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Review

Face Recognition as a Biometric Application

Relly Victoria Virgil Petrescu

ARoTMM-IFToMM, Bucharest Polytechnic University, Bucharest (CE), Romania

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Corresponding Author:
Relly Victoria Virgil Petrescu
ARoTMM-IFToMM, Bucharest Polytechnic University, Bucharest, (CE), Romania
E-mail: rvvpetrescu@gmail.com

Abstract: A facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from the given image with faces within a database. It is also described as a Biometric Artificial Intelligence-based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shape. While initially a form of computer application, it has seen wider uses in recent times on mobile platforms and in other forms of technology, such as robotics. It is typically used as access control in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Although the accuracy of facial recognition system as biometric technology is lower than iris recognition and fingerprint recognition, it is widely adopted due to its contactless and non-invasive process. Recently, it has also become popular as a commercial identification and marketing tool. Other applications include advanced human-computer interaction, video surveillance, automatic indexing of images and video database, among others. The use of facial recognition has recently become a very debatable subject and has been criticized more and more because it was considered an unethical tool used to spy on the public. The reason for such criticism is, however, largely due to the lack of information and regulation of this technology. Used proportionally and responsibly, facial recognition can and should be beneficial. It has the capacity to do much more to increase security in the future-from street crime to airport security. Armed war crime has dominated UK titles throughout the year. Recent statistics indicate that the number of people who benefited from the emergency assistance due to armed attacks increased by almost 40% compared to the two years ago, while the number of children under 18 years of age with stab wounds is increasing by 86 % in only four years. Face recognition has become a normal activity in many airports around the world. Many people today have a so-called biometric passport that allows them to go faster to the gate without having to be controlled. The facial recognition used in this way has significantly reduced waiting times for passport control but also has the ability to increase security in and around airports. Face recognition thus allows officers to identify an individual more quickly and accurately than the human eye. While some critics may worry about technology-related confidentiality issues, airports have shown that the use of facial recognition has improved security as well as speeding up processes such as check-in and in the future, even procedures boarding. When used correctly and proportionally, facial recognition can help protect the public and improve national security on multiple fronts. Similarly, advanced technology can recognize a person seen on CCTV security systems at the crime scene, justifying a person's stop and search. The ability to check in real time whether a person is on the list of criminal investigations adds an added advantage to the decision-making process before stopping and searching, thus lowering the probability of discrimination.

Keywords: Biometrics, Robots, Mechatronic Systems, Facial Recognition, Facial Recognition System, IDENTIFYING a Person

Introduction

The use of facial recognition has recently become a very debatable subject and has been criticized more and more because it was considered an unethical tool used to spy on the public. The reason for such criticism is, however, largely due to the lack of information and regulation of this technology. Used proportionally and responsibly, facial recognition can and should be beneficial. It has the capacity to do much more to increase security in the future-from street crime to airport security. Armed war crime has dominated UK titles throughout the year. Recent statistics indicate that the number of people who benefited from the emergency assistance due to armed attacks increased by almost 40% compared to the two years ago, while the number of children under 18 years of age with stab wounds is increasing by 86 % in only four years.

This recent increase in crime has put the police forces under enormous pressure and the smart use of facial recognition has an increasingly important role.

Facial Recognition in Criminal Investigations

Here facial recognition can provide additional information. These systems can save the faces of suspects, gangs, wanted criminals and those suspected of involvement in serious violent crimes. Moreover, these systems do not require prior personal involvement to recognize an individual and only see data, not sex, age or race.

The technology does not decide instead of the cop. However, it provides greater transparency in the decision-making process on the opportunity to stop and searches intervention.

Similarly, advanced technology can recognize a person seen on CCTV security systems at the crime scene, justifying a person's stop and search.

The ability to check in real time whether a person is on the list of criminal investigations adds an added advantage to the decision-making process before stopping and searching, thus lowering the probability of discrimination. Face recognition helps eliminate guns and criminals on the streets and eventually prevent offenses before they have the chance to take place.

Gambling Addiction and the Way Your Face Recognition Can Help

There are an estimated 593,000 people in the UK who are currently struggling with a gambling problem, becoming a serious issue. Having grasped the seriousness of the problem, the British Gaming Commission set limits and tips to help those who suffer from this addiction; however, as with all addictions, gambling is a habit to overcome. In order to put real limits and make a real difference, the gambling commission needs the right technology.

Face recognition technology is capable of keeping track of players and thus helping gambling companies protect their customers to a higher degree. Monitoring who enters and moves around gambling areas is an extremely difficult task for the human staff, especially in crowded areas such as casinos.

In-Face Face Recognition Technology could help the company and staff identify who registered as gambling addicts and keep track of daily play to inform staff if and when it is time to stop. It would also be able to provide effective self-exclusion procedures by identifying an individual exclusively through CCTV security systems as soon as they entered the location to allow security staff to escort them with respect.

Face Recognition in Airport Security

Face recognition has become a normal activity in many airports around the world. Many people today have a so-called biometric passport that allows them to go faster to the gate without having to be controlled. The facial recognition used in this way has significantly reduced waiting times for passport control but also has the ability to increase security in and around airports. Face recognition thus allows officers to identify an individual more quickly and accurately than the human eye.

While some critics may worry about technology-related confidentiality issues, airports have shown that the use of facial recognition has improved security as well as speeding up processes such as check-in and in the future, even procedures boarding.

When used correctly and proportionally, facial recognition can help protect the public and improve national security on multiple fronts.

Pioneers of automatic face recognition include Woody Bledsoe, Helen Chan Wolf and Charles Bisson.

In 1964 and 1965, Bledsoe together with Helen Chan and Charles Bisson worked on using the computer to recognize human faces. He was proud of this work, but because the funding was provided by an unnamed computer agency that did not allow too much advertising, few papers were published. Based on the available references, it was found that Bledsoe's initial approach involves the manual marketing of various facets, such as eye centers, mouths, etc., mathematically matched to offset possible variations. The distances between the landmarks were also automatically calculated and compared between the images to determine the identity.

Considering a wide range of images (in fact, a photo card) and a photo, the problem was to select from a database a small set of recordings, so one of the recorded images corresponds to the photo. The success of the method can be measured by the ratio of the response list and the number of records in the database. Bledsoe (1966a) described the following difficulties:

"This recognition problem is difficult due to the high variability of inclination and head inclination, illumination and angle, face expression, aging, etc. Some other face recognition tests by the machine have allowed little or no variability in these values, the variability is large, the correlation is very small between two images of the same person, two different rotations of the head.

Woody Bledsoe, 1966

This project was labeled man-machine because man extracted the coordinates of a set of features in photos, which were then used by the computer for recognition. Using a graphics tablet (GRAFACON or RAND TABLET), the operator would extract the coordinates of the elements, such as the pupils' center, the inner corner of the eyes, the outer corner of the eye, the widow's point and soon. From these coordinates, a list of 20 distances, such as the width of the mouth and the width of the eyes, the pupil's student, was calculated. These operators could process about 40 photos per hour. When building the database, the name of the person in the photo was associated with the calculated distance list stored in the computer. In the recognition phase, the distance set was compared to the corresponding distance for each photograph, resulting in a distance between the photograph and the database recording. The closest records are returned.

Since two images are unlikely to match head rotation, tilting, tilting and scale (distance from the camera), each set of distances is normalized to represent the face in a front orientation. To achieve this normalization, the program first attempts to determine the inclination, the poor and the rotation. Then, using these angles, the computer cancels the effect of these transformations on the calculated distances. To calculate these angles, the computer must know the three-dimensional head geometry. Because there were no real heads, Bledsoe (1964) used a standard head obtained from seven-headed measurements.

After Bledsoe left the PRI in 1966, this work was continued at the Stanford Research Institute, primarily by Peter Hart. In experiments on a database of more than 2000 photos, the computer has constantly exceeded people when it presented the same recognition tasks (Bledsoe 1968). Peter Hart (1996) enthusiastically recalled the project with the exclamation "It was really a work!"

Around 1997, the system developed by Christoph von der Malsburg and graduate students of the University of Bochum in Germany and the University of Southern California in the United States has outstripped most systems with those of the Massachusetts Institute of Technology and the University of Maryland. The Bochum system was developed with funding from the US Army Research Laboratory. The software was sold as ZN-Face and used by customers such as Deutsche Bank and airport operators and other crowded locations. The software was "robust enough to make face-to-face identification less than perfect." Such impediments that identify themselves as mosquitoes, beards, changed hairstyles and glasses-even sunglasses (Rulkov *et al*., 2016; Agarwala, 2016; Babayemi, 2016; Gusti and Semin, 2016; Mohamed *et al*., 2016; Wessels and Raad, 2016; Maraveas *et al*., 2015; Khalil, 2015; Rhode-Barbarigos *et al*., 2015; Takeuchi *et al*., 2015; Li *et al*., 2015; Vernardos and Gantes, 2015; Bourahla and Blakeborough, 2015; Stavridou *et al*., 2015a; Ong *et al*., 2015; Dixit and Pal, 2015; Rajput *et al*., 2016; Rea and Ottaviano, 2016; Zurfi and Zhang, 2016 a-b; Zheng and Li, 2016; Yang, and Lin, 2015; Buonomano *et al*., 2016 a-b; Faizal *et al*., 2016; Cataldo, 2006; Ascione *et al*., 2016; Elmeddahi *et al*., 2016; Calise *et al*., 2016; Morse *et al*., 2016; Abouobaida, 2016; Rohit and Dixit, 2016; Kazakov *et al*., 2016; Alwetaishi, 2016; Riccio *et al*., 2016 a-b; Iqbal, 2016; Hasan and El-Naas, 2016; Al-Hasan and Al-Ghamdi, 2016; Jiang *et al*., 2016; Sepúlveda, 2016; Martins *et al*., 2016; 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1997a; 1997b; 1997c; 2000a; 2000b; 2002a; 2002b; 2003; 2005a; 2005b; 2005c; 2005d; 2005e; 2011a; 2011b; 2012a; 2012b; 2013a; 2013b; 2013c; 2013d; 2013e; 2016a; 2016b; 2016c; Petrescu *et al*., 2009; 2016; 2017a; 2017b; 2017c; 2017d; 2017e; 2017f; 2017g; 2017h; 2017i; 2017j; 2017k; 2017l; 2017m; 2017n; 2017o; 2017p; 2017q; 2017r; 2017s; 2017t; 2017u; 2017v; 2017w; 2017x; 2017y; 2017z; 2017aa; 2017ab; 2017ac; 2017ad; 2017ae; 2018a; 2018b; 2018c; 2018d; 2018e; 2018f; 2018g; 2018h; 2018i; 2018j; 2018k; 2018l; 2018m; 2018n).

Materials and Methods

In 2006, the performance of the latest face recognition algorithms was evaluated in the Grand Challenge Face Recognition (FRGC). High-resolution images, 3D-face scans and iris images were used in tests. The results have shown that the new algorithms are 10 times more accurate than face recognition algorithms in 2002 and 100 times more accurate than those in 1995. Some of the algorithms have succeeded in overcoming human performance in face recognition and unique identification of identical twins.

The US Government sponsored evaluations and provocative issues have stimulated two-dimensional orders in the face recognition system. Since 1993, the error rate of automatic face recognition systems has fallen by a factor of 272. The reduction applies to systems that fit people with face-images captured in studio or mugshot environments. As for Moore's law, the error rate has fallen by half every two years.

Low-resolution faces can be improved by hallucinations of the face.

Essentially, face recognition is done in two stages. The first involves extracting and selecting features and the second is the classification of objects. Subsequently, developments have introduced different technologies in the procedure. Some of the most notable include the following techniques.

Traditional

Certain face recognition algorithms identify facial features by extracting markers or features from a face-to-face image. For example, an algorithm can analyze the position, size and/or relative shape of the eyes, nose, cheekbones and jaw. These features are then used to look for other matching features.

Other algorithms normalize a gallery of images and compress the face data, saving only image data that is useful for face recognition. A probe image is then compared to face data. One of the oldest successful systems is based on model matching techniques applied to a set of special facial features, offering a kind of tablet representation.

Recognition algorithms can be divided into two main geometric approaches that refer to distinctive or photometric features, representing a statistical approach that distills a picture in values and compares values with patterns to eliminate variants. Some classify these algorithms in two broad categories: holistic and feature-based models. The first attempts to fully recognize the face, while the function is based on a subdivision into components, such as according to the characteristics and each analysis and its spatial location relative to other characteristics.

Popular recognition algorithms include the main component analysis using eigenfaces, linear differential analysis, elastic graphics matching using the fisher face algorithm, the Markov hidden pattern, multiple subspace learning using tensor representation and dynamic matching of neural motifs.

Dimensional Recognition

Three-dimensional face recognition technology uses 3D sensors to capture information about the shape of a face. This information is then used to identify distinctive features on the surface of a face, such as the outline of the eye, nose and chin sockets.

An advantage of 3D Face Recognition is that it is not affected by changes in lighting as well as by other techniques. It can also identify a face in a series of viewing angles, including a profile view. Three-dimensional images on one side significantly improve the accuracy of face recognition. 3D research is enhanced by developing sophisticated sensors that make a better job of capturing 3D images. The sensors work by projecting structured light on the front. Up to a dozen or more of this image, the sensors can be placed on the same CMOS chip-each sensor captures another part of the spectrum.

Even a perfect 3D matching technique could be sensitive to phrases. To this end, a Technion group applied metric geometric instruments to treat expressions such as isometries.

A new method is to introduce a way to capture a 3D image using three tracking chambers that indicate different angles; a single camera will be directed to the front of the subject, aside second and the third under an angle. All these cameras will work together so they can track the subject's face in real time and be able to face detection and recognition.

Skin Texture Analysis

Another emerging trend uses the visual details of the skin as captured in standard or scanned digital images. This technique, called Skin Texture Analysis, transforms lines, patterns and unique stains into a person's skin in a mathematical space.

Surface texture analysis works just like facial recognition. It is made of a leather patch, called skin print. This patch is then divided into smaller blocks. Using algorithms to transform the patch into a measurable mathematical space, the system will then distinguish the lines, pores and real skin texture. It can identify the contrast between identical pairs, which are not yet possible using facial recognition software alone.

Tests have shown that by adding a skin texture analysis, performance in girls' recognition can increase by 20-25%.

Physical Recognition by Combining Different Techniques

Because each method has its advantages and disadvantages, technology companies have combined traditional, 3D and skin text analysis to create recognition systems that have higher success rates.

Combined techniques have an advantage over other systems. It is relatively insensitive to changing expression, including blinking, frowning or smiling and having the ability to compensate for the growth of mustache or beard and the appearance of glasses. The system is also uniform in terms of race and gender.

Thermal Rooms

Another form of face recognition is the use of thermal cameras, this camera will only detect the head shape and will ignore subjects such as glasses, hats or makeup. Unlike conventional cameras, thermal cameras can capture images even in low light and night conditions without using the flash and exposure to the camera's position. However, a problem with the use of thermal imaging for face recognition is that the face recognition bases are limited. Diego Socolinsky and Andrea Selinger (2004) investigate the use of face thermo recognition in life and operating scenes and at the same time build a new thermal imaging database. The study uses sensors with low sensitivity, low sensitivity, low sensitivity, low sensitivity (F), capable of acquiring Long Infrared Thermoelectric (LWIR) thermoelectric sensors. The results show that a fusion of LWIR chambers and common visual cameras has better outcomes on outside probes. The results from the inside show that the vision has an accuracy of 97.05%, while LWIR has 93.93% and Fusion is 98.40%, however, 67.06% on the outside, LWIR 83.03% and 89.02% merger. The study used 240 subjects over a 10-week period to create a new database. The data were collected on sunny, rainy and cloudy days.

In 2018, researchers at the American Army Research Laboratory (ARL) have developed a technique that will allow them to fit facial images obtained using a thermal camera with those in databases that were captured using a conventional camera. This approach has used artificial intelligence and machine learning to allow researchers to compare thermal and regular face images. Known in the form of a cross-stitch method, because of how it covers facial recognition from two different imaging modalities, this method synthesizes a single image by analyzing multiple regions and face details. It is comprised of a nonlinear regression model that maps a specific thermal image into a corresponding facial image and an optimization problem that projects the latent projection back into the image space.

ARL researchers have noticed that the approach works by combining global information (e.g., face-to-face) with local information (e.g., eye, nose and mouth). In addition to increasing the discrimination of the synthesized image, the facial recognition system can be used to transform the signature of a thermal face into a visible face image. According to ARL performance tests, the researchers found that the multi-region synthesis model demonstrated an improvement in the performance of about 30% over base methods and about 5% over the latest generation. It has also been tested for real-time thermal imaging.

Results and Discussion

Mobile Platforms

Social Media

Social media platforms have embraced facial recognition capabilities to diversify their functionality to attract a wider user base to rigid competition from different applications.

Founded in 2013, Looksery continued to raise money for Kickstarter Face Editing. Following the success of the general public, Looksery launched in October 2014. The application allows video chatting with others through a special face-changing filter that changes the look of users. While there are image enhancement applications such as FaceTune and Perfect365, they are limited to static images, while Looksery has allowed augmented reality to see videos. At the end of 2015, SnapChat acquired Looksery, which was to become the function of its goal.

SnapChat's animated targets, which use face recognition technology, revolutionize and redefine automatically, allowing users to add filters to change their look. Filtering daily filtering selections, some examples include one that makes users look like an old version of them, one that blows up the skin and one that puts a virtual flower ring on their heads. Dog Filter is the most popular filter that helped SnapChat succeed, with celebrities are known as Gigi Hadid, Kim Kardashian and regularly likes to post dogs with the dog filter.

DeepFace is a deep learning facial recognition system created by a Facebook research group.

Identifies Human Faces in Digital Images

It uses a nine-layer neural network with over 120 million connection weights and has been trained on four million images uploaded by Facebook users. It is said that the system is 97% correct, compared to 85% for the FBI system to identify future generations. One of the software developers, Yaniv Taigman, has come facebook with facebook.

The emerging use of facial recognition is the use of identity verification services. Many companies are now working on the market to provide these services to banks, ICOs and other electronic companies.

Apple introduced the iPhone X ID as the successor of biometric authentication to Touch ID, a fingerprint system. The face ID has a face recognition sensor, consisting of two parts: a "Romeo" module projecting over 30,000 infrared points on the user's face and a "Julie" module reading the model. The model is sent to a local "Secure Enclave" from the device's Central Processing Unit (CPU) to confirm a match with the owner of the phone. The facial model is not accessible to Apple. The system will not work with eyes closed in an attempt to prevent unauthorized access.

The technology learns from changes in the appearance of a user and therefore works with hats, scarves, glasses and many sunglasses, beards and makeup.

It also works in the dark. This is done using a "flood illuminator," which is a dedicated infrared light that throws invisible infrared light on the user's face to read 30,000 facial points properly.

Police

The Australian Border Service and New Zealand have created an automated border processing system called SmartGate, which uses face recognition, which compares the passenger's face with the e-passport microchip data. All Canadian international airports use Face Recognition as part of the Primary Inspection Kiosk program that compares a person traveling with the photo stored on ePassport. This program first came to Vancouver International Airport in early 2017 and was launched at all international airports remaining in 2018-2019. “Tocumen International Airport” in Panama operates an airport-based surveillance system that uses hundreds of live face recognition rooms to identify people who pass through the airport

British police companies are sending face recognition technology to public events in 2015. However, a recent report and an investigation by Big Brother Watch showed that these systems were up to 98% inaccurate

The US State Department manages one of the largest face recognition systems in the world, with an adult database of 117 million adults, usually taken from driving licenses. Although it is still far from being completed, it is implemented in some cities to give clues about who was in the photo. The FBI uses the photos as a tool.

In addition to being used for security systems, authorities have found a number of other applications for face recognition systems. Although previous post-9/11 implementations have been well publicized, more recent developments are rarely written due to their undercover nature.

At the Super Bowl XXXV in January 2001, Tampa Bay, the Florida police used the Visage Face Recognition program to search for potential offenders and terrorists to attend the event. 19 persons with a minor criminal record were potentially identified.

In the 2000 Mexican presidential election, the Mexican government used face recognition software to prevent electoral fraud. Some voted under several different names in an attempt to cast more votes. By comparing new images with those already in the voter database, the authorities have succeeded in reducing duplicate records. Similar technologies are used in the United States to prevent people from obtaining false identification cards and driving licenses

Face recognition has been used as a form of biometric authentication for different platforms and computing devices; Android 4.0 Ice Cream Sandwich added facial recognition using the front of the smartphone as a means to unlock devices, while Microsoft introduced face recognition authentication on the Xbox 360 video game console via the Kinect accessory and the Windows 10 platform in infrared products. Uses an infrared illumination system.

Face recognition systems have also been used by photo management software to identify photo subjects, enabling features such as searching for personal images as well as suggesting photos to be shared with a specific contact if the presence theirs was detected in a photo.

Face recognition is used as security added to certain sites, phone applications and payment methods.

Taylor Swift, a popular musician and popular musician in the United States, secretly uses face recognition technology at a concert in 2018. The device was embedded in a kiosk next to a ticket box and was scanned by concerts over time, met with the pursuers.

A key advantage of a face recognition system that it can identify by mass because it does not require the co-operation test. Well-designed systems installed at airports, multiplexes and other public places can identify people among fleets, even if they are aware of the system.

However, compared to other biometric techniques, face recognition may not be the most reliable and effective. Quality measures are very important in facial recognition systems, as there are large variations in these images. Factors such as illumination, expression, image and noise during face capture can affect the performance of facial recognition systems. Of all biometric systems, facial recognition has the highest rates of false acceptance and rejection, so questions have arisen about the effectiveness of facial recognition software in railway safety and at airports.

Ralph Gross, a researcher at the Robotics Institute Carnegie Mellon in 2008, describes a hindrance to visualization: "Face recognition has become pretty good in the face and 20 degrees, but once you get to profile, there have been problems." In addition to possible variants, high-resolution images are also very difficult to recognize. This is one of the main obstacles to recognition in supervisory systems.

Face recognition is less effective if face expression varies. A big smile can make the system less efficient. For example, Canada, in 2009, allowed only neutral facial expressions in passport photos.

There is also an inconsistency in the datasets used by researchers. Researchers can use anywhere from multiple topics to dozens of topics and hundreds of images to thousands of images. It is important for researchers to make available data sets that have used each other or have at least one standard data set.

Privacy is the primary concern for the storage of biometric data in companies. Chip or storage of biometric data can be accessed by a third party if it is not stored or hacked properly. In Techworld, Parris adds (2017) that "hackers will already be looking to reproduce their faces.

Conclusion

The use of facial recognition has recently become a very debatable subject and has been criticized more and more because it was considered an unethical tool used to spy on the public. The reason for such criticism is, however, largely due to the lack of information and regulation of this technology. Used proportionally and responsibly, facial recognition can and should be beneficial. It has the capacity to do much more to increase security in the future - from street crime to airport security. Armed war crime has dominated UK titles throughout the year. Recent statistics indicate that the number of people who benefited from the emergency assistance due to armed attacks increased by almost 40% compared to the two years ago, while the number of children under 18 years of age with stab wounds is increasing by 86 % in only four years.

This recent increase in crime has put the police forces under enormous pressure and the smart use of facial recognition has an increasingly important role.

Facial Recognition in Criminal Investigations

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The technology does not decide instead of the cop. However, it provides greater transparency in the decision-making process on the opportunity to stop and searches intervention.

Similarly, advanced technology can recognize a person seen on CCTV security systems at the crime scene, justifying a person's stop and search.

The ability to check in real time whether a person is on the list of criminal investigations adds an added advantage to the decision-making process before stopping and searching, thus lowering the probability of discrimination. Face recognition helps eliminate guns and criminals on the streets and eventually prevent offenses before they have the chance to take place.

Gambling Addiction and the Way Your Face Recognition Can Help

There are an estimated 593,000 people in the UK who are currently struggling with a gambling problem, becoming a serious issue. Having grasped the seriousness of the problem, the British Gaming Commission set limits and tips to help those who suffer from this addiction; however, as with all addictions, gambling is a habit to overcome. In order to put real limits and make a real difference, the gambling commission needs the right technology.

Face recognition technology is capable of keeping track of players and thus helping gambling companies protect their customers to a higher degree. Monitoring who enters and moves around gambling areas is an extremely difficult task for the human staff, especially in crowded areas such as casinos.

In-Face Face Recognition Technology could help the company and staff identify who registered as gambling addicts and keep track of daily play to inform staff if and when it is time to stop. It would also be able to provide effective self-exclusion procedures by identifying an individual exclusively through CCTV security systems as soon as they entered the location to allow security staff to escort them with respect.

Face Recognition in Airport Security

Face recognition has become a normal activity in many airports around the world. Many people today have a so-called biometric passport that allows them to go faster to the gate without having to be controlled. The facial recognition used in this way has significantly reduced waiting times for passport control but also has the ability to increase security in and around airports. Face recognition thus allows officers to identify an individual more quickly and accurately than the human eye.

While some critics may worry about technology-related confidentiality issues, airports have shown that the use of facial recognition has improved security as well as speeding up processes such as check-in and in the future, even procedures boarding.

When used correctly and proportionally, facial recognition can help protect the public and improve national security on multiple fronts.

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Ethics

This article is original and contains unpublished material. Authors declare that are not ethical issues and no conflict of interest that may arise after the publication of this manuscript.

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