

Queue Prediction with Alerting at Rossmann Hungary: eliminate long queues, increase shop revenues

How to improve user experience and buying willingness with optimized staff resource

ROSSMANN



Ultinous Video Analysis Platform

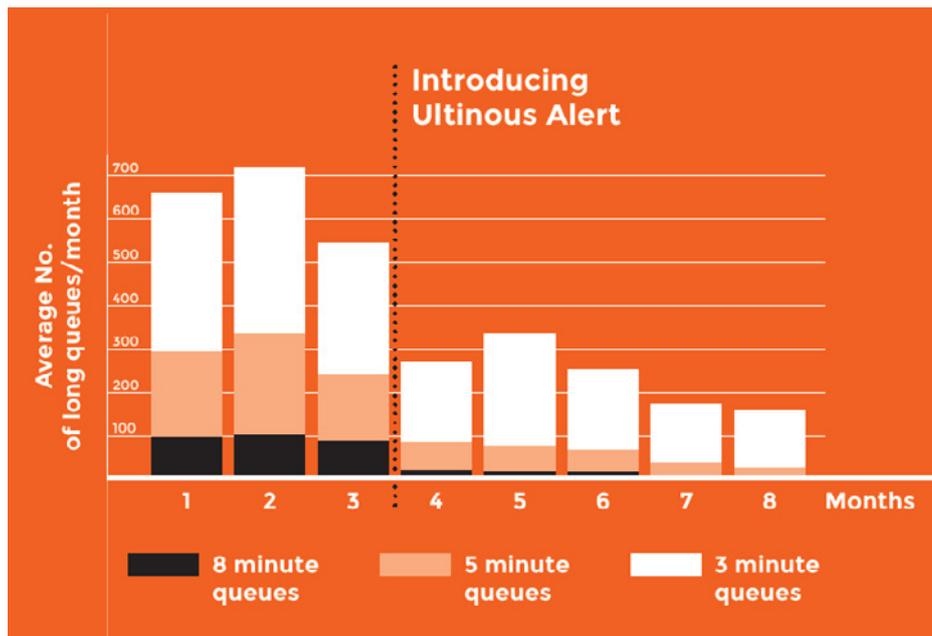
CASE STUDY



Queue Prediction with Alerting: eliminate long queues, increase shop revenues

How to improve user experience and buying willingness with optimized staff resource

Using the Ultinous Video Analysis Platform we implemented an end-to-end queue management system for the Hungarian subsidiary of one of Europe's biggest drug store chain, **Rossmann**. The queue management system uses security camera feeds as input and runs the video analysis modules to accurately assess the number and distribution of shoppers in the store at any given time. Based on these observations, a controller model sends alerts to store staff to open or close tills to minimise queuing time. Alerts are sent in a predictive way, minutes before the queue is about to form or to disperse, leaving enough time for the staff to react. In the first wave, the system has been deployed in 5 Rossmann stores, each with an average of 2,500 visitors a day. The hard data-based evaluation showed that the system resulted in a substantial drop in queue length and the disappearance of long queues and abandoned baskets. It also resulted in a significant transaction number increase, without the need to deploy additional resources.



The problem

Rossmann Hungary claimed they had an issue with long queues and wanted not only to measure the queues but to see them reduced. Long queues are a big issue in many retail stores resulting in the daily loss of potential customers. Shorter queues result in a better customer experience and increased conversion rate.

The stores are mainly located in large shopping malls which are open for 12 hours per day, each with 5 cash registers and have approximately 2,500 visitors per day. Cashiers in the stores are skilled in various tasks; it is possible to allocate resources between tills and other activities in real-time to achieve optimal resource utilization.

What customers say about queues

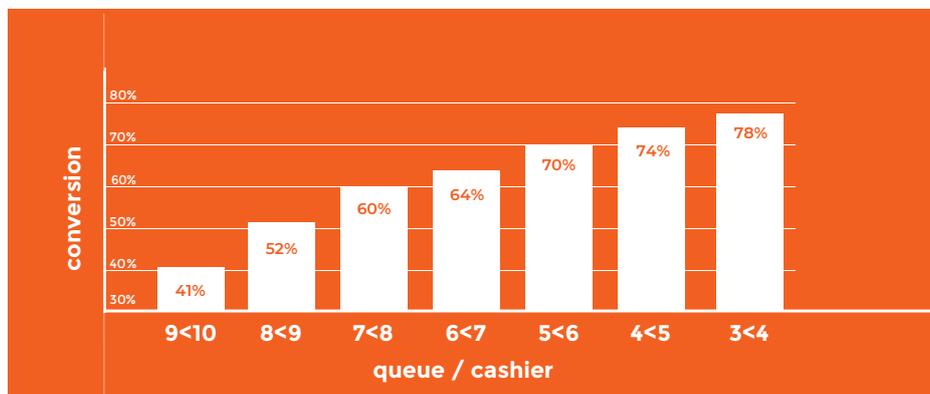


And it is not just once!

More than **50%** said they are **less likely to return to a shop** where they had queueing issues earlier.

*European research studies shows

Effect of queues on conversion rate



ROSSMANN ^{The} solution

We deployed 5 sets of 2MP IP cameras in the stores: one trained on the entrance and the others trained on the tills and queues in front of the tills. The entrance camera frame rate was set at a higher FPS and all the others to 1 FPS with all the feeds transferred in real-time to a data centre. The store upgraded its internet connection to have a guaranteed upload bandwidth and, in order to secure the streams, an IPSEC connection was made between the store and the data centre. Ultinuous has large, multi-GPU servers in its data centre to run the video processing system.

We ran head detection and real-time anonymisation on all streams. To detect cashiers and queues we defined regions of interests (ROI) for each cashier and the queuing areas. Total queue size is simply adding up the number of persons detected in each queuing ROI.

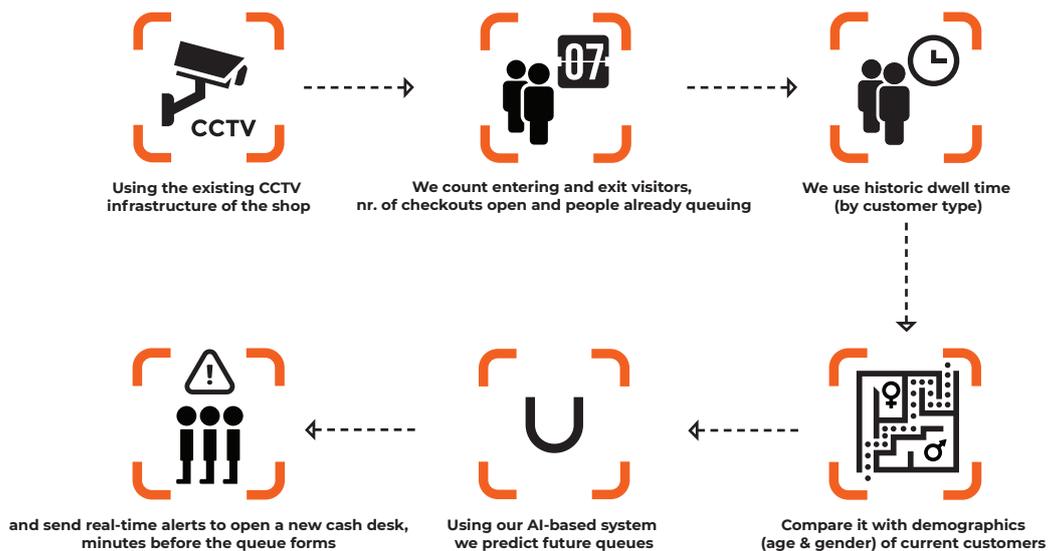
One of the key parts of our queue management solution is to accurately track incoming and outgoing traffic. Unlike most vision-based counting systems we don't use vertically facing down cameras. Instead, we use a camera that observes a certain store area from a horizontal plane of 10-30°.



Example video frame and detection for queue length measurement in a Rossmann store.

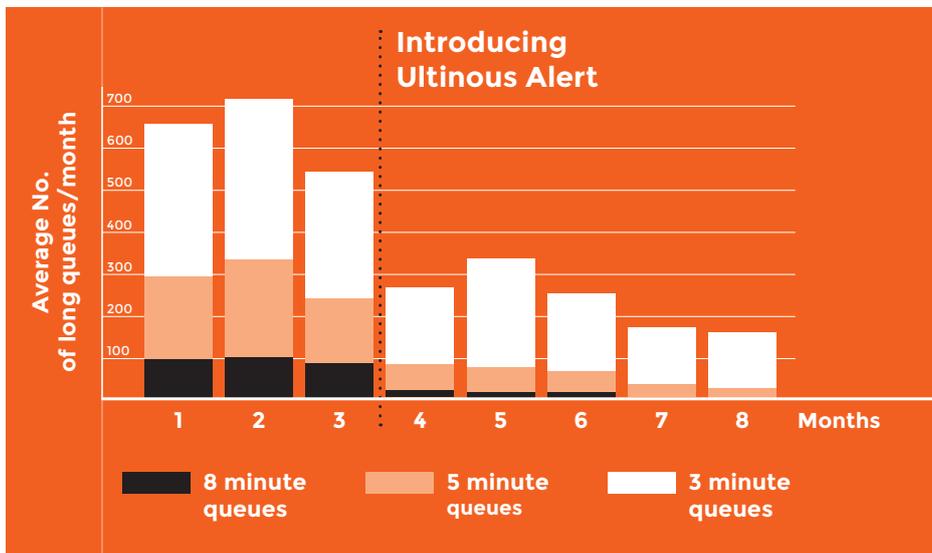
This setup allows the video stream to be used for many other purposes such as demographics (age and gender) and re-identification. We do this with real-time anonymisation to protect customers' privacy. Enter and exit events are booked when the track crosses a predefined crossing line. The system uploads observation data to our database in hourly chunks.

When a new customer enters the store, the alerting system must be able to predict when the customer will arrive in the queuing area. To do this we measured dwell-time distribution with the person re-identification module. The person re-identification algorithm uses full body features (hairstyle, clothing, etc.) to identify the same person from different angles on different camera views or to match incoming and outgoing customers on the same camera view. A predictive alerting logic takes all the observations, and alerts cashiers if the throughput needs to be increased. The system generates approximately 20-30 alerts a day per store.



ROSSMANN ^{The} results

We ran the system without alerts for a month to observe baseline queue length statistics. When we turned on the alerting feature the queue situation in the store changed significantly.



Overall cashier time in the shop has **not been increased**. The **Visitor/CROM** (cash register operation minutes) ratio **stayed intact** from alerts



Shorter Queues made **more people entering the store and buy more**

The average monthly (year-on-year) **transaction number growth** per shop is between **2.9-5.1%**



Shorter queues and increased shop assistant time make **customers more satisfied** and **return more often**



As the result of the above factors, the average **shop revenue** **increased by 1.7-2.9%**



The figure above shows how long queues changed after introducing Ultinous Queue Alerting. Shorter queues improved purchase willingness and baskets were no longer abandoned. These all lead to a substantial increase in the store revenues.

Based on these persuasive results, **Rossmann** is about to roll out the system nationwide and in additional countries.

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.

About Ultinous Retail

Ultinous offers advanced customer insights for brick and mortar Retailers with an Artificial Intelligent-based in-store platform, that learns shopper patterns, measures and shortens queues through its Queue Prediction and Alert Tool. Ultinous Alert Platform can be implemented easily and cost-effectively using the existing CCTV infrastructure and data can be easily combined with existing analytic information and tools.



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

How can we help?

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