ULTINOUS

AIRPORT

Budapest Airport
measures waiting times
to better serve passengers

Informing passengers about the expected waiting time
not only improves customer service but can also make
border control manpower more efficient

Budapest Airport measures waiting times to better serve passengers

Informing passengers about the expected waiting time not only improves customer service but can also make border control manpower more efficient

Using Ultinous' intelligent video analytics platform, Budapest Airport (BUD) one of Hungary's International Airports has been piloting a 24/7 real-time Queue management and Prediction system at its Passport Control Area to improve both the level of passenger customer service and the staff management efficiency of passport control officers.

Cameras near the Entrance section and in the wider area after the checking gates have been set to capture the live feed of bypassing travelers. The system uses face recognition technology to capture and compare passenger information. This individual information not only makes people-counting, but also the measurement of dwell times and queue-lengths possible.

After a one-month pilot period, the system proved to be able to accurately measure and display not only the current but also the estimated waiting times. The Airport management believes that the system will significantly improve the efficiency of the shift-management process of the passport control staff. This is expected to result in shorter queues, thus improves Customer Satisfaction, one of the most important factors of the Airport.

Display at Budapest Airport informing passengers on passport control waiting times

The challenge

Waiting in line for passport control at an airport is one of the most annoying situations while traveling. It significantly influences passenger satisfaction and can evenly be stressful for airport authorities to manage important security measures with effective manpower ratio. Proper information on the current and especially on the expected waiting time could significantly support both stakeholder groups.

"Budapest Liszt Ferenc Airport is one of the region's most dynamically developing aerodromes, with a 14.5 % passenger growth rate, 2.5x that of the EU average. It is important that next to quantity, we evenly improve our quality factors like Customer Satisfaction at which professionally managed Border Control plays a key role," **said Peter Huszka, COO at Budapest Airport.**

While this sounds reasonable, the checking process is influenced by multiple factors that make the exact measurement and prediction a real challenge. Some of these include the influx of passenger chunks, having not well-defined queues, where exit order significantly differs from entering order, early or late arrival of flights, unpredictable human behavior, and ad-hoc problems during the checking process. Because of the above, basic people-counting of by-passing passengers was not a valid option.

Influx of passengers
at Budapest Airport
passport control

Using current and predicted waiting times, the airport operator can provide valuable information to its passengers, turning a potentially annoying situation into a professionally handled service. In the meantime, the system provides hard data-based detailed statistics and reports to effectively manage manpower and shift management.

solution The

One of the key success factors of the airport solution is to accurately detect, recognize and track passengers who have entered the passport control area. Unlike most vision-based video analytics systems, Ultinous doesn't use vertically down-facing cameras, but a type that watches a certain area from a horizontal plane of 10-30 degrees. This setup allows the videostream to be used for accurate face recognition and person re-identification. Using this information, we are able to follow a passenger from entering the designated queuing area all the way to the exit points, even if there is no full camera coverage. This makes the implementation and operation of the whole system time- and cost-efficient.

The camera able to detect wide areas and recognize faces at the same time

As a starting point, we have set up six cameras to cover the entrance and exit points of the area. As Ultinous face recognition can simultaneously handle one million face check in real-time, no modification or narrowing-type reconstruction of the airport area was needed to handle the influx of passengers.

Technical parameters:

Camera system
· 6 x 4K Hikvision IP cameras
· 4 FPS
· 8 Mbit/sec/camera

Analysis hardware
· 1 GPU server (scalable)
· Passport control analysis runs on one GPU

Analysis system
· 7/24
· Face matching (face detection, face recognition, face DB, real-time matching)
· Real-time display (waiting time, prediction)
· Data can be assessed on-premise or can be uploaded to Google's BigQuery

Face recognition camera setup at Budapest Airport to measure waiting times

As of the special security expectation of the Airport industry, this project is running with an on-premise setup and does not store actual video or photo database. Instead, it transforms each detected face into a feature vector that describes a person's visual appearance. By re-identification of a person, only these vectors are matched, individuals are not identified. It is important to note that - due to data protection issues, - only the feature vector of a face is stored temporarily. The in GPU memory database makes it possible to match against one million registered faces in real-time. After having the queuing time measured, all face recognition data are discarded and the deleted data about the individual passengers may not be restored.

With a face recognition accuracy of 99,6 %, the system is able to measure the exact waiting times of a passenger, calculate queue sizes and create a learning algorithm-based prediction of the expected waiting time. Reports and statistics are easily accessible by airport authorities to underlie appropriate measures.

These include:
• Waiting time measurements
• Average waiting time by time of day
• Histogram of the waiting times
• Real-time waiting information
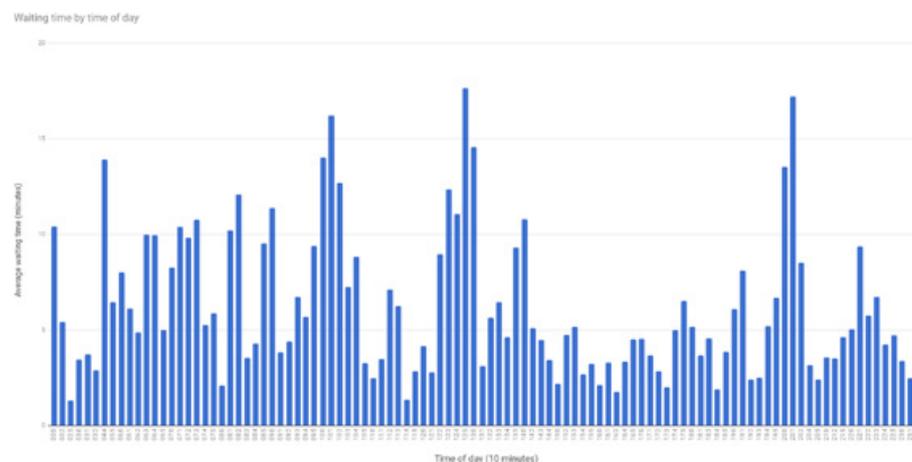
Example report:
Average measured waiting time by time of day at Budapest Airport

The results

The primary objective of the pilot was to confirm that Ultinous's face recognition technology can support Budapest Airport with accurate and reliable waiting time measurement.

As part of the one-month pilot, the following actions have been taken:

- 1 200 000 raw matches (multiple exit matches per person)
- 120 000 customer waiting time measurements
- 95% of the measurements are true matches
- Total of 5.6 million face matches

The evaluation of the data showed that Ultinous's face recognition system is permanently over-performing the match rate needed for accurate waiting time measurements and prediction, even in an always-changing parameter environment.

As Huszka highlighted: *"The main advantage of the Ultinous's solution is that - although the system setup was really fast and included the latest technology available, - it required neither heavy investments nor any reconstruction of the airport facilities, while it provides actionable data instantly. Moreover, the system is easily scalable in both number of people managed and area of usage."*

Further exploitation of the existing technology offers the following options:

- Roll out the waiting time measurement to other areas (e.g.: security screening or the whole airport)
- Use the existing infrastructure to monitor and schedule passport control staffing with predictive alert function (when to open or close a checkpoint)
- Find wanted persons and known offenders (currently managed by national police)
- Use anonymized demographic data of passengers collected in commercial areas of the airport
- Use Re-identification and Tracking solution to create Customer Journey Maps to optimize Airport

About
Ultinous

Ultinous is an AI-based technology company using deep learning to provide intelligent video analytics. Our technology provides state-of-the-art accuracy along with high-speed processing, making real-time video stream processing a reality. The ground-breaking technology is able to generate unseen analytics, metrics and real-time predictive alerts from live video feeds. The video analytics technology integrated into our solutions is used in a variety of settings and in different industries, such as retail and security.

Our image and video recognition technology are made easily accessible by a clean API, empowering developers all over the world to build a new generation of intelligent applications.

Contact
US

For more information please contact:

Sebestyén Dóra

Mobile: +36 70 335 4343
Email: sebo@ultinous.com

Or visit our website at **ultinous.com**

Real-time video analytics
with predictive alert
powered by artificial intelligence