

Facial Recognition and Public Health

— The First Report in Survey Series on
Artificial Intelligence and Healthy Society

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China-UK Research Centre for AI Ethics and Governance, Institute of Automation,
Chinese Academy of Sciences

Authors:

Yi Zeng

Research Center for AI Ethics and Safety,
Beijing Academy of Artificial Intelligence
China-UK Research Centre for AI Ethics and Governance,
Institute of Automation, Chinese Academy of Sciences
Email: yizeng@baai.ac.cn

Enmeng Lu

China-UK Research Centre for AI Ethics and Governance,
Institute of Automation, Chinese Academy of Sciences

Kang Sun

China-UK Research Centre for AI Ethics and Governance,
Institute of Automation, Chinese Academy of Sciences

Samuel Curtis

Schwarzman Scholars, Tsinghua University

I. Introduction

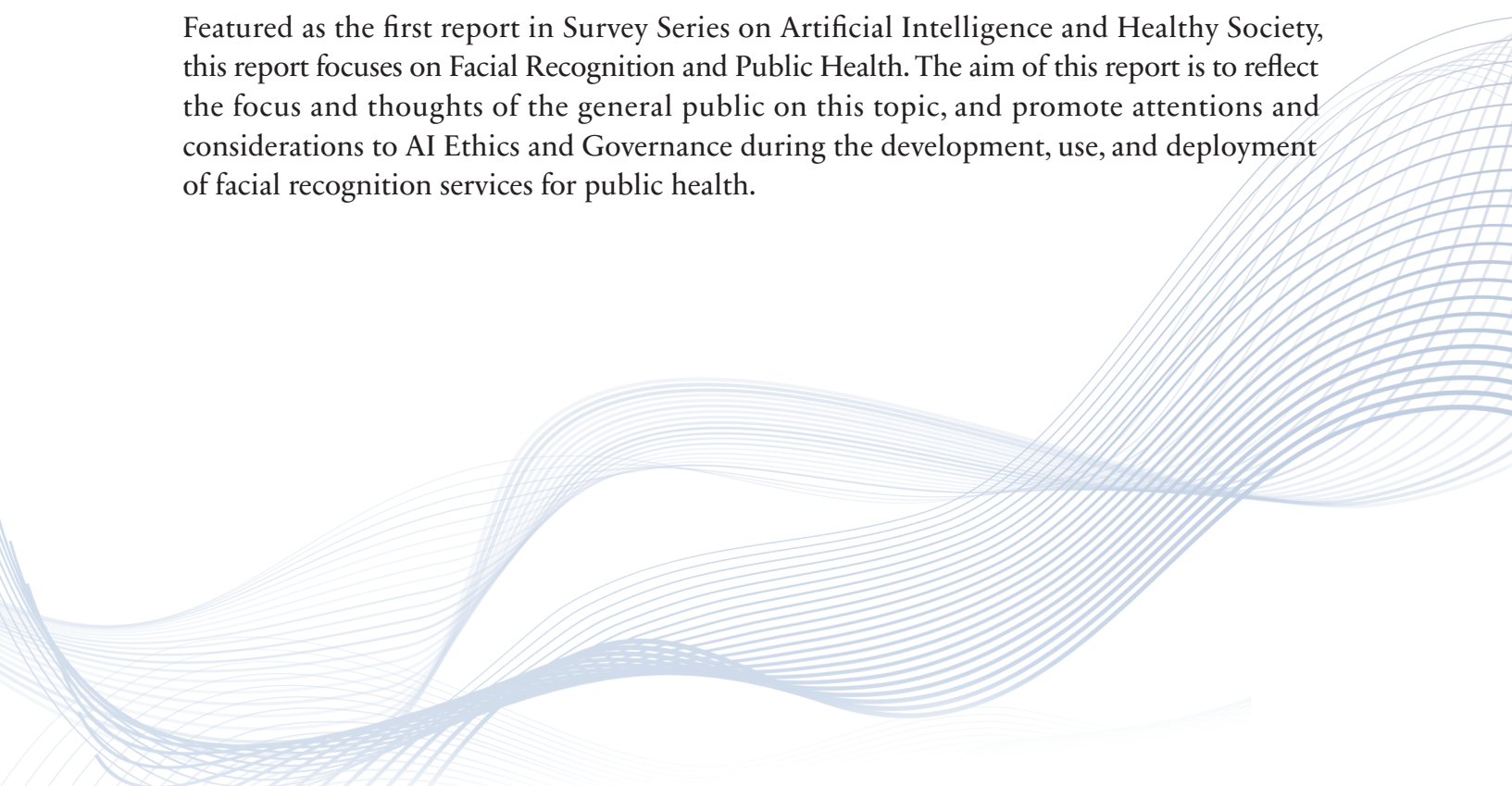
As a disruptive technology, Artificial Intelligence (AI) has been changing all aspects of humanity and society, and is expected to promote the establishment of a “healthy society.” The word “healthy” refers to both public health and people’s physical and psychological health, and the harmonious, healthy and sustainable development of relations between people and nature, society and the environment. Advanced technology should be developed for promoting the establishment and development of a “healthy society.” To achieve this goal, special attention must be given to the potential risks involved in AI development and applications.

In this regard, the Research Centre for Artificial Intelligence Ethics and Safety at the Beijing Academy of Artificial Intelligence, in collaboration with the China-UK Research Centre for AI Ethics and Governance of Institute of Automation of Chinese Academy of Sciences, initiated this survey and study on AI and healthy society, aiming to contribute to the understanding and building of a healthy society driven by AI through research and analysis.

Facial recognition, an important branch and application of AI technology, has achieved positive effects in national and public security, daily life and other scenarios. However, it also brings risks and challenges in terms of privacy and security. While during the COVID-19 outbreak, facial recognition and other automated detection technologies have played an important role in epidemic prevention and control, applications related to citizens’ personal information and privacy should be managed in compliance with the laws and regulations.

Definitions in this survey: A “public health crisis” is an event similar to the COVID-19 pandemic. A “normal situation” is a circumstance where no public health crisis happens. A “public space” is a place that is usually open to the general public, such as sidewalks, parks, and government buildings. A “non-public space” refers to blocks and buildings that are privately owned or not open to the general public.

Featured as the first report in Survey Series on Artificial Intelligence and Healthy Society, this report focuses on Facial Recognition and Public Health. The aim of this report is to reflect the focus and thoughts of the general public on this topic, and promote attentions and considerations to AI Ethics and Governance during the development, use, and deployment of facial recognition services for public health.



II. Key Findings

Based on statistical analysis from the survey results, the key findings can be summarized as follows.

2.1 The respondents generally appreciate the benefits of installing facial recognition in areas with public (health) security concerns. Most of the respondents acknowledge public safety as the primary reason for accepting facial recognition. The respondents generally agree that those who conceal their faces intentionally during a public health crisis should be punished, and most respondents are in favor of enhancing facial recognition functionalities (it should be noted that since the research was conducted during the COVID-19 public health crisis, this result might be affected in terms of facial recognition of masked faces and temperature checks).

2.2 The respondents are concerned about their privacy related to the uses of facial recognition. More than half of the respondents express concern over their privacy in the uses of facial recognition and hope they can realize and control the use of their facial data, although the majority of them do not work in industries or research related to facial recognition and only a few understand the technology. It shows that respondents remain concerned about privacy, even in the face of a public health crisis.

2.3 The COVID-19 public health crisis increased the acceptability of facial recognition among the general public. During a public health crisis, the respondents are more willing to accept facial recognition. They acknowledge the positive role the technology plays, as well as enhanced facial recognition functionalities, but they still expect their privacy to be well-protected.

2.4 The respondents hope the application of facial recognition can be reduced when the pandemic ends. They believe facial data collected at this special time should be deleted afterwards, and that unnecessary facial recognition applications eliminated.

2.5 Some of the respondents are not sure whether they support the reduction of facial recognition applications related to public health crises when the pandemic ends, which shows their concern over the recurrence of such public health crises and similar potential crises. This also gives weight to appreciating the potential of such technology to be prepared for future emergencies. Other respondents express reservations in terms of reducing facial recognition usage when the emergency ends, which highlights the necessity to establish a public health crisis precautionary and defense system driven by technology in order to prepare for any recurrence.

2.6 The acceptability of facial recognition applied in public or non-public spaces is determined by people's needs for privacy and security. Facial recognition in public or non-public spaces is more likely to be accepted when there are outstanding security concerns, whereas its acceptability is lower when people would give more priority to their privacy as security concerns are not prominent.

III. Research Methods

The questionnaire consists of five sections: basic information of the respondents, knowledge about facial recognition technology, attitude towards facial recognition in normal situations, attitude towards facial recognition during a public health crisis, and attitude towards facial recognition after the public health crisis.

The research team published the questionnaire on the WeChat official account of the Beijing Academy of Artificial Intelligence, and on the official website of the China-UK Research Centre for AI Ethics and Governance (<https://ai-ethics-and-governance.institute/2020/03/27/facial-recognition-and-public-health-management-survey/>). Any user can access and fill out the questionnaire on their smartphones or computers. The questionnaire was also shared in WeChat Moments and group chats. This is an anonymous survey collecting no sensitive personal information. The respondents could choose to answer all or some of the questions. The questionnaire (in Chinese) can be accessed here: <http://forms.baai.ac.cn/f/ZPYKaS>. The questionnaire (in English) can be accessed here: <https://forms.gle/9U5Lc6krFrpE9Ubr9>.

The survey was carried out from March 27, 2020, through April 8, 2020. The research team received a total of 1,133 valid questionnaires and 4 invalid ones. Valid questionnaires came from 11 countries, and 961 of them are from China (including Hong Kong, Macau, and Taiwan), with all provinces, municipalities directly under the central government, autonomous regions, and special administrative regions covered. Female respondents accounted for 49%, while males for 51%. 42.8% of the respondents have undergraduate degrees, and 40.8% have graduate degrees or higher. The majority of the respondents are students. See Figure 1 and Figure 2.

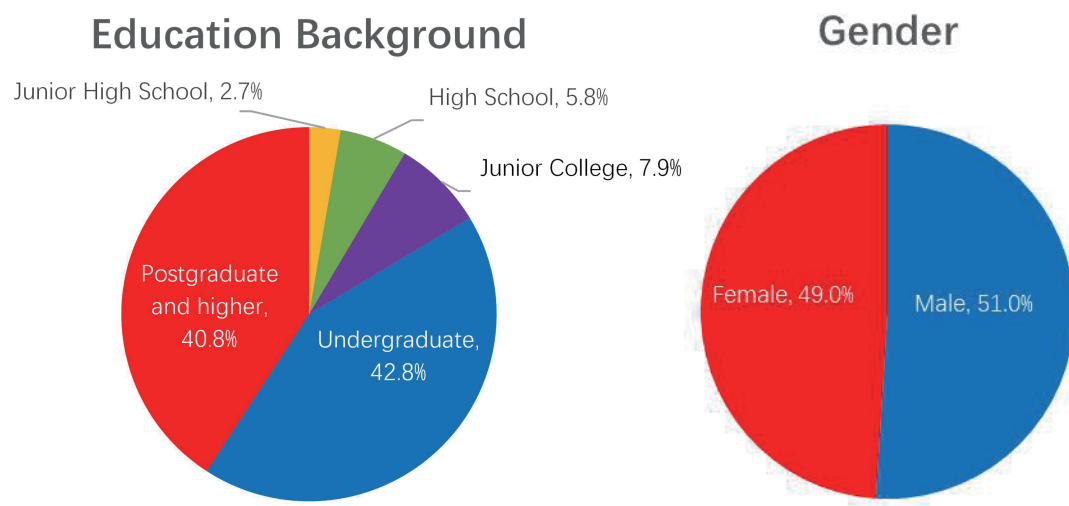


Figure 1 Respondents' Education Background and Gender Data

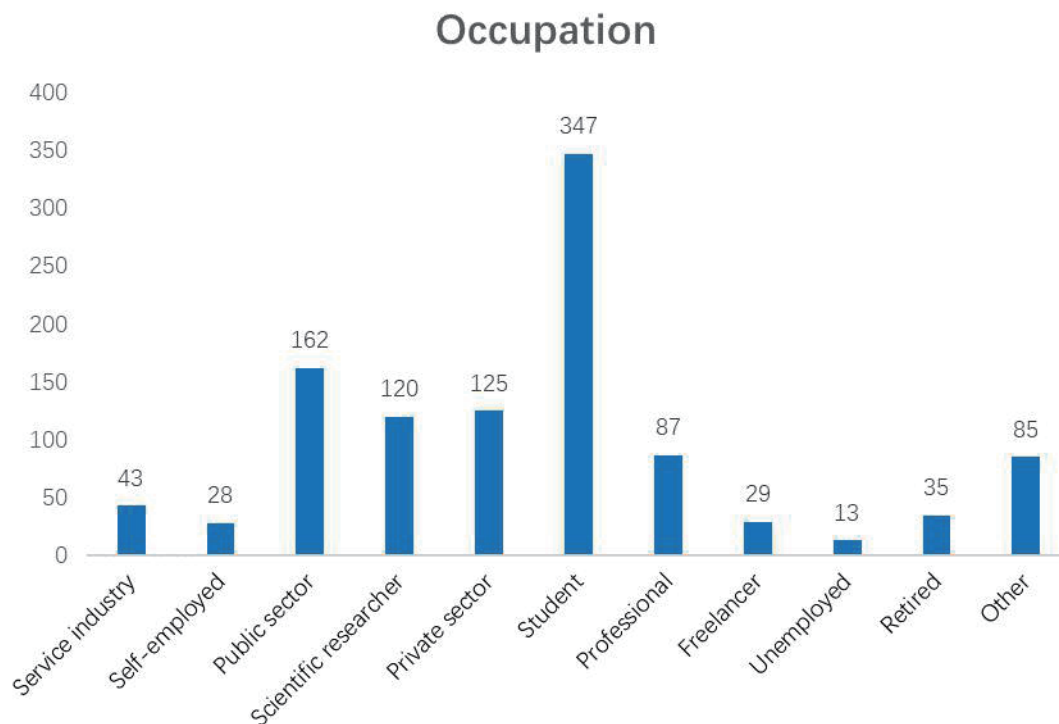


Figure 2 Respondents' Occupation Data

In this questionnaire, 33 questions are based on the Likert scale. According to reliability and validity analysis ¹, the results show a reliability coefficient (Cronbach's alpha) of 0.873 (good), which means the results are reliable. The KMO value of validity is 0.989 (greater than 0.5), indicating the data applies to factor analysis; the Bartlett test shows a P-value lower than 0.05, indicating that the results are valid.

¹ Reliability analysis aims to examine the consistency or stability of results with a reliability coefficient as its measurement. Larger reliability coefficient indicates higher reliability. The best reliability coefficient is 0.8 or higher; 0.7 to 0.8 is acceptable. Validity analysis aims to test whether the interviewees understand the intention of the questionnaire design. In other words, it helps to find out whether the questionnaire meets its goal.

IV. Survey Results and Analysis

4.1 Respondents generally appreciate the benefits of installing facial recognition in areas with security concerns

71.3% of the respondents choose public safety as the reason for accepting facial recognition, which ranks the top among all the reasons.

▶ The respondents generally agree that those who conceal their faces intentionally during a public health crisis should be punished.

As shown in Figure 3, only 37.1% of the respondents believe that those who intentionally conceal their faces in front of facial recognition cameras during normal situations should be punished, while 34.1% taking a neutral stand. However, 63.6% of the respondents agree that those who intentionally conceal their faces during a public health crisis in front of facial recognition cameras should be punished, while 25.3% taking a neutral stand. It is thus revealed that although there are differences among respondents when deciding whether those who cover their faces intentionally should be punished in normal situations, most of them agree that there should be punishment during a public health crisis. This partly shows that most respondents appreciate the importance of facial recognition for safeguarding public health.

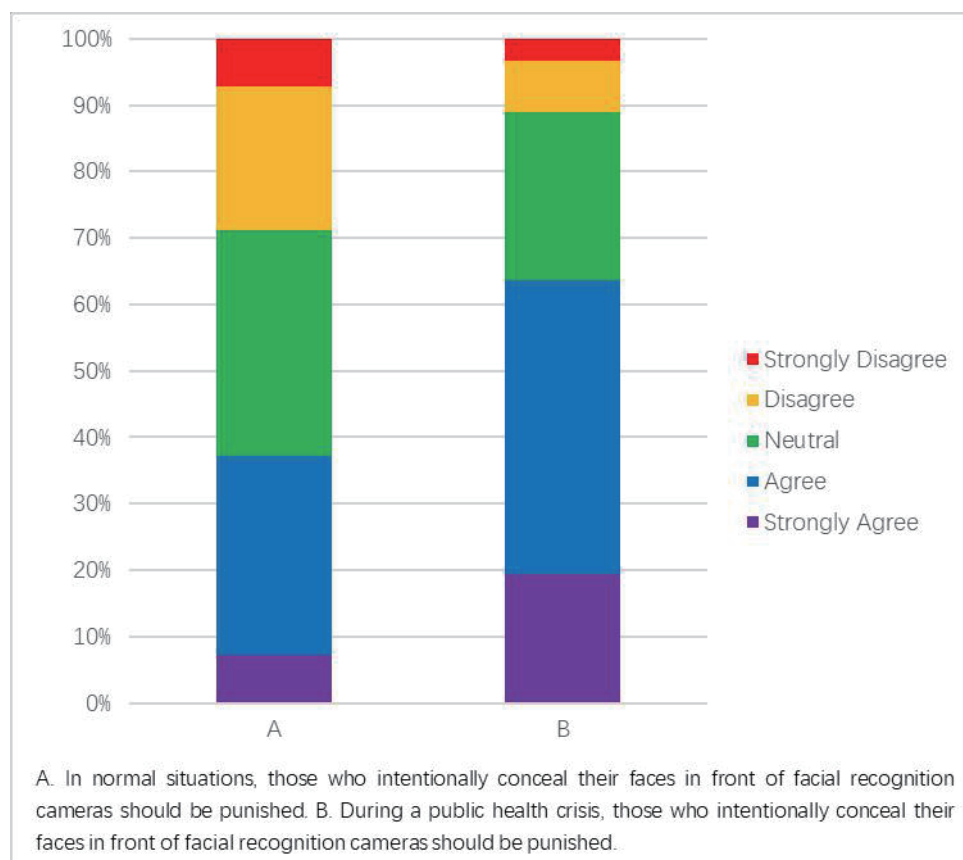


Figure 3 Whether those who intentionally conceal their faces in front of facial recognition cameras should be punished — in normal situations and during a public health crisis

► Most respondents accept enhanced facial recognition

The respondents generally support enhanced facial recognition for masked faces and using facial recognition technology for temperature checks. 68.3% of the respondents support the usage of enhanced facial recognition for people with masks in normal situations; 77.1% support the usage of enhanced facial recognition for temperature checks in normal situations. It should be noted that as the survey was conducted during the COVID-19 outbreak, the respondents are more likely to welcome the application of facial recognition related to pandemic prevention and control.

4.2 Respondents are generally concerned about privacy in facial recognition

In terms of reasons for refusal of facial recognition, 76.0% of the respondents cited privacy disclosure as the primary concern.

► The respondents who know little about facial recognition are also concerned about the privacy of facial recognition.

Only 9.4% of the respondents work in areas related to facial recognition; 33.7% know something about the technology. But 65.8% pay attention to the privacy issue of facial recognition in daily life. A total of 60.6% of the respondents note that they have no idea who collects the data of their facial features, but 93.8% believe that they are entitled to be informed. Only 33.5% of the respondents believe that their facial data remains safe for now and data disclosure is unlikely to happen. This means that most respondents know little about how their facial data is being used and are concerned about their data security (See Figure 4).

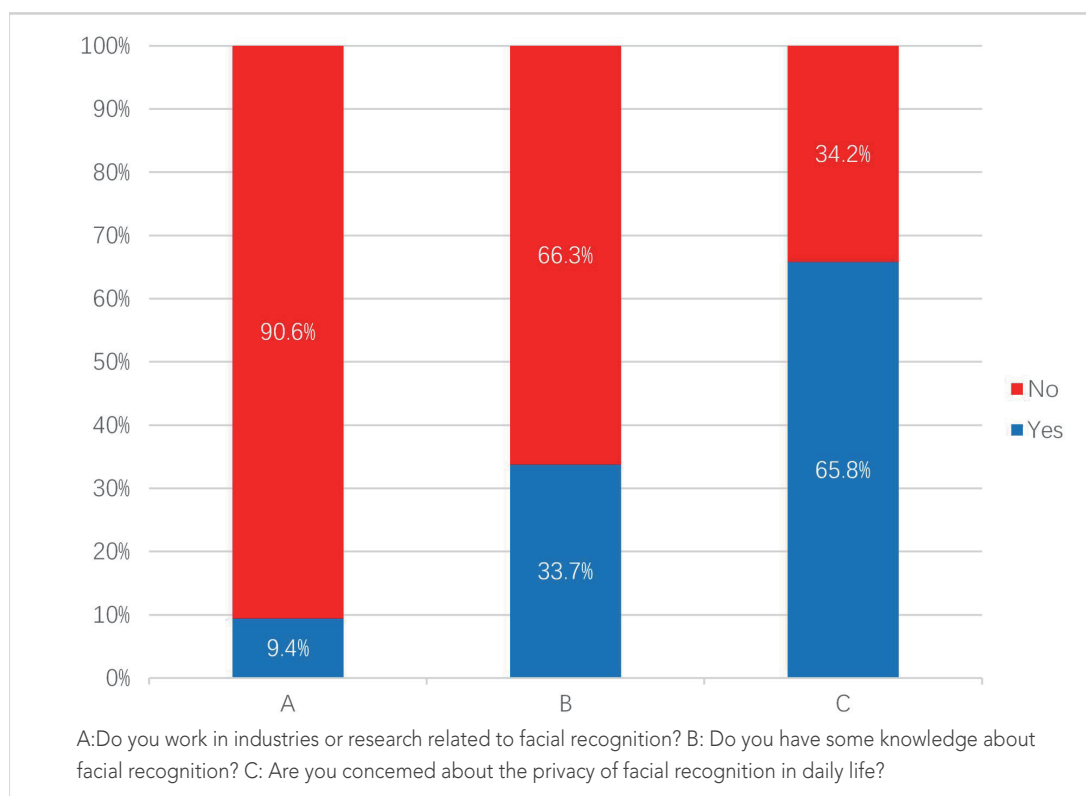


Figure 4. Respondents' knowledge of facial recognition and concerns about its privacy issues

► **Respondents have privacy concerns over facial recognition both in normal situations and in a public health crisis.**

As shown in Figure 5, 45.7% of the respondents do not support undifferentiated tracking of activities with facial recognition in normal situations, and 29.4% remain neutral. Even during a public health crisis, only 54% of the respondents agree with such tracking. The results show that, out of concerns for privacy or freedom, a large proportion of the respondents may oppose undifferentiated tracking of activities with facial recognition.

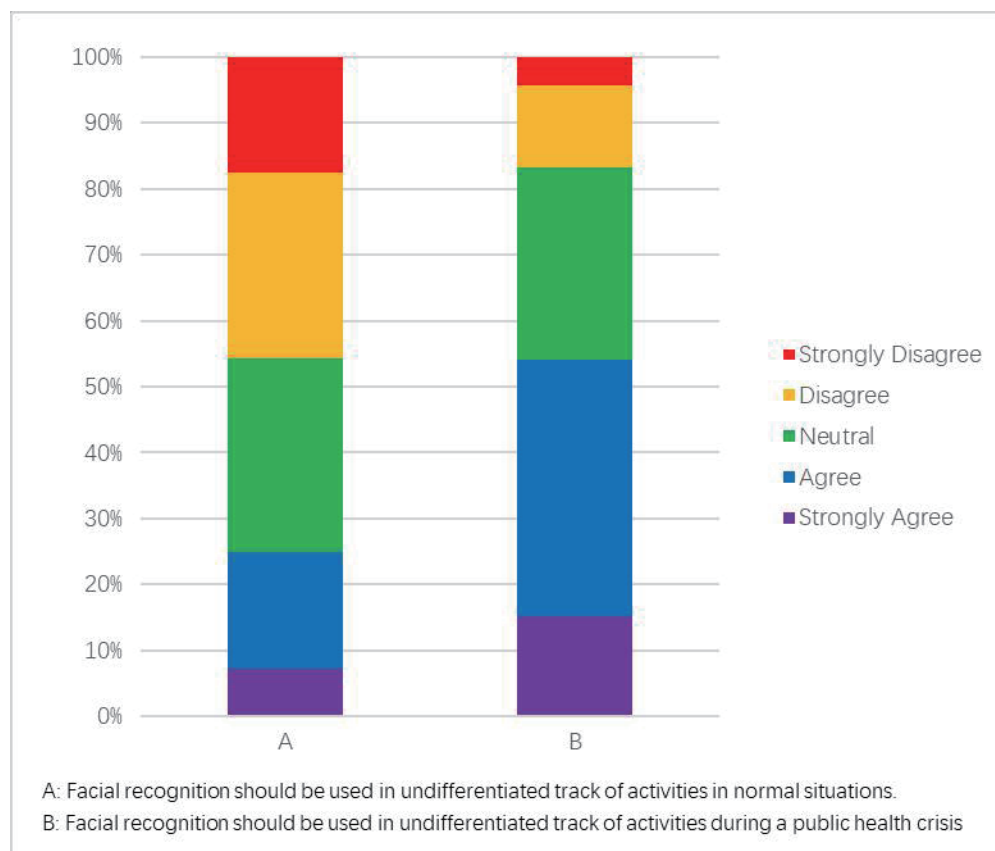


Figure 5. Whether facial recognition should be used in undifferentiated tracking of activities in normal situations and during a public health crisis

► **Even facing a public health crisis, the respondents still want to be informed of the usage of their facial data.**

As shown in Figure 6, in times of a public health crisis, 86.6% of the respondents consider it necessary to be informed of personal facial data collection in non-public spaces; 89.5% believe that they should be informed of why and how such data is collected and used. 85.9% want to be informed of where facial recognition usage is extended to, and 93.2% note that they should also be informed beforehand in cases where such data would be used if it is to be used elsewhere after the public health crisis ends.

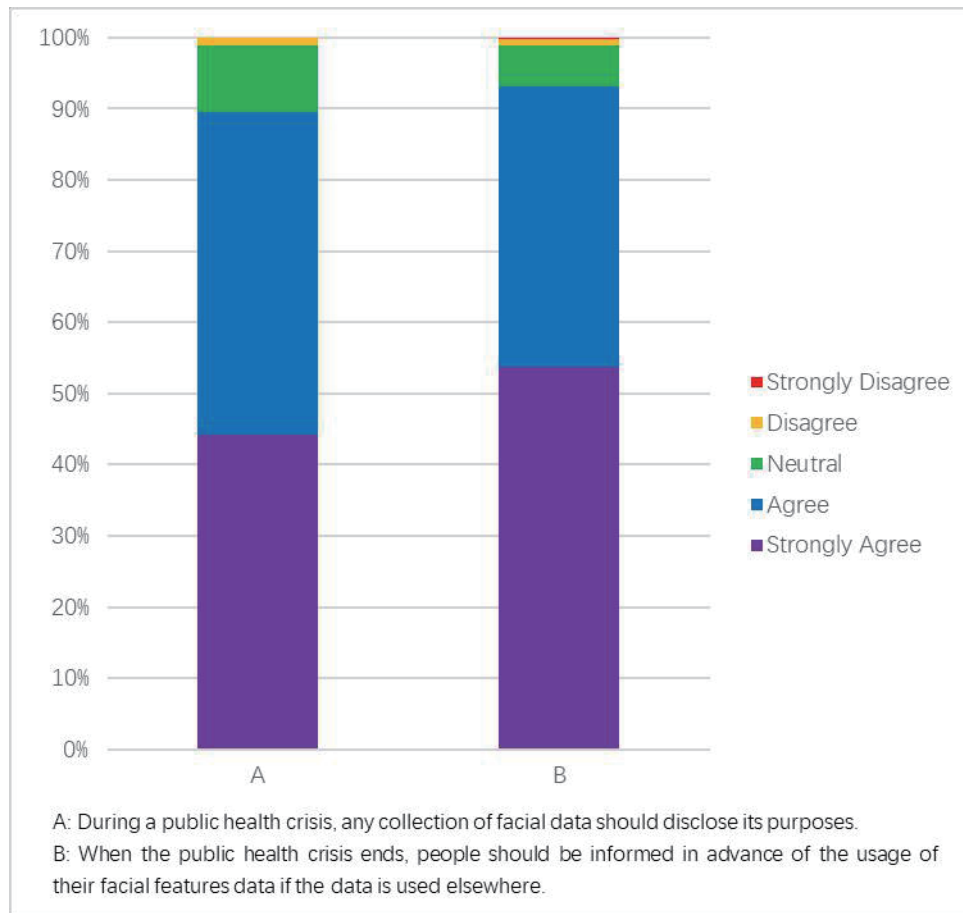


Figure 6. Informed consent for facial recognition during and after the public health crisis

4.3 The outbreak of a public health crisis increases the acceptability of facial recognition technology among the general public

► Respondents mostly appreciate the positive role played by facial recognition during a public health crisis.

As shown in Figure 7, 86.1% of the respondents explicitly acknowledge the effectiveness of facial recognition in helping combat a public health crisis; 74.0% note that they have experienced the positive role of facial recognition in responding to a public health crisis; 77.6% clearly state that the application of facial recognition in the current public health crisis is reasonable. Thus, the respondents generally acknowledge the usefulness of facial recognition application during a public health crisis.

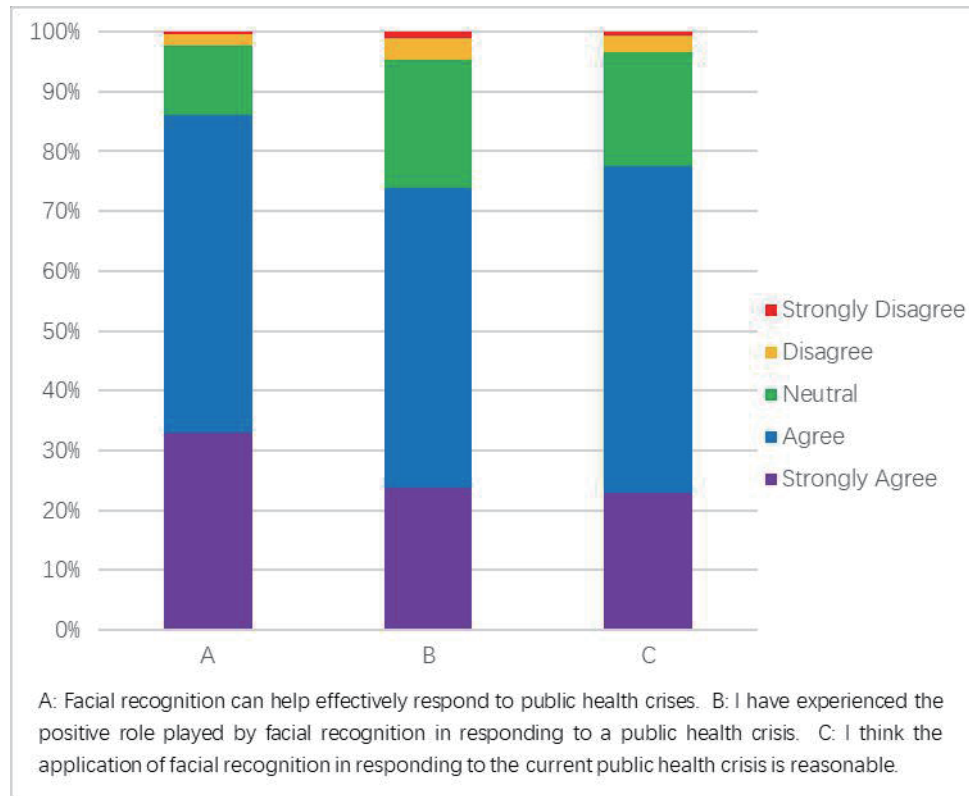


Figure 7. Knowledge of the application and purpose of facial recognition in a public health crisis

► Respondents support strengthening the development and installment of facial recognition in times of a public health crisis.

If facial recognition is helpful in response to a public health crisis, 84.8% of the respondents agree with its installment in public spaces; 69.0% agree with its installment in non-public spaces. Enhanced facial recognition is generally accepted among respondents in times of a public health crisis. Altogether 81.9% of the respondents are supporters of enhanced facial recognition for people with masks, and 88% support enhanced facial recognition for temperature checks. This shows that, during a public health crisis, most respondents accept the development and installment of facial recognition.

4.4 Most respondents preferred reducing unnecessary facial recognition applications after a public health crisis. Some respondents have no clear view on supporting such reduction, which shows their concerns about the recurrence and emergence of such crises.

► Most respondents believe that when the public health crisis ends, facial data collected during this time should be deleted, and the applications of facial recognition should be reduced.

As shown in Figure 8, in the case when a public health crisis is over, 82.3% of the respondents support the idea of deleting the facial data collected for pandemic control and informing the public about such deletion; 80.3% contend that the facial data owned by involved businesses

for epidemic control should be destroyed; 72.3% think it is important to reduce unnecessary scenarios of facial recognition applications. It can be seen from the results that, after everything is back to normal, the respondents generally believe that it is necessary to delete facial data collected for epidemic control and reduce the installment of facial recognition.

► **After a public health crisis, some respondents have no clear view on supporting such a reduction. This may result from their concerns about the recurrence of the crisis or the emergence of new crises, against which they believe such technology can be used for prevention purposes.**

It is worth noting that 27.7% of the respondents remain neutral on, disagree with, or strongly disagree with cutting down unnecessary applications, showing that some respondents have taken on a wait-and-see attitude toward the potentials of facial recognition technology and its applications under normal or unknown circumstances. Recently, some regions experienced a recurrence of the COVID-19 pandemic and adjusted their risk level from medium to high², which underscored the rationality and necessity of these concerns.

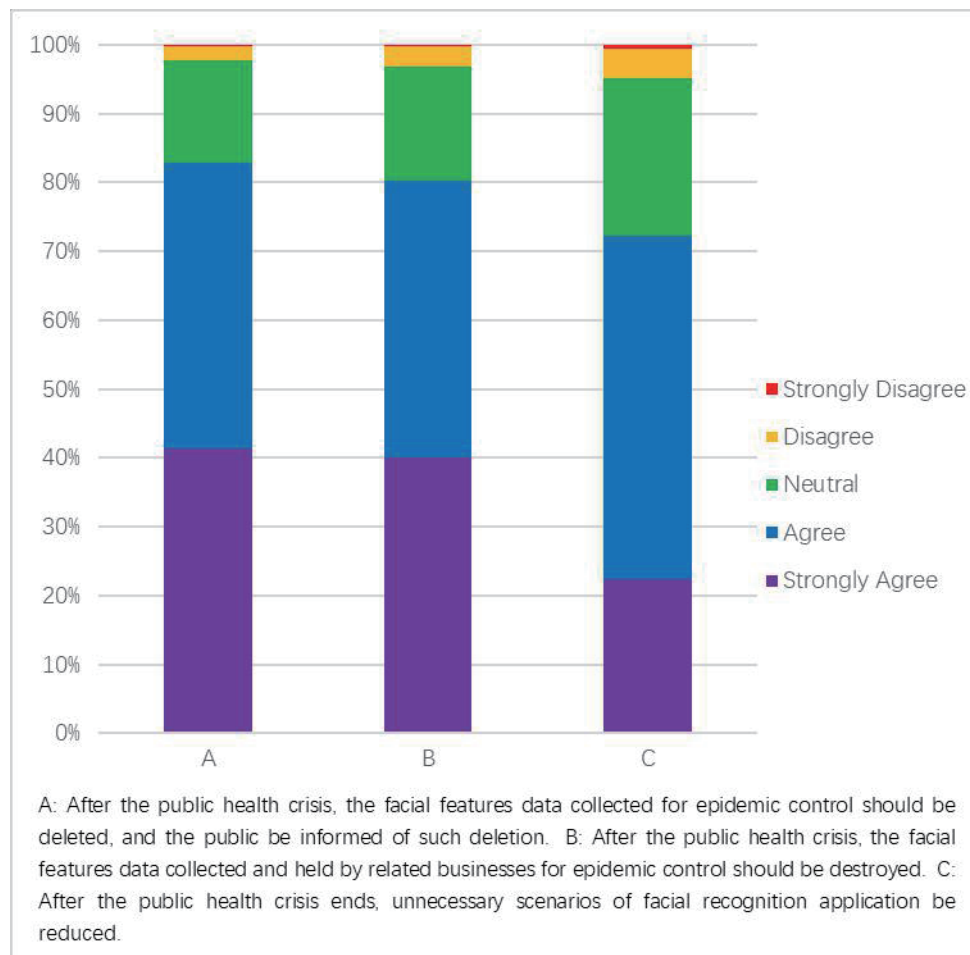


Figure 8. Disposal of facial recognition applications and facial data after a public health crisis

4.5 The acceptability of facial recognition in public or non-public spaces is determined by privacy and security needs.

► In normal situations with no public health crisis, the respondents believe those who reject facial data collection should not be prohibited from entering public or non-public spaces, with no significant attitude difference between public or non-public spaces.

As to whether it is necessary to prohibit those who reject facial data collection from entering specific areas in normal situations, for public spaces, 38.9% of the respondents disagree, and 33.3% are neutral; for non-public spaces, 37.6% of the respondents disagree, and 30.9% are neutral. The attitudes of respondents remain similar for public and non-public spaces. See Figure 9.

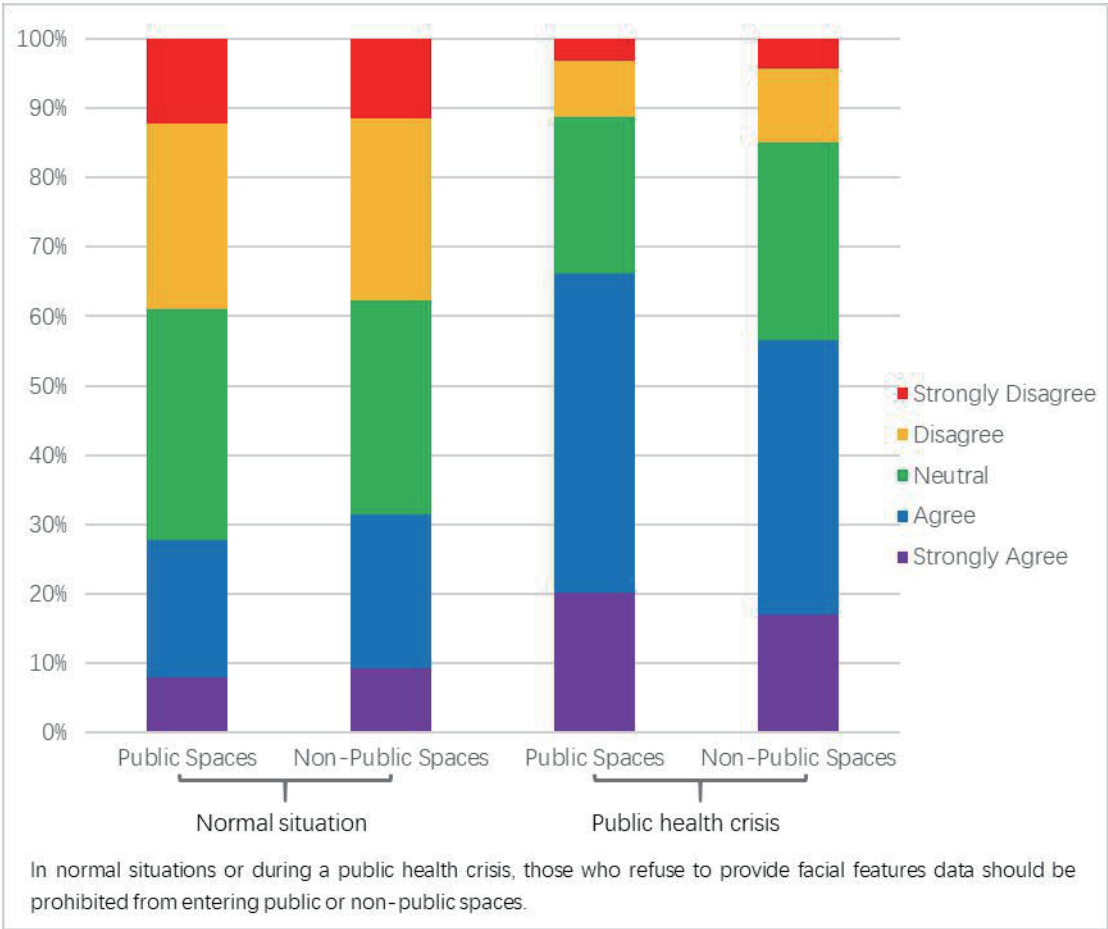


Figure 9. Whether or not to prohibit those who reject facial data collection from entering public or non-public spaces in normal situations and during a public health crisis

► **In times of a public health crisis, the respondents prefer prohibiting those who reject facial data collection from entering public or non-public spaces, and such preference is more strongly expressed in the case of public spaces.**

As to whether it is necessary to prohibit those who reject facial data collection from entering specific areas during a public health crisis, for public spaces, 66.1% of the respondents support this idea, and 22.7% are neutral; for non-public spaces, 56.6% of the respondents agree, and 28.4% are neutral. This shows that, during a public health crisis, such preference is more strongly expressed in the case of public spaces than non-public spaces.

► **When the public health crisis ends, the respondents are more willing to destroy the facial data collected in non-public spaces than in public spaces.**

After the public health crisis, 84.3% of the respondents support destroying the facial data collected in non-public spaces, and 72.1% maintain the same idea for those collected in public spaces. This indicates that the respondents are more willing to destroy the data collected in non-public spaces than in public spaces.

► **When the public health crisis ends, more respondents support collecting facial data in public spaces than in non-public spaces.**

After the public health crisis, to avoid the outbreak of another pandemic, 65.5% of the respondents support the collection of facial data in public spaces, and only 40.2% support this in non-public spaces, which means that when the pandemic is over, the respondents are more supportive of collecting facial data in public spaces than in non-public spaces. Additionally, although the proportion of respondents supporting facial data collection in non-public spaces is lower than that in public spaces, for non-public spaces, the respondents who explicitly support still outnumber those who explicitly oppose. This reveals public concerns about the recurrence of a public health crisis, as well as the public's expectations for the potentials of facial recognition-related technologies.

V. Conclusions and Suggestions

Owing to the survey method adopted by the team, the proportion of respondents with a bachelor's degree or higher is 83.6%. In this sense, the survey results may be more of a reflection of the opinions of individuals with higher educational background. Also, certain additional conditions are applied to a few questions, which may affect the universality of the conclusions to some degree.

This survey was conducted during the COVID-19 pandemic. China has taken proactive measures to check body temperatures and track close contacts with facial recognition technology in response to this public health crisis. Although a densely populated country, China only spent around two months to bring the pandemic within the “mitigation stage.”³ In this process, the Chinese people also learned about the positive role of facial recognition and other related technologies. We can see that the respondents, **while acknowledging the positive role of facial recognition in responding to a public health crisis, also expressed concerns about issues such as privacy and security. They hope that the usage of facial recognition can better protect personal privacy and data, better safeguard public security, and also better leverage technological potential in the fight against public health crises in compliance with laws and regulations.** Some respondents expressed reservations in terms of reducing unnecessary applications of facial recognition, which reveals their concerns about the recurrence of such crises or the emergence of new crises when the pandemic is over, and their expectations for the potential uses of these technologies in preventative measures. The pandemic itself and this survey both show that **strengthening a technology-driven early warning and prevention system for public health crises is all the more necessary, so as to prevent the outbreak of another large-scale public health crisis.** Additionally, some respondents of this survey also expressed their hope to **enhance public education about facial recognition and thus improve the public understanding of the technology itself, as well as its potential applications. This will encourage more people to accept and support the “proper use” of facial recognition and other AI technologies, to participate in the supervision of potential technological or ethical risks arising from technological development and application, and to offer their indispensable feedback and suggestions.**

³ https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200405-sitrep-76-covid-19.pdf?sfvrsn=6ecf0977_4