inexplicable ads. Eventually, users will

look for a new social platform with better service and advertisers will also look for a new partner with common interests. The social media service media lost income and users, then go bankrupt. Thus, "provide stakeholders who perceive that they will be negatively impacted by the action with the opportunity to understand and to contest the proposed action" (Clarke, 2017) is necessary.

4.2 The Benefits

1. Making company deeply understand the interests of different types of benefits to optimize service.
2. Getting public praise to attract more users to use and more investors to invest.
3. Occupying more market share to get more benefits.
4. Establishing customer feedback mechanism, Understanding the latest customer service needs to adjust strategies.

4.3 The Consequences

1. Reducing company operating efficiency.
2. Wasting a lot of time to communicate with stakeholders.
3. Capital investment leads to financial pressure.
4. When a small number of people affected negatively refuse the action, which influences the decision power of the company.

If the social media service provider can accept the cost of capital and time to establish an effective feedback mechanism. This will not only improve the accuracy of the company's decision-making but also increase the satisfaction of the stakeholders. By the way, it will attract more users and investors. Therefore, Guideline 4.7 Breathing Space is essential for the long-term development of a company.

Question 5

5.1 Inherently Interpretable Model

5.1.1 Globally interpretable models

Adding interpretability constraints could be applied to the scenario.

By adding more semantically meaningful constraints could be added to a model to further improve interpretability. However, models with higher interpretability may result in lower prediction accuracy. In classification models, we can use enforcing sparsity terms so that decision trees are pruned by replacing subtrees with leaves to encourage long and deep trees rather than wide and more balanced trees, these constraints make a model simpler and could increase the model's comprehensibility by users. (Mengnan Du, 2020)

5.2 Post-Hoc Global Explanation

5.2.1 Model-agnostic explanation

Permutation feature importance could be applied to the scenario.

The importance of a specific feature to the overall performance of the model can be determined by calculating how the model prediction accuracy deviates after replacing the value of the feature,

(Mengnan Du, 2020)which the social media service provider can ensure that the importance of different data types to make the model more accurate.

5.2.2 Model-specific explanation

Generalized linear models (GLM) could be applied to the scenario.

The social media service provider can see how the model works by examining its weights and visualizing them. However, weights may not be reliable when different features are not properly normalized, and their measurement ranges vary. Besides, when the feature size is too large, the interpretability of the interpretation will be reduced, which may be beyond human comprehension. (Mengnan Du, 2020) In this way, the partial identities, conflated identities, obfuscated identities can be deleted before data analysis to improve the accuracy of inference.

5.3 Post-Hoc Local Explanation

5.3.1 Model-agnostic explanation

A local approximation-based explanation could be applied to the scenario.

When the social media service provider process data with multi-identity and suspicious identity, it can use an interpretable white-box model, which is well in a small neighborhood near the original input. Then the contribution score for each feature can be obtained by examining the parameters of the white-box model. (Mengnan Du, 2020) This can help the social media service provider identify effective identities faster.

5.3.2 Model-specific explanation

Back-propagation-based methods could not be applied to the scenario.

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