

Analysis on people's perception of Data Security and Privacy

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ABSTRACT

With the rapid development of smart devices, their usage gets increasingly entangled with the general public. As they facilitate people's daily life in various dimensions, this convenience however comes at cost of data privacy and security. For example, applications recommends products for people which the recommendation system builds up on the historical purchasing behaviors of the users. In this paper, we study the people's perceptions on the data security and privacy. We are also interested to learn the types of data that people are willing to trade for better user experience and convenience. We conduct the research through a survey that we publish on multiple social media platforms and analyze the data through multiple correlation experiments. We find that people's views on privacy and security could be related to various factors like education, time spent on phone, type of data being shared and reasons for use of data.

INTRODUCTION

Smart devices usage have swept the world with its convenience and portability since its invention around 30 years ago. With the increasing efficiency and multi-tasking capability, the smart devices, mainly cellphones, get to be embedded more and more deeply into people's daily life. As we say all the time, "data is the new oil", is not quickly grasped as the smart devices. People for most of the time ignore, if not overlook, the immense value hidden under the data. With the world's industrial giants transformed from resources companies, such as electricity and gas, to tech companies, such as Google, Facebook, Amazon, etc., we come to realize that the monetary potential that the data can bring is humongous. However, people and government just recently come to realize the threats on individual's privacy rights brought by unconstrained data collecting algorithms, such as smart devices applications, cameras, etc. Previous works like noTrace [1] have tried developing solutions to increase people's awareness about type of data being collected to protect them against leakage of private data like personally identifiable information or sensitive information.

Therefore, in this study, we aim to study the research question: how do people evaluate or feel about their data being collected? To what extent are they comfortable to trade data privacy for user experience? Use of apps have increased in the COVID-19 era and studies like "Enabling User-centered Privacy Controls for Mobile Applications: COVID-19 Perspective"[2] have shown that trust on the agency collecting

data and transparency of the process plays important role in user-adoption.

We conduct our study through survey which consists of multiple types of questions aiming to explore different granularity of research questions. The survey contains around 15 questions, and is published in multiple social media platform in order to diversify the responses as much as possible. Our survey is structured in a top-bottom way, i.e., from more general behaviors to more specific thoughts. We start by querying the users' demographics, then their smart devices usage history, to their thoughts on data security and privacy. Our survey has collected around 60 responses, with a response completion rate of 81%.

We analyze the data through multiple data visualization tools, such as pie chart, bar chart etc. As we have speculated, people of higher education degree are more concerned with their data privacy and security. However, the gender and race factors do not have strong correlation with people's awareness of data privacy and security. We also observe that people care more about their data security when their daily cellphone usage increases. People are also more willing to share their data if more transparency about data collection and sharing is shared with them. One thing that could raise concern is people's general reluctance attitude towards reading security terms or application permissions when installing applications. As during the USA Senate Hearing with Mr. Mark Zuckerberg, one senator criticizes sharply the security terms that Facebook utilizes, the critic goes like: "Mr. Zuckerberg, I strongly encourage you to go home and rewrite your security terms, because they are not made for people to understand." (Note not exact words.)

To put the survey on a broader level, humankind has gone through two major revolutions, the agricultural revolution and the industrial revolution. With each revolution comes fundamental society hierarchy reshuffling and political systems collapse. The "AI revolution", as some people call it, is happening right now, but people never feel it in the moment, but have only hindsight. However, what is dangerous about the "AI revolution" is that it may leave some people potentially "economically useless" forever. Interested readers are welcome to read the book "21 Lessons for the 21st Century" by Yuval Noah Harari. While the government is acting unacceptably slowly to this new revolution, people should be more aware of the potential dangers present by these unbiased data collection algorithms, of which the profits the people have no share.

METHODS

Survey and Data Collection

Our survey consists of 19 questions organized into 4 categories: demographic information (3 questions), smart devices usage habits (4 questions), security habits (6 questions), privacy perceptions (4 questions), and general feedback (2 questions). In the first category, we query on the age, the gender and the education background of user. In the second category, we query on the years, average hours per day and purposes of smart devices usage, we also ask whether users use smart devices to track their personal data such as health status, workout routines, etc. In the third category, we ask users the frequency that they change their password, whether they install applications from third party, read through application provider's privacy policy or the applications permissions access when using a smartphone device. We are also interested in the users behavior about the website cookies which are files created by the websites to collect users' data for better user experience. In the fourth category, we ask users what data they think the phone applications can collect from them, and how comfortable they are to trade these information for better user experience. The users are also asked about under which condition they would be comfortable to share these data with applications and whether they are concerned about their privacy and feel a stricter privacy law is necessary.

The survey contains 12 single-choice questions, 3 multiple-choices questions, 3 text-entry questions, and 1 slider question. We developed the survey using the online platform called Qualtrics¹. We publish the survey on diverse platforms, Reddit², and social media such as What's App and WeChat. In total, 63 people took our survey, among them, 51 completed the survey and the rest are in progress which accounts for a response rate of 81%. Therefore, we take only into consideration the completed surveys.

Data Analysis

We used the mean of different data points that we collected during our survey to compare and understand which factors play an important role in users perception towards privacy. We calculated percent changes to understand the extent to which a particular factor influences the users perception towards privacy.

RESULTS

Demographics

Out of all the participants of our survey 44.07% identified as female, 50.85% identified as male, 3.39% identified as non-binary and 1.69% identified as a non listed gender. Majority of participants belonged to the 18-24 age group (47%) followed by the 25-34 age group which was the second most common (39%). As for education majority of the participants had a master's degree followed by bachelor's degree and high school graduate diploma or equivalent.

Device Usage Habits

¹<https://www.qualtrics.com/>

²<https://www.reddit.com/r/SurveyExchange/>

Majority of the participants reported that they have been using smartphones for the last 8-10 years(57.60%), 30.77% have been using it for 5-7 years and the rest belong to greater than 10 years or less than 5 years. Most people reportedly used smartphones for 3-4 hours(41.82%). Followed by 1-2 hours and 5-6 hours which are almost the same values (23.64%) and at last more than 6 hours(10.91%). Social Networking, Web surfing, Entertainment, Calling and Texting were the top purposes for which people used their smartphones. Many also used their devices for health tracking.

Security Habits

Regarding their security habits, most of the people reported changing their passwords only when they feel it is compromised. But, people usually avoided downloading applications from unknown sources on their phone with only 22.22% installing applications like games or social media only because it was not available in their region.

Privacy and Permissions

Although majority of the participants reported rarely or never reading through privacy policies they paid attention to the permissions an app was requesting with 37% reading always and 24% reading sometimes. Regarding the data stored as cookies on their devices (most people preferred accepting only necessary cookies. (see Figure 1,2,3). Also, 72.55% people feel that we need stricter privacy laws.

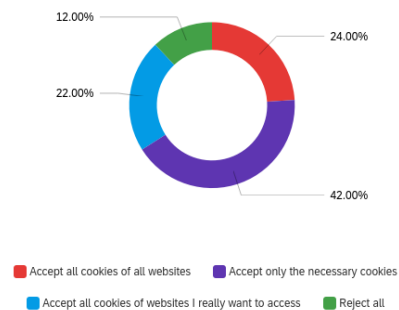


Figure 1. Behaviour of users when they access a website that asks cookie preferences

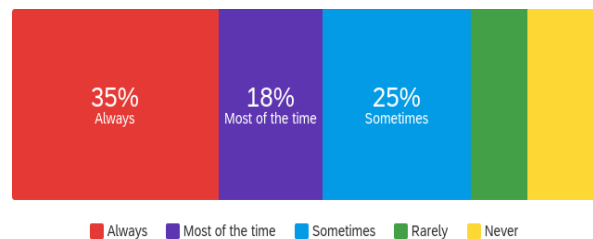


Figure 2. How often do users go through access permissions of an app

DISCUSSION

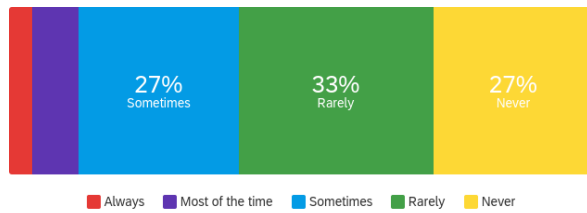


Figure 3. How often do users go through privacy policies of an app

- We observe that people who did a masters degree are 50% percent more likely to be concerned about their privacy compared to respondents who studied a bachelor’s degree. So this supports the assumption that education of the user might play a role in how users perceive privacy
- We also see that as the users’ usage of their phone increases the more they are concerned about their privacy, For example people who use their phone for 5 to 6 hours are twice more likely to feel concerned about their privacy compared to those who use phones for 3 to 4 hours. So the extent of usage and the purpose users use their smartphones for can influence their perceptions towards privacy. For example, a user who uses social media apps like Facebook and Instagram might have encountered situations like personalization of ads and recommendations which a regular user who just uses their smartphone to contact people or perform activities that don’t necessarily personalize their experience based on the user.

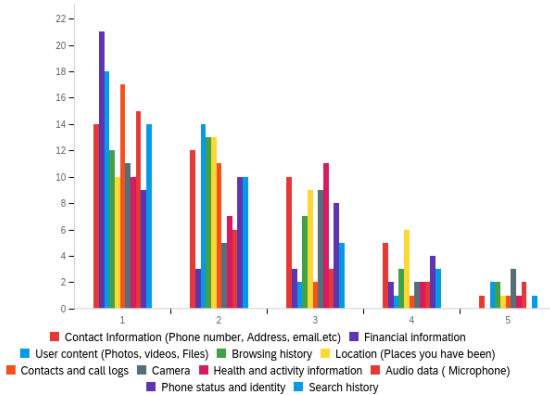


Figure 4. Average of how comfortable are users to share the following data (1- most uncomfortable, 5- most comfortable)

- We can see that users are mostly comfortable sharing their camera and location access mostly since a lot of applications especially social media require these. People are least comfortable sharing their financial information and contact information (see Figure 4)
- We can also see that most of the users would be comfortable sharing their data if there is information on how their data was going to be collected, stored and used but we can also see that a lot of users would not want apps accessing any of their data. (see Figure 5)

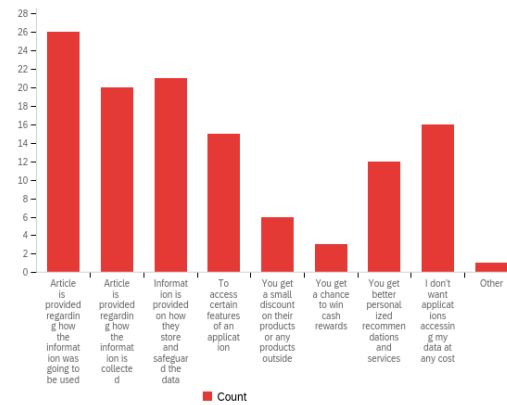


Figure 5. In which cases users are comfortable to share their data

Challenges and Limitations

Developing a survey which could answer all the relevant questions without being too lengthy for the participants to answer was one of the major challenges. Due to time constraints we couldn’t gather a lot of participants and had to rely mostly on friends and family. Hence, the data collected could have been biased towards people of a certain age group and certain level of education. Due to the low number of participants, the research might not be able to generalise the findings to larger population. We are aware of these limitations and will aim to correct and overcome these in our future work.

CONCLUSION AND FUTURE WORK

We observe that people pay a lot of attention to what kind of data an application is accessing and would like stricter laws to have more control over their data. Education level of the user and time spent on device could also affect people’s concern over privacy. People don’t feel 100% comfortable sharing any kind of data but allow it for the usage of apps. Transparency among collection, storage and usage of data especially when presented in an accessible and easy to read manner could help people trust applications with their data, which could help applications collect needful data responsibly.

Future Work

Our future work would aim to include larger number of participants and diverse participant background. We would also like to dig deeper and find out if the relationships that we found in data were statistically significant or just a coincidence. Potentially, we could use additional methods of data collection like interviews or focus groups to get detailed insights

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