Video sent on segmented LAN

SSL

SSL

Best shot | Best-Shot Technology

If face matches, alarm sent

Data held on server in encrypted database with quarantine list

SSL

Search result

Video Insight server
Receives alarm from server and triggers alarm for client

STADIUM SECURITY

Wanda Nijholt *on how Brøndby football club employs facial recognition and security camera solutions to keep fans safe*

The rapid development of facial recognition technology, backed by artificial intelligence, and the latest camera technology has been the key for one famous European football club in its efforts to combat unruly behaviour and to establish an even friendlier stadium environment for fans. In addition to the obvious security benefits, the technology is also providing opportunities to further enhance the visitor experience from cutting queues to the potential for tailored marketing services.

Who could ever forget their first visit to a big stadium for a sporting event? The crackle of excitement in the air like an electrical charge when walking to the stadium with friends and family; an army of supporters marching in the matching colours of their team. The anticipation queueing to pass through the turnstiles and the first view of the pitch when emerging into the floodlights.

As the most popular sport in the Western world, football has long been hailed as the game of the people. But live television coverage and the danger of partisan support spilling over into violence has threatened to put off many from attending games at stadiums across Europe. Now professional football clubs are fighting back. Stadiums are once again becoming safer and more enjoyable experiences for fans with the use of the latest facial recognition technology. Danish football super club, Brøndby IF, is one such early adopter.

Brøndby IF is one of the most successful football clubs in the Danish Superliga. The community has a strong bond with the club and an enthusiastic fan base. This enthusiasm, however, sometimes spills over into unacceptable behaviour by a small minority. Some fans were occasionally bringing in flares and lighting them in the stands, which is against the Danish Football Association rules and can lead to club fines.

The club was also aware that family attendance had fallen at some of the more high-profile games,

Best-Shot functionality enables large numbers of different faces to be processed without overloading the network

such as the local derby with FC Copenhagen, due to concerns over hooliganism and safety. With an average attendance of 14,000 people per game and up to 100 registered persons on the stadium blacklist for causing trouble, the club wanted to find a way to make genuine fans feel even safer at the family-friendly stadium by preventing problems before they could occur.

Up until this point, lists of banned people were distributed to security staff at the entrance gates. They would manually check each person coming into the stadium, but this process was time consuming and not always effective.

"Our people were doing a good job, but if you have to recognise up to 100 people in a crowd of thousands it can be a difficult task," explained Tom Larsen, Stadium Manager at Brøndby IF.

At the same time that Brøndby was exploring security options, Panasonic had been in contact with the Danish Football Association about its latest facial recognition technology and the potential for use as stadium security. An introduction was made and after discussions, Brøndby IF invited Panasonic to run tests at the stadium to verify the effectiveness of the system in real-world conditions.

Panasonic brought a mobile version of its facial recognition solution to the stadium to demonstrate and test the solution. The trial quickly established that there were potential challenges, such as variable lighting and the varying angles of images that were being taken.

However, with refinements the system proved very effective. Even when faces were partially covered by sunglasses or scarves, the system was able to successfully identify test subjects.

Brøndby IF was so impressed with the system's capabilities that it decided to implement the solution.

Using the security solution, blacklisted offenders can now be automatically identified in the crowd before they attempt to enter the stadium. System operators in the surveillance room double check matches made by the system before sending notification to the stewards at the gates to prevent them from entering.

The automated procedure at the entrance also decreases congestion at the gates, so genuine fans can get in faster. As well as improving security outside, the system allows staff more time to focus their attention on creating a safe and entertaining environment for those inside the stadium.

SPOT THE DIFFERENCE

The technology is integral to the success of the solution. On the camera side, 'Best-Shot' functionality is utilised to automatically select the best facial images for analysis, even in difficult light conditions. Only the best images, from the multiple images of each person, are selected and then sent to the server. This enables a large number of different faces to be processed without overloading the network, and contributes to cost reduction of the entire system.

On the software side, the world's highest-level of facial recognition performance has been achieved using the FacePro facial image analysis. The software enables extremely precise checks even with angled views of the face, when the face is partially concealed by sunglasses or a mask, and when facial changes over time (up to 10 years) may be difficult to distinguish with the human eye.

Similar Panasonic technology solutions are already in operation at facial recognition gates at Tokyo International Airport's immigration control.

Without the need for prior registration of biometric data, the system compares the photographic data of the traveller's face in the IC chip embedded in the person's passport with a photo taken at the facial recognition gate to verify their identity. Jumbo Ten Brink Food Stores in the Netherlands has also installed the technology as part of its 'zero tolerance shoplifting policy.'

Another issue important to address in the implementation of the Brøndby stadium solution was compliance with European Union GDPR. Initially, some fans and supporter groups were sceptical about the scheme. They were worried about the Big Brother concerns of privacy and personal data protection. These fears quickly faded once the club

OFFENDERS CAN NOW BE IDENTIFIED IN THE CROWD BEFORE THEY ATTEMPT TO ENTER THE STADIUM

explained the sensitive way that the scheme had been implemented. Security personnel remain in control of the process at every stage. It was very important to Brøndby that the solution was people-led and technology supported.

According to the GDPR, facial recognition is considered sensitive data and cannot be used unless for an exceptional reasons, such as in the public interest. "We contacted the Danish Data Protection Agency and asked for permission," explained Marlene Winter Plas, lawyer and partner at DLA Piper, which advised on the solution. "It took about six months to get an acceptance and it was a very good process."

The solution is very flexible and can be configured to delete or store data as required. Data from the camera is encrypted and the data and images of people not on the blacklist are never stored. In addition, the details of banned individuals are encrypted and only stored on a server blocked from the internet and other external systems.

The new security solution worked from day one. A blacklisted person was identified and prevented from entering the stadium on its very first day of

use. Mickel Lauritsen, Head of Security at Brøndby IF, said: "We can see that we have decreased the amount of flares being used within the stadium during our matches. It has been a success and it's an absolutely vital tool in order to maintain safety and security." Looking to the future, Brøndby IF sees the possibility of using a mobile version of the system at away matches.

But today's modern international stadiums are no longer dedicated to just one event such as football or rugby; they have become centres of entertainment, sport and conferences, welcoming hundreds of thousands of visitors through their doors each year. So in addition to stadium security, there is also the opportunity to use the latest artificial intelligence applications and camera solutions to further enhance the visitor experience.

FLEXIBLE FRIEND

The same solution, for example, has been tested at stadiums to help speed the entrance of season ticket holders. By using facial recognition to check their identity, it removes the requirement for paper IDs to be checked and quickens access. The same type of system could easily be deployed in theme parks, museums and entertainment venues.

There has been a lot of interest in the Brøndby solution with visits from representatives of other industry sectors, as well as other football clubs. Visitors are keen to understand how the technology can be used to improve visitor throughput and enhance customer experience at a wide variety of venues, from airports through to visitor attractions.

"The accuracy and processing capacity of the technology means that it is ideal for sporting stadiums, but potentially also many other venues where security and high visitor numbers are a factor," commented Gerard Figols, Head of the European security business at Panasonic. "Besides the pure security factor, the facial recognition system can also help to enhance the customer experience by enabling quicker, more streamlined access into venues. "

The use of artificial intelligence and facial recognition technology may have begun in stadiums for security purposes, but with the potential to use the technology for a wide range of other visitor benefits it may well be just the first of many future innovative applications of the technology ●

Wanda Nijholt is the Product Marketing Manager for Security Solutions at Panasonic Business Europe. Working at Panasonic for the past six years, she holds a Master of Sciences in International Marketing Management.

The software enables extremely precise checks even with angled views or when the face is partially concealed by sunglasses or a scarf