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Application of Face Recognition Technology

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ABSTRACT
With the development of artificial intelligence, face recognition technology was born. After decades of development, face recognition technology's ability has exceeded the recognition ability of ordinary people, and has been valued and applied in all walks of life. Although face recognition is one of the mainstream research directions for many experts and scientists, and ordinary people hear of face recognition, people still have only a rough understanding of the application of face recognition technology and do not know its potential uses. The purpose of this article is to introduce the common uses of face recognition technology. It can be concluded that face recognition has important and universal applications in access control, security, payment, self-service and virtual idol.

Keywords: *face recognition, artificial intelligence, technology, technology application*

1. INTRODUCTION

With the high development of computer technology and the collection of big data becoming possible, the rise of artificial intelligence has become an inevitable phenomenon in the history of scientific and technological development. Although people have various definitions of artificial intelligence, it is a technology that enables them to complete specific tasks by learning existing materials.

The positive role of artificial intelligence in all aspects has inspired many computer scientists and entrepreneurs to explore it infinitely and has become the mainstream of employment, business management and scientific and Technological Development in society. In China, the number of patents applied for face recognition technology reached 6700 in 2019, including 61.4% of patents in inventions [2]. With the development of artificial intelligence, face recognition technology stands out. Compared with other recognition methods, such as fingerprint recognition, iris recognition, speech recognition, palm shape recognition and vein recognition, face recognition technology has high accuracy and initiative (actively recognize human characteristics rather than passively accept human input) and accuracy (the highest is 99.8%) [2]. Because of this advantage, face recognition becomes an application that is more popular than other methods in our daily life, business and other fields. The purpose of this paper is to show the application of face recognition in five aspects: access control system, security system, payment system, self-service and virtual idol. This study discusses the various applications of face recognition technology, which reflects the more possibilities of artificial intelligence and presents readers with strong potential of the development and application of face recognition.

2. APPLICATION OF FACE RECOGNITION TECHNOLOGY

2.1. Access control system

In some districts, the management office only allows registered residents to enter. In the company, administrators and bosses only allow employees to enter and require employees to take attendance. In Baidu company, the workers can already punch in and leave with their face. This not only enables workers to conveniently punch in, it also saves the costs for someone to manually record the attendance. Going even further, Baidu Visual, a Baidu technology group, is now engaging in the development of face recognition toward people wearing masks. This shows that face recognition is even more looked at seriously today. In more important institutions, such as government agencies, only government officials can enter. However, it is inefficient and expensive to arrange real people to check the identity of guests. Therefore, face recognition technology has a role to play there. The face recognition system uses the computer to act as a management tool and database in the background. By comparing the information stored in the database with the face information input by the camera,

it can judge whether the visitor is allowed to enter and restrict the entry of irrelevant personnel. [4] By connecting the face recognition technology with the attendance system, we can punch in with the face, improve the authenticity of employees and prevent false punch in. According to a study done by Zhiyan group, the production of face recognition attendance machines in China increased from 2012 to 2018 in exponential rate from 52 thousand to 1 million.

2.2. Security system

Using face recognition technology, people have improved the security system. In airports, stations, government agencies and other important areas where people gather, the face recognition system has characteristics beyond normal human beings: check more people in a short time. When a group of people is walking and criminals are hiding among them, security guards or police, or even police dogs, are likely to be unable to identify criminals. However, with the ability to quickly calculate and retrieve the database, the computer-driven face recognition technology can check everyone's face, and no one will miss it, leaving criminals nowhere to escape. The application of face recognition in ticket checking can not only improve the efficiency of ticket checking, but also eliminate the possibility of bad people entering or leaving the country. [3] In fact, as an important technology of American face recognition, traveler verification system has been expected to be used in up to 20 international airports, providing an important guarantee for American homeland security [1]. Also, face recognition helps with the identification of criminals and ensures security in people's life. Since 2015, the Thorn group used a tool called the Spotlight, which is a face recognition tool, to help investigators identify over 17,000 illegal traffickers, saving over 15,000 children from sex trafficking in North America, proving the usefulness of face recognition in the security system [8].

2.3. Payment system (financial field)

Now the payment developed in a variety of ways. Cash payment has come out of people's lives, and it is replaced by new payment methods such as online payment (WeChat payment, Alipay) or credit card. Although it provides people with many conveniences, (no need to bring money, count money and change), it also poses a threat to payment and property security – password stealing, etc. In this case, people need a payment method that can replace passwords to ensure their property security, that is, face recognition. Payment can be easily completed by showing one's face, making it even easier than phone payment. Face recognition can also exclude people who try to use picture to steal money out of the account. When people begin to pay with their faces, the risk of password stealing disappears. In fact, the application of face recognition technology in the payment field has been so popular that in a survey in the United States in 2017, 35% of respondents believed that face recognition would be used as a payment method in the next 10 years [6].

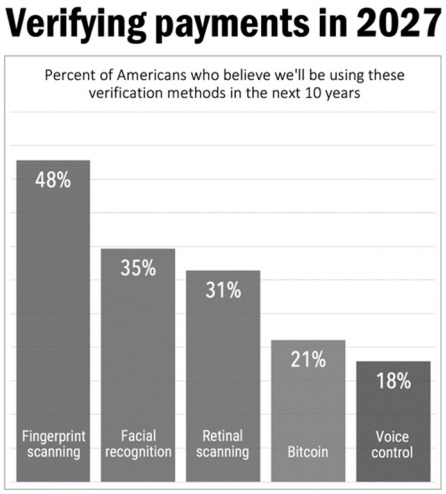

Figure 1. Verifying Payments in 2027, viewpost 2017[6]

This picture shows that almost half of American people surveyed believe the face recognition technology will be used for payment in the next ten years, proving that people put high expectation on face recognition technology in the field of payment.

2.4. Self-service

Face recognition also plays a very important role in the field of self-service, such as that in hotels. From check-in to check-out, the identification of guest identity in each scene is a difficult problem. Paper vouchers, room cards, ID cards and other methods are used to identify guests. As a result, the internal systems of the hotel are "independent, complex, full of inconsistent data and cumbersome experience" [5]. Guests need to spend a lot of time checking with the staff to confirm their identity, take the elevator with their room card, and sign on paper when using the service. Some hotels do not apply good technology, so ID card verification is easy to make mistakes and high security risks. If the door card is lost, it will take dozens of minutes or even hours to go to the front desk, which is very inconvenient. However, if face recognition technology is applied to hotel management, customers can quickly register (including payment) directly by recognizing their faces during registration and when taking the elevator without worrying about security problems and the loss of identity to others. [5] In one Marriott International's Hotel in Hangzhou, China, Chinese visitors use a kiosk powered by Alibaba's face recognition technology. They scan their ID cards, pause their faces before the camera, and pick up their room keys. This three-process check-in takes less than one minute, which greatly exceeds the speed of manual and artificial check-ins.

2.5. Virtual Idol

Not only in the social fields such as access control, security, payment and services but also in the entertainment field familiar to young people, the technology of face recognition is used in virtual idol. In order to make the expression and position of virtual idol change with the change of facial expression and position, face recognition technology is used to recognize facial features and expressions. This technology is widely used by virtual idols and has attracted a large number of viewers and fans. In BiliBili (a live video platform similar to YouTube), from December 2018 to May 2019, the number of virtual idols is increasing month by month (as shown in the figure below) [7].

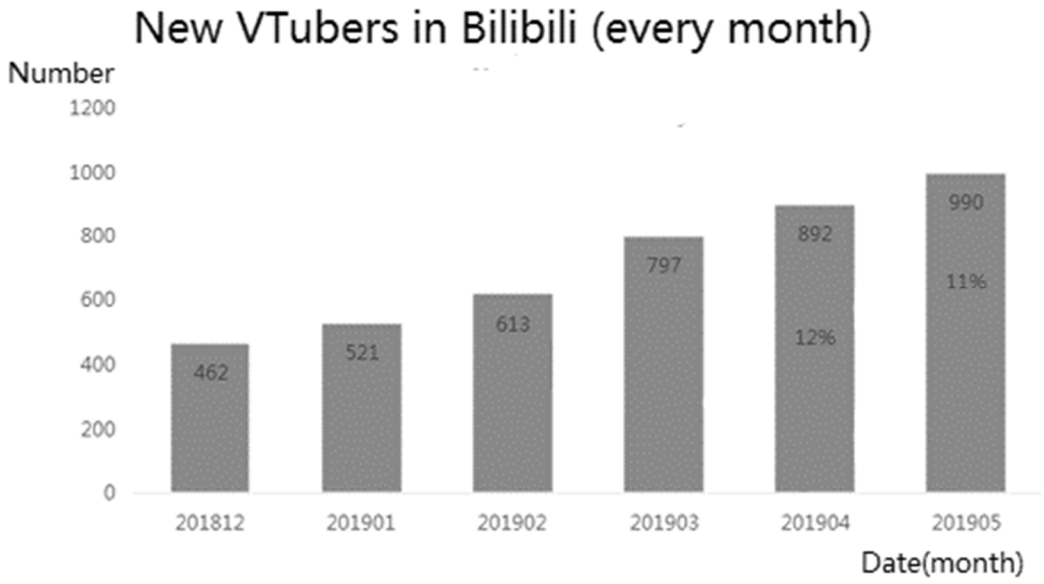

Figure 2. Number of New VTubers in Bilibili Every Month Over the five-month course from December 2018 to May 2019, the rate of increase of Vtubers in Bilibili video platform doubled, showing that the power of face recognition has enabled people to easily access and become a visual idol and made visual idols popular over time.

3. CONCLUSION

This paper shows the application of face recognition technology from five aspects: access control, security, payment, self-service and virtual idol. The application of access control greatly restricts the leaving early and access of irrelevant personnel; The application in security makes fugitive criminals have nowhere to hide; The application in payment has greatly improved the convenience and security of payment; The application in self-service has brought great convenience to business and life; Virtual idols use face recognition to increase their popularity. However, this is not the peak of the development of face recognition technology. The application of face recognition will be extended to other fields in the future, and will also get greater development in the current application field. It will promote the development of other science and technology.

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