FACIAL RECOGNITION

Technological watch

12 NOVEMBRE 2020
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Introduction

Facial recognition is a biometric tool like fingerprint recognition and iris recognition which uses Big Data and Artificial Intelligence. Facial recognition is a method of identifying or verifying the identity of a person using their face from photos, videos, or in real-time. The identifying, so-called one-to-many consists of determining the identity of one person among N individuals known in a database (1: N). The verifying, so-called one-to-one consists of verifying the identity of the person is the good one. For example, it's used to unlock the smartphone (1: 1).

Facial recognition is a field of computer vision. Computer vision is an intelligence artificial technology trying to imitate human vision. The goal of computer vision is to understand a real-world scene using images and videos. It can interpret the scene by identifying objects. The different things that can do the computer vision are to identify, track, measure, detect, and classify objects from an image or a video. Facial recognition is only based on the face.

The process of face recognition is based on 3 phases. First, our face is detected and captured with a photo or video or in real-time after that a software is used to create a virtual model that's very detailed based on all face features like the distance between the eyes, the width of the nose, and so on. This virtual model represents a unique facial signature. That facial signature is then compared to a database of known faces. All the process can happen in a matter of seconds.

The first apparition of facial recognition was in the 1960s. Wilson Bledsoe developed a system that classified photos by manually recording the coordinates of facial features such as the nose and mouth using a graphics tablet. A computer could then automatically compare the distances and return the closed match.

In the 1990s the Defense Advanced Research Project Agency (DARPA) and the Army Research Laboratory (ARL) designed a face recognition program that led to more sophisticated face recognition technology. The first version of this technology was tested by law enforcement agencies at the 2002 Super Bowl to found criminals. But this test was not conclusive, it gave a lot of false positives.

Due to the rapid development of artificial intelligence facial recognition technology is getting faster and more accurate.

Nowadays there are a lot of facial recognition applications. The main application of facial recognition is in the area of safety and security. The law enforcement agencies use it to fight against crime, prevent terrorist attacks, help locate missing people, and so on. Security checkpoints in airports around the world are increasingly using this technology to protect flyers and identify criminals. The second main application of facial recognition is in the area of police surveillance to identify criminals that are wanted.

Facial recognition can also be used on Social media to identify someone in a picture. In 2017s, Apple introduces Face ID that allows using facial recognition to authenticate a user on the smartphone.

The bigger argument against facial recognition technology, it's the privacy of individuals. Some cities across the world can collect the facial data of people and store them without any permission.

The reason that I choose facial recognition it's because we are living in a strange world since the pandemic and I wanted to know what the impact of the mask on facial recognition was. Facial recognition is growing so fast we can use it on a recent smartphone to make a bank transaction or other things.

Monitoring
Use of facial recognition against protestors.

During the summer, there were a lot of manifestations about racial injustice in the United States mainly. Facial recognition was abused widely in the search for protestors.

In New York, The police department used facial recognition to find an activist of the Black Lives Matter movement who was charged with assaulting an officer.

Many officers were sent to the home of the activist without a search warrant, which provoked movement in the streets. After that NYPD was criticized for using facial recognition to find the activist because, in a video, we can see an officer analyzing a document marked "Facial Identification Section Informational Lead Report" with a picture from the activist's Instagram. But the police department confirmed to a local newspaper, that it was only using facial recognition for investigative purposes by comparing an image from a surveillance video with a set of legally possessed images.

But since 2011, the police department uses the software from Clearview AI to identify suspects in investigations. Clearview AI is a firm that specialized in facial recognition, more than 2400 police department use Clearview AI software. This company is controversial because it collects data from social media. Even before the protests against police violence, the company was criticized for not respecting the privacy of individuals. It's for this reason that the police were also criticized to use software from a company which not respecting privacy.

After that, all these criticisms, the mayor of New York said that they had to be careful with the use of facial recognition and that they were going to review the standards of use. The Senator of Manhattan State Brad Hoylman even wants to ban the use of facial recognition by the NYPD.

In addition to the case in New York, the Miami police used Clearview's software to identify protestors. Due to the investigation against a young woman who threw two rocks at an officer during the protests, the police department of Miami had to clarify the use of facial recognition saying that it is not used against peaceful protesters but against violent protesters who commit crimes.

In the United-states, facial recognition is used by at least 25% of police agencies. 8,000 is the number of times that the police of New York have used facial recognition in 2019.

Besides mass monitoring, facial recognition at another negative point: it's not 100% reliable. There is a real risk to have a false positive. One of the recent victims of facial recognition is Robert William who has been wrongfully accused by an algorithm for a crime he did not commit. Because the algorithm is less accurate for people of color due to a low diversity of images in the database.

IBM, Amazon, and Microsoft have all committed to not sell facial recognition to law enforcement at least temporarily to support the Black Lives Matter movement against racial injustice.

Use of facial recognition against the Police

The city of Portland, Oregon, met in early September to ban facial recognition for everyone.

During the Black Lives Matter protests, one man, Christopher Howell, began developing facial recognition software to identify Portland police officers who were hiding their names on uniforms. During the protests the Portland police had replaced their names on the uniforms with personal numbers to avoid doxing ("search for and publish private or identifying information about a particular individual on the internet, typically with malicious intent. ").

Mr. Howelle is not the first to develop facial recognition software to identify police officers. Colin Cheung a protester in Hong Kong had developed software to identify police officers based on online photos of them. He was arrested and had to abandon his work. In October 2020, an Italian artist, Paolo Cirio, published 4000 faces of French police officers taken during demonstrations on the internet in the form of an exhibition. But he had to remove them at the risk of prosecution.

The technology has advanced so much that it is easy for anyone to build this kind of software. Most of the work is finding the data to build the model. All the technical side is already created.

Christopher Howell was a bit worried about the ban on facial recognition because he didn't want to give up his work but fortunately for him the bill does not apply to individuals. But he must keep his software private.

Face-mask recognition

From the beginning of the COVID-19 pandemic, China required everyone to wear the mask in public, or the police reprimand those who did not wear it.

LeewayHertz, an American based company, wonder if he can develop artificial intelligence which analyzes an image and detect whether people are wearing masks or not. It is a more pacifist way to fight against the virus for the co-founder of LeewayHertz.

The algorithm behind the face-mask recognition is based on face detection and mask recognition. The first step is to seek the face. After the detection of the face, the algorithm classifies the face in three categories: unknown, no mask, or wearing masks. but the algorithm doesn't identify people so there are no real privacy issues to ask about. The algorithm is only used for counting how many people are wearing masks. This number will raise awareness.

Due to the global health crisis, RealNetworks has updated its SAFR facial recognition software to provide better face detection and face recognition accuracy for both masked and unmasked faces.

With this update, the face detection rate is 95.1 % and the recognition accuracy rate is 98.85 % for faces covered by a mask. The speed of detection has also increased. Thanks to these improvements, it will be possible to have facial safety systems without having to remove the mask. With this version, we have also a dashboard that indicates how many people wear a mask. We can use a filter on demographics data. This software has been deployed for the first time at Tijuana airport

Other applications of facial recognition

National facial recognition system in Singapore

Singapore will integrate a digital identity system: SingPass. It will enable citizens to access private and public government services through facial recognition technology. When the person authenticates, the software makes sure that the person is present and that it is not a photo or a video.

The software also ensures that students take their own exams. As usual, many privacy concerns but the company was providing the software, GovTech has ensured that personal information will not be shared with private companies.

Singapore will be the first country in the world to use facial verification in its national identity scheme.

Facial recognition payment technology

In Kazakhstan's capital city, public transport passengers will be able to use their faces to pay for their tickets using Face Pay technology. How does it work? Just look at a camera, which will recognize the face and deduct the price of the travel directly on the bank card.

From the beginning of 2021, 100 electric buses will be deployed in the capital thanks to the credit card payment system. This system will make life easier for passengers, who will no longer have to look for their wallets in their bags.

This system will be able to cope with pandemics such as COVID-19 because it will reduce the exchange of money and thus reduce the spread of the virus.

Conclusion

As we have seen, facial recognition is a very powerful tool that has a lot of positive aspects: simple and secure identification, facilitates identification, reduces fraud, finds the bad guys, and so on.

But many people are worried about its use because there are a lot of privacy issues. People don't want their faces to be in databases. We saw that companies like Clearview were building their database using information about people they found on the Internet. Mostly on social media like Facebook, Instagram, and so on.

Facial recognition is growing very fast, thanks in particular to the rapid development of artificial intelligence. Nowadays anyone can design a facial recognition system using open source tools. The biggest job is to find quality images. We are seeing more and more applications of facial recognition, for example to unlock our phones, to get into secure buildings, and so on.

Facial recognition still needs to improve because it is not 100% reliable and can make misidentification which can endanger some people. It also needs to better detect colored people.

Facial recognition is expected to dominate the world in the near future, everything will be done through facial recognition. It has an almost infinite potential.

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