Rights Risks of Using Affective Computing Technology in Public Governance and Their Regulation

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Abstract: *As the frontier of intelligent computing technology, affective computing has been used in border inspection, case investigation, crime assessment, public opinion management, traffic management and other scenarios of public governance. However, there are still public risks associated with its failure to meet the basic requirements of modern public governance, and these risks are rooted in its technical characteristics. The technical characteristics of turning emotions into signals can give rise to such problems as degrading the right to informed consent, de-governance, and undermining human dignity when applied in public governance, and consequently can lead to social rights anxiety. Additionally, the affective modeling characteristics of affective computing tend to incur the rights risks of insufficient algorithm accuracy, algorithmic discrimination, and algorithmic black boxes. To avoid these risks, it is necessary to adopt the dynamic consent model as the premise for applying affective computing in public governance, and to regulate the auxiliary application of affective computing in public governance in a hierarchical manner, to achieve a balance between the application of affective computing technology and the protection of citizens' rights and the maintenance of public ethics.*

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I. Introduction

The informatization of society and people has been a historical trend since the mid-20th century. As early as the 1940s, Norbert Wiener, who founded the field of cybernetics, proposed that humans are "organic entities of information," suggesting that there is essentially no difference between humans and control machines, and that "any organization can maintain its internal stability because it has ways to collect, use, maintain, and transmit information."[1] This means that, on the one hand, machines, as artificial creations, can have intelligence similar to humans; on the other hand, the essence of humans can be reshaped and reconstructed in the cyberspace. Wiener's theory, with the help of information, has bridged the gap between non-living and living beings for artificial intelligence (AI), giving human life the possibility of technology application. Based on this, in 1956, Allen Newell and Herbert Simon demonstrated that computers could have logical reasoning capabilities, solving the AI problem of rational computing. The question of whether emotions in human intelligence can be computed was raised as a result. Marvin Minsky, a pioneer in affective computing, posed the question of "whether a machine without emotions could achieve intelligence."[2] In his book *The Society of Mind* which was published in 1985, he pointed out that "whether machines can have emotions depends on the way they exhibit intelligent behaviors."[3] Minsky considered affective computing as a key issue for intelligent machines, transforming scientific understanding of emotions into external descriptions of emotional behaviors. Minsky's ideas laid

[1] N. Wiener, *Cybernetics or Control and Communication in the Animal and the Machine*, translated by Hao Jiren (Beijing: Peking University Press, 2018), 134.
[2] Yi Xianfei and Hu Jingpu, "Uncertainty and Guiding Mechanism Construction of Artificial Affective Technology," *Journal of Jishou University (Social Sciences Edition)* 1 (2023): 124-133.
[3] Marvin Minsky, "The Society of Mind: Elegant Interpretation from Cell to Artificial Intelligence, Human Thinking," translated by Ren Nan (Beijing: China Machine Press, 2016), 86.

the foundation for the technical realization of affective computing. John Hopfield proposed a model of neural networks in 1982. It simulates the information storage and retrieval functions of human brain neurons, making the technical realization of affective computing possible. After half a century of theoretical accumulation and technical development, Rosalind Picard published the book *Affective Computing* in 1997, defining affective computing for the first time. She defined affective computing as "computing that relates to, arises from, or influences emotions"[4] It can be seen that affective computing emerged in the context of human informatization and machine intelligence. Affective computing, along with rational computing, is an essential part of the development of AI. Affective computing is the perception, recognition, simulation, and influence of human emotional states through affective computing technology.[5] In short, the significance of affective computing technology is that it enables machines to not only perform rational computing like humans but also perceive emotions like humans.

In recent years, rational computing technology and affective computing technology have been increasingly embedded in the daily lives of the people. But social sciences and humanities often focus on the question of "whether machines can think rationally like humans" and are keen to discuss the risks and response measures of rational computing technology,[6] but there are very few discussions on artificial affective technology.[7] This ignores the particularity of affective computing among many intelligent technologies, its wide application in social life, and the possible risks in its application. According to the *Affective Computing White Paper* released in 2022, the industry application of affective

[4] Rosalind Picard, *Affective Computing*, translated by Luo Senlin (Beijing: Beijing Institute of Technology Press, 2005), 186.

[5] Wang Lusheng, "Affective Computing: Application Dilemma and Its Legal Regulation," *Oriental Law* 4 (2021): 49-60.

[6] For example, Sun Weiping, "Artificial Intelligence and Human's 'New Alienation'," *Social Sciences in China* 12 (2020): 119-137 and 202-203; Li Xunhu, "Inclusive Regulation of Artificial Intelligence in Criminal Justice," *Social Sciences in China* 2 (2021): 42-62 and 205.

[7] One piece of supporting evidence is that as of February 26, 2023, a search on National Knowledge Infrastructure (NKI) on the topics of "affective computing" and "artificial emotions" yielded a total of 432 papers in the social sciences field, including 406 on "affective computing" and 26 on "artificial emotions."

computing covers six major areas: (1) education and training; for example, using facial emotion recognition technology to assess students' concentration and emotional changes on MOOC platforms; (2) life and health; for example, screening and treatment of affective disorders (autism, emotional and cognitive disorders, etc.); (3) commercial services; for example, using affective computing devices to assist customers in selecting perfumes; (4) industrial design; for example, inferring a driver's mental state through changes in facial features to reduce traffic accidents; (5) science and technology media; for example, analyzing internet users' textual sentiment data to investigate online public opinion; (6) public governance; for example, identifying terrorism by tracking textual sentiment on social networks. In the future, the industry application of affective computing will also expand to five areas namely: smart services, virtual reality, social security, financial decision-making, and integration of science and art.[8] It can be seen that affective computing can be applied to both individuals and the public domain in social life. Applications at the individual level mainly involve private areas such as business, education, and health that are related to the interests of citizens, while those in the public domain are mainly concentrated in the field of public governance that is related to public interests. The application of affective computing in the public domain must comply with laws, regulations and public ethics.[9] However, the technical characteristics and application models of affective computing bring the risk of violating laws, regulations and public ethics, causing rights anxiety in society.

Currently, existing research on affective computing application has already

[8] DeInno Science, Shanghai Scientific & Technical Publishers of Shanghai Century Publishing (Group) Co., Ltd., Documentation and Information Center of Chinese Academy of Sciences, and the Institution of Engineering and Technology (UK), *Affective Computing* white paper, page 65-69 and 73-75, Zhejiang Lab, accessed April 28, 2023, https://www.zhejianglab.com/upload-file/20221208/1670465654902617.htm.

[9] The public ethic referred to in this paper does not refer to real morality, but to the ought-to-be critical morality; it does not refer to a specific critical morality, but to a universal critical morality. What it actually refers to is critical rational morality. For the distinction between critical morality and real morality, please refer to Lon L. Fuller, *The Morality of Law*, translated by Zheng Ge (Beijing: Commercial Press, 2005); HLA Hart, *The Concept of Law*, translated by Xu Jiaxin and Li Guanyi (Beijing: Law Press • China, 2018); HLA Hart, *Law, Liberty, and Morality*, translated by Qian Yidong (Beijing: Commercial Press, 2021).

noticed the many risks it brings about. For example, Wang Lusheng believes that the application of affective computing may infringe on personal information and human dignity, and opposes the computation of emotions.[10] This involves the infringement of personality rights, which "reflect the unity of spirit and matter in human existence, endow individual human beings with universal values and extraordinary status, and are a fundamental characteristic of human beings."[11] Ruan Kai believes that the application of affective computing may lead to problems of misidentification and over-identification, which may pose ethical risks in terms of social justice.[12] Yi Xianfei and Hu Jingpu believe that affective computing is characterized by uncertainty, which may bring security risks and ethical challenges.[13] Hu Jingpu and Chen Fan argue that affective computing raises issues of blurred interpersonal relationships, threats to personal identity, and doubts about the authenticity of emotions.[14] Bao Kangyun believes that affective computing has risks in legitimacy, security, accuracy and accountability.[15] Although the above studies reveal the risks in the application of affective computing from multiple perspectives, they still have two problems: first, they fail to distinguish the different risks in the application of affective computing in the private and public sectors, especially lack of attention and analysis on the risks in the field of public governance; second, they fail to discuss the application risks in public governance based on the specific technical characteristics of affective computing. The risks of affective computing in public governance application are mainly caused by its inherent technical characteristics. In the application of affective computing in public governance, it

[10] Wang Lusheng, "Affective Computing: Application Dilemma and Its Legal Regulation," 49-60.
[11] Gong Zhuo, "Research on the English Translation of Terms in China's Civil Code," *China Terminology* 1 (2022): 73-79.
[12] Ruan Kai, "Issues, Risks, and Governance of Affects Recognition Technology," *Journal of Dialectics of Nature* 2 (2023): 82-90.
[13] Yi Xianfei and Hu Jingpu, "Uncertainty and Guiding Mechanism Construction of Artificial Affective Technology," 124-133.
[14] Hu Jingpu and Chen Fan, "Analysis of the Research Approach of 'Artificial Emotions'," *Philosophical Explorations* 1 (2022): 133-148.
[15] Bao Kangyun, "Risks and Regulation of Facial Emotion Recognition Algorithms," *Northern Legal Science* 1 (2022): 36-49.

is crucial to pay attention to the potential rights risks caused by the technical characteristics of affective computing itself. These risks should be effectively mitigated through technical regulation to promote the effective realization of social public interests in the public application of affective computing. While empowering public governance with technology, it is also essential to effectively maintain human dignity and social justice.

II. Specific Applications of Affective Computing in Public Governance

The essence of affective computing is the perception, recognition, simulation, and influence of human emotional states, with the ultimate goal of simulating and affecting one's own and others' emotional states.[16] Therefore, the applications of affective computing can be divided into two categories: influencing the recognized individual and influencing a third party. The former mainly involves medical treatment,[17] while the latter is widely present in using affective computing to provide decision-making assistance for policymakers. Using affective computing to aid public governance is a representative application area of the latter category. It is mainly reflected in security prevention and administrative management, specifically including areas such as border inspection, case investigation, crime assessment, public opinion management, and traffic management.

First, during border inspections, inspectors use affective computing to assess whether incoming people are potentially deceptive. For instance, police in the United Kingdom and the United States use the detection software Converus to examine eye movements and pupil size to identify potential deception, while

[16] Regarding the concept of affective robot teachers, See Rosalind W. Picard, "Affective Computing," at *MIT Media Lab*, accessed April 28, 2023, https://affect.media.mit.edu/pdfs/95.picard.PDF; Gong Shanyao, "Application Risks of Affective Computing in Educational Scenarios and Its Legal Regulation," *Fudan Education Forum* 6 (2022): 40-46.

[17] For example, see Yue Yuanlei and Xu Zhuoyu, "Multidimensional Dilemmas and Legal Implementation of Affective Computing Applications in Medical Scenarios," *Medicine and Philosophy* 19 (2022): 39-44.

Hungary, Latvia, and Greece use the iBorderCtrl system to scan facial expressions of incoming individuals to determine if they are lying.[18]

Second, during case investigations, law enforcement officers use affective computing to determine the dangerousness of specific individuals and the credibility of their confessions. For example, law enforcement officers use the early warning analysis system Alpha Eagle to collect facial videos of the human body, calculate personal stress and emotional state, and predict suspicious and dangerous persons; they use the Ling Shi Multimodal Emotion Analysis System to discover key changes in people's responses to specific issues, collect their micro-expressions, movements, heart rates and other indicators, and help interrogators understand the psychological reactions of the people being interrogated.[19] The TaiGu Computing company has launched the Unperceived Emotion Monitoring and Analysis System for Interrogation Scenarios, which can integrate video image processing, parallel computing, deep learning and other technologies, and use non-contact physiological signal collection and micro-expression recognition methods to help interrogators establish quantitative emotion models and realize emotion monitoring and analysis.[20] Interrogators can use physiological data, involuntary facial reactions, and unforgeability to analyze emotional changes and language clues to help determine the credibility of the information provided by the person being interrogated.[21]

Third, in criminal assessment, law enforcement officers assess the criminal risks of specific individuals using the affective computing technology. Criminal assessment combines clinical psychology and affective computing technology to

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[18] Wang Lusheng, "Affective Computing: Application Dilemma and Its Legal Regulation," 49-60.
[19] Ibid.
[20] "TaiGu Computing Behavior Analysis Technology Makes Life Smarter and Better!" TaiGu Computing, accessed February 26, 2023, http://www.taigusys.com/news/news145.html.
[21] DeInno Science, Shanghai Scientific & Technical Publishers of Shanghai Century Publishing (Group) Co., Ltd., Documentation and Information Center of Chinese Academy of Sciences, and the Institution of Engineering and Technology (UK), *Affective Computing* white paper, page 70, Zhejiang Lab, accessed April 28, 2023, https://www.zhejianglab.com/upload-file/20221208/1670465654902617.htm.

categorize criminal possibilities into "first offense assessment," "recidivism assessment," "violence risk assessment," "sexual offense risk assessment," "property crime risk assessment," etc. It relies on cameras to collect emotional signals and computer vision technology to perform data analysis and processing. For example, in the Non-contact Real-time Dynamic Psychological Assessment System, the person being assessed only needs to stand in front of the camera for a few seconds, and after several days, stable test results can be obtained.[22] The system is based on the theory of the relationship between emotion and criminal behavior and the theory of the relationship between emotion data analysis and criminal behavior inference, which greatly facilitates the crime assessment of law enforcement personnel.

Fourth, in public opinion management, law enforcement officers use text sentiment analysis to accurately monitor public opinion. Text sentiment analysis refers to the use of artificial affective technology to judge the positive, negative, and neutral sentiments in the text, and evaluate the emotional tendency of the text. The results of sentiment analysis can be used for public opinion monitoring and prediction. For example, intelligent public opinion systems summarize the development context of public opinion events and provide predictive trends by conducting entity recognition, semantic disambiguation, knowledge graph construction, topic classification, automatic summarization, sentiment analysis on text information, and effective brand recognition, face recognition, object recognition, and text recognition for image-based information.[23] Text sentiment analysis technology can also be applied to analyze the unstructured content of information,[24] which can help with early warning of terrorism to reduce the

[22] Ma Ai and Song Yezhen, "How Does Affective Computing Technology Promote the Development of Crime Risk Assessment Tools?," *Psychological Science* 1 (2021): 52-59.
[23] "AI Enables Public Opinion Monitoring to Develop from Information Retrieval to Multi-dimensional Content Recognition," rmsznet.com, accessed February 26, 2023, https://baijia-hao.baidu.com/s?id=1724816219127308973&wfr=spider&for=pc.
[24] DeInno Science, Shanghai Scientific & Technical Publishers of Shanghai Century Publishing (Group) Co., Ltd., Documentation and Information Center of Chinese Academy of Sciences, and the Institution of Engineering and Technology (UK), *Affective Computing* white paper, page 70, Zhejiang Lab, accessed April 28, 2023, https://www.zhejianglab.com/upload-file/20221208/1670465654902617.htm.

threat of terrorism to society.

Fifth, in traffic management, traffic flow distribution based on social affective computing focuses on capturing the role of affective factors in traffic decisions, thereby revealing travelers' travel decisions and route choices, and providing intellectual support for traffic management. For example, the Emotion Change Model of Social Emotional Optimization Algorithm[25] can enrich the traffic flow distribution system by introducing the important influence of emotions, truly simulate the impact of emotional factors on travelers' utility perception, improve the accuracy of traffic demand forecasting, and help improve traffic management.

From the specific manifestations of affective computing in the application of public governance in the abovementioned five aspects, it can be seen that affective computing has developed from theory to technology, and then to practice. Affective computing has been widely used in public governance. Its advantages mainly lie in helping decision-makers collect more information, providing decision-making assistance to them, and making public governance more efficient and scientific to a certain extent.

From the perspective of distinguishing between affective computing "as science and technology" and affective computing "as practical application," the former involves the scientific theoretical basis of affective computing, while the latter is only the practical effect of this technology. The performance of affective computing in the application of public governance, although belonging to affective computing "as practical application," is inseparable from the technical characteristics of affective computing "as science and technology". Affective computing "as science and technology" has a fundamental impact on that "as practical application" in terms of technical logic. Picard divides affective computing design into three aspects: emotion signals and systems, emotion recognition and expression, and emotion synthesis. The technical characteristics

[25] For the model design of traffic flow distribution based on social affective computing, please refer to Li Wenyang, "Research on Traffic Flow Distribution Based on Social Affective Computing," (master's thesis of Beijing Jiaotong University, 2017).

of turning emotions into signals and affective modeling reflected in these three aspects of affective computing inevitably lead to rights risks caused by technical characteristics in their application in public governance. Therefore, it is necessary to reflect on, based on the underlying technical logic, the specific application of affective computing in public governance from the perspective of the technical characteristics of it "as science and technology."

III. Technical Characteristics and Rights Risks of Turning Emotions into Signals in Affective Computing

In the process of affective computing, turning emotions into signals and systems is the prerequisite for computers to capture and recognize emotions. Turning emotions into signals refers to the process in which computers, in the discovery of emotions, cannot truly experience human emotions, but only speculate on the internal emotions of people through emotional signals. In this sense, emotions themselves are equated with emotional signals. The technical characteristics of turning emotions into signals in affective computing fundamentally impact the applications of affective computing in public governance, and contain risks of de-governance, undermining human dignity, and degrading the right to informed consent.

A. Technical characteristics of turning emotions into signals in affective computing

In the operation mechanism of affective computing, computers identify human emotions through emotion signals. The application of emotion signals is directly related to the bodily attributes of emotions. The emotion phenomenon theory holds that emotions reflect people's direct knowledge of the world, that the body plays a carrier role in understanding emotional phenomena, and that emotions need to be grasped in embodied cognition and interactive subjectivity. This point was absorbed by Picard, who envisioned a computer as a mirror of emotions that could listen to the speaker's speech, capture the speaker's facial expressions, and provide appropriate advice for the speaker.[26] Emotions, such as

[26] Rosalind Picard, *Affective Computing*, 64.

thoughts, are expressed and communicated through various forms of expression, such as language, gestures, music, and behaviors.[27] Based on the theory of emotional phenomenon, emotions are physical and can be observed through external representations and thus captured by machines. "If a computer is trying to recognize or understand your emotions, it should have information that tells it not only what emotions you have, but also that it has information about them by looking at your face, listening to your voice, noticing your gestures, and assessing the context in which you are."[28] Emotional signals are divided into directly observable emotional signals and non-directly observable ones. When observing emotional signals, sensory signals can be identified by directly observing facial, movement and other information, or captured indirectly through measuring devices. In addition, the emotions we observe also include voluntary and involuntary physical and behavioral signals.[29]

B. Rights risks in the application of turning emotions into signals and affective computing in public governance

The technical characteristics of turning emotions into signals in affective computing deeply influence its application in public governance, and there is a higher degree of application risk compared to individual scenarios.

1. Turning emotions into signals degrades the right to informed consent

In public governance scenarios, citizens interact emotionally with public governance entities through physical presence, and citizens are able to independently control the release of their emotions. This means that the emotion information obtained by public governance entities from citizens is obtained with the informed consent of the citizens. When physically present, citizens have the ability to autonomously control their own emotions, especially the ability to autonomously control emotion information that they do not want to be obtained by public governance entities.

Turning emotions into signals means that citizens cannot directly perceive

[27] Ibid., 165.
[28] Ibid., 18.
[29] Ibid., 147.

whether the public governance entities have obtained emotion information from them through their bodies. In particular, sensory signals are captured indirectly through measuring devices, making it impossible for the subject of emotional data to perceive the fact that personal emotion information in the form of signals is being collected, and making it difficult for them and the data controller[30] to use the emotional data on the basis of agreement. In addition, even if the public governance entity provides an informed consent agreement regarding the collection of emotional information, due to the complexity of the formatted consent contract and the trust in the public governance entity, the citizens that provide emotional data often agree to the collection of emotional data without knowing what terms are written in the contract. This indicates that the autonomy of informed consent regarding emotion information is very limited in practice. Therefore, the signalization of public emotion information can easily lead to degradation of citizens' autonomy over their personal emotion information in the public governance application of affective computing. Its negative consequences also include that citizens, who have lost their right to autonomous control over their own emotions and the right to informed consent for emotional data, actively conceal their emotions that should be expressed freely in public governance in order to avoid the social governance entities from collecting their personal emotion information in a covert manner. Citizens' freedom to express their emotions has also been degraded in public governance. For example, in 2018, a middle school in Hangzhou, Zhejiang Province, used emotion recognition technology in the classroom to judge students' status and remind teachers which students were distracted in class. The emotion recognition system also evaluates teachers' teaching based on the analysis of students' and teachers' class status. This practice not only disrespects students' right to informed consent but may also make students become hypocritical, forced to

[30] The differences among the three concepts of emotional data subject, facial data and data controller can be found in the national standard of "Information Security Technology — Security Requirements of Face Recognition Data"; see the State Administration for Market Regulation and the Standardization Administration of the People's Republic of China, *Information Security Technology — Personal Information Security Specification: GB/T35273-2020* (Beijing: China Quality Inspection Press, 2020).

perform under the camera.[31]

2. De-governance of turning emotions into signals

The technical characteristics of turning emotions into signals means that the application of affective computing in public governance can only be carried out based on disembodied emotions. Affective computing, which is based on disembodied emotions that are separated from the human body, once applied in public governance, will lead to the public governance entities' understanding of citizens' emotions being separated from citizens' self-awareness. Public governance will face the possibility of regressing to one-dimensional social management. Then affective computing ultimately leads to human alienation and loss of self.

Specifically, affective computing based on turning emotions into signals, in the process of converting emotions into such signals, abandons the discussion on the essence of emotions and goes straight to the external expression and practical functions of emotions.[32] The essence of emotions is closely related to embodied emotions, while the external manifestations of emotions are closely related to disembodied emotions. Embodied emotion emphasizes the physical and cognitive nature of emotions. Humans gain experience through personal experiences, and the physical properties of the body also affect the formation of cognition, including emotion. Therefore, embodied emotions are closely related to the self-consciousness of the subject. Disembodied emotion, in the sense of computer science, brain science, and psychology, emphasizes the representation and cognition of emotions apart from the human body, and calculates emotional signals according to regulations.[33] The difference between embodied emotions and disembodied emotions alienates emotions from the perspective of affective computing, and people's subjective emotions and self-consciousness are

[31] Liu Bozhi and Liang Dan, "Abuse of 'Facial Recognition' Damages the Educational Ecosystem: Delegates Discuss the Use of Facial Recognition Technology in Schools", *China Education News*, March 11, 2021.
[32] Zhu Min, "Affective Computing Shows Great Application Potential," *Social Sciences Weekly*, January 19, 2023.
[33] Lawrence Shapiro, *Embodied Cognition* (London: Routledge, 2011), 91-92.

replaced by objective signals. This means that affective computing is not a natural combination of emotion and embodied cognition. Affective computing will inevitably lead to the separation of emotion and human embodied cognition, and the intrinsic connection between the two is considered dispensable. The difference between embodied emotions and disembodied emotions leads to the technical logic of affective computing being a one-sided interception of human emotions, and the deep connection between emotions and people's bodies and inner experiences is not sufficiently respected. In addition, in the difference between embodied emotions and disembodied emotions, the emotional exchanges among people are not respected. Emotions are interactive physical and mental experiences. In this sense, only "those who have shared the same experiences with them can understand and sympathize that they would say or do such things because of their pain."[34]

Public governance in modern society emphasizes the interactive connection between the public and the governance subjects. And emotional identification based on mutual respect should be formed between the governance subjects and the public.[35] In modern public governance scenarios, people and public governance subjects interact emotionally through physical presence, thereby achieving public participation and cooperative governance based on emotional identification. The application of affective computing based on emotional signals in public governance scenarios means that the communication between people and public governance entities will enter a state of disembodiment and absence. The public governance entities that use affective computing can only form one-dimensional, de-embodied emotional connections with citizens. This means that, in reality, affective computing can only serve as a one-dimensional management tool, playing the role of traditional management methods, rather than providing technical empowerment for modern public governance.

3. Turning emotions into signals undermines human dignity

[34] Roland Barthes, *A Lover's Discourse*, translated by Wang Yaojin and Wu Peirong (Shanghai: Shanghai People's Publishing House, 2016), 259.
[35] Zhang Wenxian, "Rule of Law and Modernization of State Governance," *China Legal Science* 4 (2014): 5-27.

The technical characteristics of turning emotions into signals mean that the application of affective computing in public governance essentially turns the emotions of people with subjectivity into signals, which will lead to public ethical risks in which the dignity of people as the objects of governance in public governance is undermined, and people's subjectivity will be completely lost.

The technical characteristics of turning emotions into signals in affective computing could harm human dignity. The logical starting point of this theory lies in the ethical tradition of Kantian deontology. In *Groundwork of the Metaphysics of Morals*, Kant extensively elaborated on why human dignity is the fundamental attribute of human beings. Kant begins with a comparison of dignity and price: "In the kingdom of ends everything has either a price or a dignity. Whatever has a price can be replaced by something else as its equivalent; on the other hand, whatever is above all price, and therefore admits of no equivalent, has a dignity."[36] In Kant's distinction between the kingdom of ends and the kingdom of nature, the former is the moral world composed of all rational beings, in which the objective laws followed by rational beings are moral norms, so the kingdom of ends is a world of universal legislation. Dignity is something in the kingdom of ends that cannot be considered as having a price and has no equivalent. Everything that has a price and can be considered an equivalent can serve as a means to some higher value. At the same time, the reason why a thing has a price is precisely because it presupposes an absolute value and a highest purpose, which is each rational being itself. Kant argued that dignity is the highest value of being human, the ultimate end of all purposes. Then, every rational being in the kingdom of ends is an objective end, and every rational being cannot be regarded as a mere means. Kant thus derives the moral law in the kingdom of ends: "Act that you treat humanity, whether in your own person or in the person of any other, always at the same time as an end, never merely as a means."[37] This is the "formula of humanity."[38] On the one hand, it

[36] Immanuel Kant, *Works of Immanuel Kant*, vol. 4, Li Qiuling eds. (Beijing: China Renmin University Press, 2005), 443.
[37] Ibid., 437. See also Immanuel Kant, *Critique of Practical Reason*, translated by Deng Xiaomang, edited by Yang Zutao (Beijing: People's Publishing House, 2003), 119.

can be concluded from the formula of humanity that people should always be regarded as ends rather than merely means. The reason why an act is moral is that it fully respects human dignity rather than merely treating people as a means to achieve certain practical goals. People should not only not treat others merely as means, but also not treat themselves merely as means. They should respect others as well as themselves.[39] On the other hand, everyone is a rational being and an objective purpose in the kingdom of ends, and therefore everyone has dignity. Therefore, everyone has equal moral status, and the principle of human dignity can deduce the moral requirement of treating people's moral status with caution.[40] In short, human dignity means that people's moral status should be respected and they should not be treated merely as means.

From the perspective of the public ethics of human dignity, the application of affective computing in public governance characterized by turning emotions into signals seriously undermines human dignity. On the one hand, turning emotions into signals means the de-embodiment of emotional communication between humans and machines. The irreplaceability of the body is an indelible mark of human nature. And respecting humans means respecting the purpose of human nature, prohibiting the use of the purpose of human nature as a means. "It is human shortcomings, not human rationality, that are difficult for machines to imitate."[41] The emotional communication at the absence of bodies makes it impossible for us to confirm whether the other party has emotionally communicated, thus to some extent undermining the purpose of humanity. The irreplicability of the body creates the uniqueness of embodied emotions. The reproducibility of emotional signals creates the programmability and replaceability of disembodied emotions. And turning emotions into signals means that the emotional exchange between body and mind is only a temporary

[38] Christine M. Korsgaard, *Creating the Kingdom of Ends* (Cambridge: Cambridge University Press, 1996), 106-132.
[39] Cheng Xinyu, *Human Dignity and Bioethics* (Shanghai: Huazhong University of Science and Technology Press, 2021), 73.
[40] Wang Rongfa and Zhu Jianting, *New Bioethics* (Shanghai: East China University of Science and Technology Press, 2011), 99; ibid., 75.
[41] John Peters, *Speaking into the Air: A History of the Idea of Communication*, translated by He Daokuan (Beijing: Huaxia Publishing House, 2003), 224.

stage leading to future bodiless communication. On the other hand, in affective computing, the deep understanding of human emotions is merely to treat human emotions as signals in programs or computing models. The premise for affective computing to be established is to recognize the "computability" of emotions. Abstract emotions must be converted into computable numbers, and the overall emotions must be replaced by a combination of parts. The computability aims to achieve an equivalent exchange between imitations and originals based on similarity, an equivalent exchange between humans and machines. "There is something that can be used as an equivalent for something else at a certain price."[42] This equivalent exchange is no different from directly destroying Kant's highly emphasized dignity, which is "above all price and therefore admits of no equivalent."[43] As long as the cognition of human emotions does not change, the emphasis on human dignity remains the most attractive part of the moral cause, and as long as the computability of affective computing is based on the equivalence of machines and humans, the application of affective computing will inevitably ignore the moral status of humans. Once human emotions are programmed in large-scale applications to public governance, they will exist in the form of technical goals of affective computing, and then people will inevitably be reduced from ends to means. This also runs counter to the basic values of modern public governance that emphasize the dignity and rights of individuals.

IV. Technical Characteristics and Rights Risks of Affective Modeling in Affective Computing

Affective modeling means that in the process of affective computing, in addition to emotion signals and systems, emotion recognition and expression and emotion synthesis are also important links. Both links are highly dependent on the emotion modeling technology. On the one hand, in the process of emotion recognition and expression, computers' inference of human emotions is based

[42] Zhang Wenxian, "Rule of Law and Modernization of State Governance," *China Legal Science* 4 (2014): 5-27.
[43] Ibid.

on emotion modeling, which is the mapping relationship between specific emotional signals and specific emotions. This mapping relationship belongs to a mathematical model, not a psychological phenomenon. On the other hand, in addition to being able to recognize and express emotions, computers must also have five abilities to generate emotions, namely, emotional behaviors, rapid first-order emotions, cognitively generated emotions, emotional experiences, and physical and mental interactions. This involves how to control and express emotions, and how to correctly and intelligently perceive and reason about emotions.[44] These five abilities also highly depend on emotional modeling.

A. Technical characteristics of affective modeling in affective computing

Emotional states are internal, involving changes in internal physiological and psychological processes, so no subjects other than a real person with emotions can fully identify emotional states.[45] Emotion recognition realizes the recognition and expression of emotions through emotion modeling. For example, based on standards such as speech speed, fundamental frequency range, pronunciation, and speech quality, a mapping relationship is established between human voice and emotions such as fear, anger, sadness, happiness, and disgust. Based on this, emotion modeling is performed to identify the speaker's emotions. Computers' inference of human emotions is based on emotion modeling, which is the mapping relationship between specific emotion signals and specific emotions. This mapping relationship is a mathematical model, not a psychological phenomenon. This means that the ultimate goal of affective computing is essentially to continuously make machines closer to the level of having emotions, because machines do not have the physiological basis of humans and cannot truly have human emotions. Therefore, recognizing emotional states and synthesizing emotions can only be achieved through external observation of emotional signals and inference based on emotional models. Emotion recognition and synthesis are essentially inference activities from the outside to the inside. Model-based inference is the fundamental feature

[44] Rosalind Picard, *Affective Computing*, 194.
[45] Ibid., 167.

of emotion recognition, expression, and synthesis. In a nutshell, from the technical logic of affective computing, the essence of affective computing is to interpret emotion signals in emotional models, which is essentially a deduction of semantic logic, rather than an internal experience activity including factors such as concentration, immersion, invisibility, and empathy.[46] It does not have a physiological basis or a socio-cultural basis.

B. Rights risks in the application of affective modeling and affective computing in public governance

The technical characteristics of affective modeling in affective computing bring many rights risks to the application of affective computing in public governance. Although these risks are often reflected in the general application of AI in public governance, the risks brought by the application of affective computing pose a greater threat to human dignity and subjectivity.

1. The algorithm of affective modeling is not always accurate

The key to realizing the application of affective computing lies in affective modeling, but the current technology has problems with algorithm accuracy. Inaccurate affective computing models will cause the application in public governance to face multiple risks.

First, the emotional data basis of affective modeling leads to bias in the accuracy of emotion models. Affective modeling is mainly based on observable human emotional characteristics. According to different characteristics, it analyzes the connection between each characteristics and emotion, and establishes a computable mapping relationship between emotion and characteristics. Emotion analysis integrates the mapping relationships established by various emotion models to more accurately obtain emotional states. The essence of affective modeling is to determine the probability of a person being in a specific emotional state given the observed values. However, emotions cannot be divided into various parts represented by observed values. Affective modeling and the observability of emotions need to be based on

[46] Zhang Shoulian and Hu Minzhong, "Emotions in Humans and Machines," *Journal of Dialectics of Nature* 10 (2021): 115-121.

emotions as a whole. Humans are born as organisms. Affective computing is limited to recognizable emotions and cannot exhaust emotions as a whole. Therefore, emotion models based on observable emotions rather than emotions as a whole may have issues with algorithm accuracy.

Second, the uncertainty of the emotion generation mechanism will also lead to biases in the accuracy of the emotion model. Affective computing is an interdisciplinary field involving computer science, neuroscience, psychology, and social science. Computer science focuses on developing technologies for emotion detection, recognition, understanding, and feedback to enable machines to have human-like emotional capabilities. Neuroscience and psychology provide the basic definitions, structures, and elements of human emotions to establish a scientific foundation for affective modeling. Social science serves as the application domain of affective computing, providing practical directions for its applications. It is not easy to provide a precise definition of emotions. There is no universal concept of emotions, and no consensus has been reached on the definition of emotions.[47] In addition to the lack of a fundamental concept of emotions, cutting-edge sciences (including computer science, neuroscience, cognitive science, psychology, etc.) have not provided a unified mechanism for emotion generation. This makes emotions always retain their implicit experiential characteristics, and it is difficult to establish a convincing emotional model that relates the brain's organizational structure, hormone secretion status, behavioral performance, and emotions. Affective computing, unlike rational computing, heavily relies on accurate understanding of emotions. However, emotions are not easily understood, leading to uncertainty of algorithm models of affective computing.

Third, the uncertainty in the design of affective computing technology also leads to biases in the accuracy of emotion models. Technical design itself is just a future-oriented control serving technical goals.[48] Affective computing is

[47] Yi Xianfei and Hu Jingpu, "Definition, Types and Characteristics of Contemporary Emerging 'Emotion Enhancement Technology'," *Studies in Philosophy of Science and Technology* 3 (2019): 70-75.
[48] Carl Mitcham and J. Britt Holbrook, "Understanding Technological Design," translated by Yin Wenjuan, *Journal of Northeastern University (Social Science Edition)* 1 (2013): 1-8 and 74.

characterized by the integration of multiple disciplines, and the complexity and instability of its technical structure make it difficult for the public to form an accurate philosophical foresight about affective computing technology.[49] Affective computing has developed from single modality to multi-modality, bringing significant uncertainty to its applications.[50] The anonymity and opacity of computers will further expand the uncontrollable and uncertain factors of moral evaluation in human-computer interaction.[51] These factors are constraints that make it difficult for emotional models to accurately perform affective computing.

Fourth, the diversity of affective computing algorithms restricts the accuracy of emotion models. The specific use of affective computing algorithms will lead to different human-computer relationships and life relationships. Currently, these algorithms do not follow unified technical standards, resulting in diversified affective computing methods and possible uncertainty in the performance of technical functions.[52] From the technical logic of affective computing, there is uncertainty in both emotion attribution and machine disembodied emotions in interactive environments. During use, with individual differences and different people's control over their own emotions, new uncertainties will arise in affective computing.[53] Research has shown that most commercial facial expression recognition and emotion recognition systems currently lack scientific rigor.[54] The main advantage of affective computing in

[49] Daniele Rotolo, Diana Hicks and Ben R. Martin, "What is an Emerging Technology?," 44 *Research Policy* 10 (2015): 1, 827-1 and 843.
[50] David J. Ortinau, Robert L. Anderson, R. and Eugene Klippel, "Managerial Implications of an Exploratory Post Behavioral Investigation into the Adoption of Technology Based Discontinuous Innovations," in *Proceedings of the 1988 Academy of Marketing Science (AMS) Annual Conference*, Kenneth D. Bahn eds. (Berlin: Springer, 2015), 275-276.
[51] Liu Hongyu, Yi Xianfei and Ye Antao, "Brain-Computer Interface Technology and Its Humanistic Risks," *Journal of Changsha University of Science and Technology (Social Sciences Edition)* 2 (2021): 1-7.
[52] Yan Kunru, "The Paradox of Technological Design and Its Ethical Norms," *Studies in Philosophy of Science and Technology* 4 (2018): 90-94.
[53] Yi Xianfei and Hu Jingpu, "Uncertainty and Guiding Mechanism Construction of Artificial Affective Technology," 124-133.
[54] Lisa F. Barrett, Ralph Adolphs, Stacy Marsella, et al., "Emotional Expressions Reconsidered: Challenges to Inferring Emotion from Human Facial Movements," 20 *Psychological Science in the Public Interest* 1 (2019): 1-68.

public governance is that it provides decision makers with efficient and scientific decision-making references. The accuracy of algorithm models is a technical prerequisite to ensure the scientific nature of affective computing in assisting public governance decision-making. If the emotional model algorithm has serious bias in accuracy, it cannot provide scientific opinions for public governance decisions. Once the erroneous opinions made by affective computing are adopted by public governance decision makers, it will cause public governance to deviate from the expected direction and even infringe on people's rights, causing serious consequences.

2. Affective modeling algorithms have discrimination and algorithmic black box

Affective computing shares the same underlying algorithmic logic as other intelligent technologies. In other words, they are essentially "opinions expressed mathematically or in computer code,"[55] and also have the inherent defect of algorithmic discrimination shared by general intelligent technologies. Algorithmic discrimination specifically refers to biases in the algorithm itself due to factors within the algorithm itself or other sudden errors, resulting in irreversible, persistent and unreasonable consequences. The most common is different results for the same people or the same results for different people due to some imperceptible reasons. The recognition results of affective computing are based on the inferred relationship between emotional signals and internal emotional states. This inferred relationship is continuously adjusted and optimized through machine learning algorithms fed with big data. The representativeness and bias of data feeding become a major problem, so affective computing cannot avoid the problem of algorithmic discrimination.[56]

There are three characteristics of algorithmic discrimination. First, it is difficult to detect. The designer of the algorithm and the one-sidedness of the

[55] Song Hualin and Meng Limian, "The Role of Artificial Intelligence in Administrative Governance and Its Legal Control," *Journal of Hunan University of Science and Technology (Social Science Edition)* 6 (2018): 82-90.
[56] Liu Youhua, "Research on Algorithmic Bias and Its Regulatory Path," *Law Science Magazine* 6 (2019): 55-66.

feeding data will affect the mapping relationship of the emotion models, but the process of establishing this mapping relationship is difficult to detect, which makes algorithmic discrimination difficult to detect. Second, it will be irreversible. Algorithms are inherently non-neutral, which is irreversible and can only be improved to a certain extent by improving the quality of data feeding. Third, it will be continuous. Based on the hidden and unexplainable nature of the algorithm, affective computing will continue to discriminate against people of a specific gender, skin color, and appearance. Applications of discriminatory affective computing have the potential to classify humans based on factors such as age, race, skin color, education level, and appearance, leading to different levels of acceptance among different groups. People may be labeled and evaluated differently based on their physical characteristics. For example, in crime assessment, an important scenario for the application of affective computing in public governance, the problem of algorithmic discrimination in emotion models is particularly evident. In the United States, the American Civil Liberties Union conducted a test in which they first compared photos of U.S. congressmen with photos in a crime database, with 5 percent of the people being matched. When specifically comparing photos of African American congressmen with photos in the crime database, the error rate exceeded 20 percent.[57] Empirical research using emotion recognition technology combined with affective computing shows that emotion recognition systems have obvious racial and gender discrimination, and most of the facial expression and emotion recognition systems currently in use are not scientific enough.[58] This proves that affective computing is not only technically unreliable, but also tends to be discriminatory.

Affective computing has the common inherent defect of algorithmic

[57] Kate Ruane, "Biden Must Halt Face Recognition Technology to Advance Racial Equity," at American Civil Liberties Union, accessed February 26, 2023, https://www.aclu.org/news/privacy-technology/biden-must-halt-face-recognition-technology-to-advance-racial-equity.

[58] Yi Xianfei and Hu Jingpu, "Uncertainty and Guiding Mechanism Construction of Artificial Affective Technology," 124-133.

discrimination of general intelligent technologies. The application of general intelligent technologies may bring the risk of infringing on the rights of social fairness and justice due to algorithmic discrimination. Reflection on the risks brought by affective computing cannot be limited to the general intelligent technologies, but must focus on the harm caused by the expansion and deepening of algorithmic discrimination in public governance applications. In other words, the application of emotion recognition in public governance will expand the scope and depth of algorithmic discrimination, thereby seriously infringing on social fairness and justice. The comprehensive application of affective computing in public governance also means the comprehensive introduction of algorithmic discrimination. Because public governance involves the national economy and people's livelihood, the implementation of administrative decisions based on affective computing will have a profound impact on the rights and obligations of people under administration. If people ignore algorithmic discrimination and directly apply affective computing to the field of public governance, such as administrative decision-making and criminal case investigation, it will result in damage to social fairness and justice. Imagine if interrogators relied too much on affective computing to judge the authenticity of confessions and used it to assess the degree of dangerousness of criminal suspects. This would inevitably lead to the difficulty in safeguarding the legitimate rights and interests of citizens and cause great distrust of public governance among citizens.

There is also the issue of an algorithmic black box in affective computing, which severely restricts its application in public governance. Since algorithms are not self-explanatory, even their designers may not know how the algorithms come up with their results.[59] In this case, the algorithm itself cannot explain how it reaches conclusions. Due to the limitations of professional knowledge, the algorithmic black box itself is a major obstacle for the public to understand AI.[60]

[59] Lisa F. Barrett, Ralph Adolphs, Stacy Marsella, et al., "Emotional Expressions Reconsidered: Challenges to Inferring Emotion from Human Facial Movements," 1-68.
[60] Ji Dongmei, "Institutional Construction of Transparency Principles of Artificial Intelligence: Paradigm Selection and Element Analysis," *Studies in Science of Science* 4 (2022): 611-618 and 757.

This causes the public to distrust public governance that relies on affective computing. The public, limited by their level of knowledge, can only know that some results are derived from lines of code, but they do not truly understand the basis and principles behind the results. In addition, the affective computing algorithm itself is a trade secret or state secret and is difficult for the public to know. This means that the public has no way of knowing the factual basis and analysis process of affective computing in public governance, and cannot meet the transparency requirements for decision-making in modern public governance.

V. Ways to Regulate the Rights Risks in the Application of Affective Computing in Public Governance

By exploring the technical characteristics of affective computing, we can find that the characteristics of turning emotions into signals have the risk of degrading the right to informed consent, de-governance, and undermining human dignity in public governance applications. The characteristics of affective modeling have the risk of insufficient algorithm accuracy, algorithmic discrimination, and being an algorithmic black box. These risks constrain the application of affective computing in public governance. Therefore, it is necessary to propose practical and effective regulatory paths based on the technical characteristics of affective computing and the application problems it brings in public governance, so as to eliminate the risks in public governance applications.

A. Taking the dynamic consent model as a prerequisite for the application of affective computing in public governance

The core issue of the three rights risks of affective computing in public governance applications, namely degrading informed consent rights, de-governing, and undermining human dignity, lies in the undermining of citizens' subjectivity in public governance by affective computing technology. In the process of applying affective computing in public governance, the premise for maintaining the status of citizens as the subject of public governance is that

citizens have the right to consent to public applications of affective computing that involve themselves. Only by using affective computing technology based on citizens' consent can we achieve a balance between maintaining public interest goals and defending citizens' subjectivity in the application of affective computing in public governance.

The principle of informed consent requires that in public governance, the objects of affective computing, that is, the subjects of affective data, have the right to know how and for what purpose the relevant data is used. The governance subject, as the user of affective computing, needs to obtain the express consent of the objects of affective computing when collecting and identifying the emotional signals of relevant data, and it is forbidden to collect emotional signals without consent. The subject of emotional data has the right to refuse unreasonable use of affective computing and collection of emotions, and has the right to require administrative bodies to disclose the specific use of relevant data and review it.[61] Although the principle of informed consent has the legitimacy and prerequisite status to regulate the infringement of citizens' subjectivity by affective computing, how to specifically construct the principle of informed consent still needs to be analyzed.

The "dynamic consent model" can serve as important reference in the construction of the principle of informed consent in the application of affective computing in public governance. Some scholars have proposed a third way between the specific consent model and the general consent model, namely the

[61] Tang Jianhua, "Ethical Risks and Legal Regulation of the Unreasonable Diffusion of Facial Recognition Technology: Also on the Construction of Dynamic Consent Regulation Model," *Social Sciences in Xinjiang* 3 (2022): 135-144.

"dynamic consent model."[62] Under the dynamic consent model, individuals have greater control over the use and sharing of their data, and people can dynamically grant or revoke access rights as needed to ensure that their data is only used in specific circumstances or for specific purposes. Therefore, the dynamic consent model has the potential to transcend the value dilemma of the consent model and is currently the most reasonable model suitable for the regulation of the application of affective computing in public governance. On the one hand, the dynamic consent model is different from the specific consent model. Under the specific consent model, frequent and multiple consents from the data subjects are required once smart technology involves data processing. However, today, the combination of intelligent technologies and big data has made data processing requests very cumbersome. If consent is required for every data processing operation, the frequency of consent collection will greatly increase, leading to high costs. On the other hand, the dynamic consent model is different from the general consent model. The application of affective computing technology should focus more on protecting personal dignity and rights, rather than weakening the standard of consent. The dynamic consent model advocates the use of modern internet information technology to build a communication platform, so that information processing, including emotional information, and informed consent become a continuous, dynamic and open process. The subject of emotional data can keep abreast of the latest information and freely choose to join or exit.[63]

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[62] Some scholars have also proposed conditional consent models and hierarchical and staged consent models. These consent models are also on the spectrum of consent models drawn in this paper. For details, see Tian Ye, "Dilemma and Solution of the Informed Consent Principle in the Big Data Era: Taking the Personal Information Protection of Biobanks as an Example," *Law and Social Development* 6 (2018): 111-136; Shi Jiayou and Liu Siqi, "Personal Information Protection in Facial Recognition Technology: On the Construction of Dynamic Consent Model," *Law and Economy* 2 (2021): 60-78; Chen Xiaoyun, Tian Yu, Ping Li, et al., "A Preliminary Study on the Implementation of 'Dynamic + Universal Informed Consent' in Medical Institutions," *Chinese Medical Ethics* 4 (2018): 487-491; Shan Fang and Mao Xinzhi, "Ethical Challenges and Countermeasures of Informed Consent in Biobank Research," *Journal of Dialectics of Nature* 3 (2019): 110-115.

[63] Tang Jianhua, "Ethical Risks and Legal Regulation of the Unreasonable Diffusion of Facial Recognition Technology: Also on the Construction of Dynamic Consent Regulation Model," 135-144.

Therefore, under the dynamic consent model, emotional data subjects can consent or not based on their personalized choices.[64] First, under the dynamic consent model, emotional data subjects become the focus of data processing, and the effectiveness of subject authorization will be fully realized, which is conducive to protecting the full exercise of the subject's autonomy of will. The subjects can manage emotional information with the help of the dynamic consent platform, which enables them to know what data is processed by affective computing and how the data is processed. It can be said that the dynamic consent model better protects the right to know of the subjects, and the subjects voluntarily decide whether to agree to the processing of data on the basis of full knowledge. Second, under the dynamic consent model, public governance bodies that apply affective computing to public governance need to fully shoulder the obligations of data and information disclosure. The dynamic consent model requires administrative bodies to effectively and in real time explain to individuals how emotional data is collected, processed and secured, which is conducive to making the processing of affective computing easy to understand and enables citizens to participate in the application of affective computing in public governance. This is consistent with the democratic spirit of modern public governance. Third, under the dynamic consent model, the right of withdrawal of the subjects of emotional data is fully protected. The exercise of the right of withdrawal under the general consent model and the specific consent model is one-time and continuous. Under the dynamic consent model, the subjects of emotional data can withdraw their consent at any time and provide new consent at any time. Allowing the subject to fully decide on the withdrawal of consent safeguards the subject's autonomy. Fourth, the construction of a dynamic consent platform has made the dynamic consent model develop from theory to reality. The combination of big data and the internet makes the construction of such a platform not a technical problem. In the dynamic consent platform, the subjects of emotional data can be aware of data processing information in a timely manner and consent or withdraw consent in a timely

[64] Shi Jiayou and Liu Siqi, "Personal Information Protection in Facial Recognition Technology: On the Construction of Dynamic Consent Model," 60-78.

manner.

B. Regulation of the auxiliary application of affective computing in public governance in a hierarchical manner

In the application of affective computing in public governance, problems such as insufficient algorithm accuracy, algorithmic discrimination, and algorithmic black box exist, which limit its role to being only auxiliary in public governance. This means that the conclusions of affective computing can only be referenced by decision-makers in public governance, rather than serving as the basis for public governance decisions or judgments. Therefore, a "one-size-fits-all" regulatory model is adopted for the auxiliary application of affective computing in public governance.

To more accurately achieve a balance between the auxiliary role of affective computing in public governance applications and risk mitigation, a specific application scheme of hierarchical regulation can be adopted. Specifically, it is necessary to adopt differentiated regulatory schemes based on the risk level of the application of affective computing in public governance and build a risk-based regulatory system for the application of affective computing in public governance.[65] In addition to the regulatory model of complete prohibition corresponding to unacceptable risks, some acceptable risks can be divided into three levels: high, medium and low. High risk corresponds to high-intensity regulation, medium risk corresponds to medium-intensity regulation, and low risk corresponds to low-intensity regulation.

Unacceptable risk refers to the application of affective computing without the dynamic consent of the subjects of the emotional data. Since the consent of the subjects of emotional data is closely related to the individual's subjectivity and human dignity, if affective computing is applied to public governance without the dynamic consent of the subjects of emotional data, the nature of human beings as the purpose will be fundamentally undermined, and the humanistic foundation and democratic spirit of public governance will no longer

[65] Wang Lusheng, "Affective Computing: Application Dilemma and Its Legal Regulation," 49-60.

exist. Therefore, a prohibitive regulatory model should be adopted for the application of affective computing without the dynamic consent of the emotional data subjects. This also matches the dynamic consent model as a prerequisite for the application of affective computing in public governance.

The manifestation of high-risk affective computing in public governance is that the uncertainty and discrimination of affective computing will seriously affect the basic rights of citizens. Even the existence and degree of enjoyment of basic rights will be partially affected by the results of affective computing. Possible scenarios of high-risk affective computing include:[66] (1) in the public service sector, affective computing is used to determine whether an individual is entitled to public housing, electricity and telecommunications services, which involves the constitutional right of citizens to equal enjoyment of public services; (2) affective computing is used in the education system to conduct emotional assessments to determine their educational opportunities; (3) in the law enforcement field, affective computing is used to determine the authenticity of a suspect's confession and decide whether to take coercive measures based on it. Due to the uncertainty of affective computing, using computational conclusions as a reference for matters involving citizens' basic rights in public governance also carries a huge risk of harming basic rights. In principle, a prohibitive attitude should be adopted towards the application of high-risk affective computing in public governance. Only when the public governance body seeks public interest, strictly abides by legal requirements, compensates when basic rights are infringed, and cooperates with full-process supervision, can the conclusions of affective computing be used as a reference factor in decision-making on matters involving basic rights of citizens.

Medium-risk affective computing in public governance manifests as affective computing moderately affecting individual rights without determining the existence of individual rights or substantially affecting individual rights. Medium-risk affective computing is mainly caused by the logic and uncertainty of the development of affective computing technology. Affective computing

[66] Ibid.

with uncertain factors will more or less have a certain impact on personal rights. In such cases, it still needs to be classified as a medium-risk application.[67] For example, when administrative bodies carry out social management, they promote teaching institutions to adopt differentiated teaching strategies based on affective computing. Although this has not had a decisive impact on citizens' right to education, it has also had an adverse impact to a certain extent.[68] In principle, auxiliary applications of medium-risk affective computing do not need to be completely banned or completely allowed, but should be carefully supervised. The *Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence* provides a comprehensive regulatory framework for reference.[69] First, relevant guidelines should be issued to define the classification rules for medium-risk affective computing, taking into account the expected purposes, extent of use, potential adverse impacts, user status, and reversibility of harmful outcomes of affective computing applications. Second, it is necessary to stipulate the guidelines for the use of medium-risk affective computing. For example, a risk management system should be established to identify and foresee possible risks, determine risk notification measures, and inform users of the risks. Third, data governance should be carried out, requiring that the affective computing system be developed based on certain industry standards, quality requirements, verification and test data, and stipulating data governance and management standards that should be followed, with special attention paid to data collection, output processing, data evaluation and bias detection. Fourth, it is necessary to establish a record-keeping mechanism that requires the affective computing system to automatically record events when risks are foreseen to ensure function

[67] Ibid.

[68] For example, some representatives of the National People's Congress of China believe that this will make students hypocritical, as students may be forced to perform in front of the camera, see Liu Bozhi and Liang Dan, "Abuse of 'Facial Recognition' Damages the Educational Ecosystem: Delegates Discuss the Use of Facial Recognition Technology in Schools," *China Education News*, March 11, 2021.

[69] Wang Lusheng, "Affective Computing: Application Dilemma and Its Legal Regulation," 49-60.

traceability throughout the system's life cycle. Fifth, it is necessary to improve the transparency and explainability of affective computing algorithms. The design, development, and operation of affective computing systems should be transparent enough so that users can understand and use them. The affective computing system should include information such as the provider's contact information, the system's functional features and limitations, and its intended purpose. Sixth, the human supervision system should conduct effective supervision during the design process of the affective computing system to minimize the rights risks that may arise from the affective computing system under conditions of design intent or misuse. It is believed that supervision should be reflected before the system is put into use, which requires public governance bodies to refer to the supervision records of relevant departments when actually using affective computing.

Low-risk affective computing, on the other hand, is used in public governance as an auxiliary application that has little or no impact on individual rights. In a sense, the application of affective computing to identify terrorism and conduct public opinion management, as well as traffic flow management to optimize people's travel, may only involve infringement of personal rights in a mild sense. For such a mild impact on individual rights, the corresponding regulatory requirements should not be too high. It should be required that affective computing algorithms meet transparency requirements and, based on dynamic consent model, strengthen the prompt of "your emotions may be detected."[70]

VI. Conclusion

As the application of affective computing in public governance involves a wider range of public interests compared to its application in private domains, and must meet the basic requirements of modern public governance, a separate discussion on the application of affective computing in public governance is of great significance. The application of affective computing in public governance

[70] Lee Steen and Philip Kim, "Affective Computing: Invasive Technology and Legal Consideration to Protect Consumers", 11 *Issues in Information Systems* 1 (2010): 577-584.

is inseparable from the technical logic of affective computing. The risks that may arise in the application fundamentally stem from the technical characteristics of affective computing. Therefore, discussing the two major technical characteristics of affective computing, turning emotions into signals and affective modeling, is of fundamental significance in exploring the technical roots of the application of affective computing in public governance. Under the concept of modern public governance, the application of affective computing in public governance must defend the subject status of citizens, and the dynamic consent model is the most efficient choice to protect the rights and dignity of citizens in this case. In order for affective computing to play an auxiliary role in public governance applications, it is necessary to maintain a balance between use of technology and rights protection. Through regulation in a hierarchical manner, we can effectively achieve coordination among the application of technology, the development of technology, the protection of citizens' rights and maintenance of public ethics, thereby reducing the rights risks brought about by affective computing.

(Translated by *CHEN Feng*)