

# Real Time Mask Wearing Recognition and Detection based on Artificial Intelligence

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## Abstract

**Affected by the epidemic, more and more people wear masks, and face recognition for people with masks is becoming increasingly important. This project uses the basic algorithm for wearing masks to carry out research on whether to wear masks. Whether to wear a mask is judged by the influence of big data on the shape of the mask, the fit of the mask to the face, and the skin color. In this way, the system can detect whether to wear a mask accurately, and provides a basis for mask face recognition, which facilitates the detection of whether to wear a mask in modern public places, and makes contributions to epidemic prevention in China.**

## Keywords

**Epidemic Prevention and Control; Mask Wearing Identification; Inspection for Wearing Respirator.**

## 1. Project Background

Influenced by the epidemic, most people wear masks when they go to and from public places. At the same time, with the development of society, face recognition has become a hot stream of the times. Wearing a mask is a big obstacle to face recognition. The detection of mask wearing can help people monitor whether others wear masks, and also help improve the face recognition system.

CCTV once pointed out that wearing masks has many advantages, which can effectively protect people's health and prevent the spread of viruses. At the same time, it has also been shown on various platforms that wearing masks is conducive to anti-virus, anti allergy, anti haze and other benefits. At the same time, due to the impact of the epidemic situation, the state has increased the requirements for epidemic prevention and control, and various organizations have also actively cooperated to respond to the call of the state: consciously urge and consciously enter public places to wear masks. Now, although the epidemic situation in China has basically ended, there will still be outbreaks in some areas. Therefore, the awareness of epidemic prevention and control needs to be strengthened, especially wearing masks. However, wearing masks will make some people feel uncomfortable, so that they do not wear masks or wear masks irregularly, which seriously strengthens the hidden danger of the epidemic and endangers their own and others' health. Therefore, it is very important to detect whether a mask is worn in public. With the development of society, face recognition systems can be seen everywhere in our life. However, because people wear masks, the algorithms of previous face recognition systems have shown great problems. Whether people wear masks or not, I think detection can greatly optimize the face recognition system and make people's lives more convenient, which is conducive to social development.

## 2. Literature Review

Under the COVID-19, in the construction sites, school authorities and other places where the identity information of the entrance personnel needs to be identified, the personnel can quickly recognize the face and synchronously detect the body temperature after wearing masks and hard hats, which has become a new technical achievement. Mask recognition is particularly important among them. Mask recognition technology is often associated with face recognition technology.

At the beginning of the epidemic, people studied the mask identification technology. Zhongke Shituo has developed mask detection and recognition technology, which can automatically detect whether the mask is used, and accurately recognize the face in real time in the mask scene. In case of an epidemic, with the maturity of technology testing, Android mask recognition and face detection technology will be open to companies that produce epidemic prevention products for free to support the resumption of production and epidemic prevention. As a new highlight of face recognition perceptual computing and face research solutions, the face detection and recognition technology of Zhongke Shituo masks is flexible, can be applied independently, can be managed online, and can be connected to the epidemic outbreak platform. In addition, large companies are also exploring mask recognition. Huawei has tried to promote facial recognition technology for many times, and has applied for a patent for image reconstruction technology called "facial recognition methods, equipment and computer-readable media". The patent shows that a facial image with accessories (glasses, masks, hats, etc.) can be reconstructed into a facial image without accessories through an image reconstruction network.

Although the mask detection in foreign countries was carried out late, it has also made achievements and is regarded as an important part of face recognition. For face recognition with masks, the Ministry of Homeland Security said that there were still many mistakes. Arun Vemury, director of the Biometric and Identity Technology Center of the Science and Technology Council (S&T) of the Ministry of Homeland Security, said: "This is not a perfect 100% solution, but it can prevent people from taking off masks at airports or ports of entry, thus reducing the risk of many passengers and airport staff during the COVID-19 epidemic."

At present, face mask recognition technology is still a technology worthy of attention to ensure the protection of people's safety and health, whether in epidemic prevention or information collection. However, it should be noted that checking personal identity information when detecting whether to wear a mask can help track others' tracks. Therefore, facial mask recognition technology can also track suspects and fugitives in the future in combination with the police database, provided that only the police are allowed to call and release data. Moreover, compared with iris recognition, face recognition is easier to input, and compared with fingerprint recognition, it is not easy to be imitated, which is also the direction of future face mask recognition.

## 3. Face Recognition System under Mask

Face recognition technology has been applied to public security, intelligent security and mobile phone security. In our daily life, we will encounter many things, such as unlocking mobile phones through facial recognition, and accessing certain areas through facial recognition. Of course, there are also famous toothbrush payments. In order to prevent and control the epidemic, everyone must wear a mask when leaving. The next question is how the face recognition system works when people wear masks.

When the mask covers most of the face, the face recognition system usually cannot retrieve complete facial features, and can only capture a few pages of information. If the facial image

recorded in the system is a complete facial image, there is a big difference between the two images and the imagined facial image. For example, the facial recognition system installed on most of our mobile phones may be difficult to identify people wearing masks. It is said that every time the screen is unlocked, many people can avoid sharing the screen by pressing the password.

However, there are also face recognition systems for detecting hidden faces on the market. Then these face recognition systems will consider your face and hat. To explain this problem, we need to understand how face recognition systems work.

The hardware of face recognition system is mainly composed of camera and computer or intelligent terminal (such as mobile phone or tablet computer). Face recognition system is a very complex software. Face recognition system, camera control software, image acquisition and image preparation for face recognition, extraction function and face matching. Before the test, face recognition mode is used to detect the face and its position. Facial feature extraction is the extraction of visual field features. When comparing facial features, the extracted and stored facial features will be compared in the system to verify whether they match. Otherwise, the check will fail.

In order to ensure the correctness of the face under the mask, the face recognition system must be able to use the mask to monitor and locate the face. Generally speaking, this problem can be solved by training the face recognition model. For example, if the face recognition system is a comprehensive pattern, the neural network pattern used to recognize faces is the weight distribution pattern trained with this method.

After the face and position are detected, the comparison model of different facial features is determined according to the facial wear. Common face recognition compares faces with standard databases. If the mask has facial features, please note that the mask used to extract features to obtain information about mask features (except masks), and the mask database template mask recognition technology used to create comparison based inspection results have been widely applied to birds on Jindo Island and the third civilian group in the middle plane of the island above the Fire Protection Bureau Museum.

#### **4. Conclusion**

In fact, before the outbreak of the epidemic, mask identification technology has been applied to varying degrees. For example, in the security field, many suspects wear hats and masks to avoid being traced to Yang and other surveillance personnel. In this case, more accurate face recognition is helpful to solve the problem.

With more and more cases confirmed, some researchers are considering the method of adding new functions by adding devices. High resolution recognition is the deep mining of massive data. Under the current material and technical conditions, you can complete other tasks in a short time by obtaining additional data from the mining area. Through the background analysis, the image and video information collected by the high vision surveillance camera can be realized through the identification, installation, reflection and display of earphones and other improved technologies. Do not replace vehicles, risk management, isolated safe areas and other original equipment. This can reduce value-added information and material costs.

For example, if this drilling technology is improved in the future, it may not be possible to see electronic eyes as dense as birds on the highway, monitoring equipment and excellent recognition algorithms to meet each requirement. With the promotion of the new intelligent platform system to the construction site and its continuous application to more complex applications, the more innovations, the more background jobs, the higher the ability to identify and test, the stronger the ability to build a system interface seamlessly connected with the

existing system, and the human resource management allows employees to input and use the network at the same time.

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