Case Study

Quick Service Restaurant

QSRs Boost Drive-Thru and Store Efficiency with meldCX and Intel

meldCX® uses IoT and computer vision AI for insights on optimizing operations and customer service; powered by Intel® Xeon® Processors for real-time AI inferencing

The quick service restaurant (QSR) landscape and consumer behavior experienced a significant transformational shift post COVID, elevating the role of drive-thru services and requiring many of these restaurants to pivot to improve drive-in service.

Many QSRs have expanded their drive-thru service capacity, integrating dual or triple lanes, digital menu boards, and predictive ordering technology to streamline the ordering process.

At the same time, the emphasis on convenience has also influenced changes to the physical layouts of these restaurants. Many are now reconfiguring dining areas to support the balance between fast service and improved dine-in experiences.

Before making the leap into these investments, many restaurants turn to analytics software that can assist with statistics and insights on customer mobility utilizing existing data on service times and customer activity. The capabilities of this software are best delivered using on-premises servers designed to operate on the restaurant premises. These edge servers provide faster data capture and processing because they don't have the latency that results when the data is sent to the cloud. Also, these edge servers are capable of using virtualization to host other essential services and business applications such as networking, point of service, inventory, and others.

meldCX, an Intel® Industry Solution Builders' Retail Builders Community member has developed a robust and comprehensive software tool to collect and analyze drive-thru data and provide insights for improving customer experience and profitability.

Vision Analytics Provides Data-Driven Insights

Viana™ is meldCX's vision analytics solution, designed to anonymously capture and analyze real-world customer activity so QSRs can gain an in-depth view of drive-thru performance and the in-store customer journey. Viana gathers key metrics such as wait times, queue sizes, and peak hours to inform staffing and layout decisions, ensuring smooth operations across multiple channels.

Viana for Drive-Thru

Viana for Drive-Thru is tailored to address common challenges in QSR drive-thrus, helping restaurant managers to make data-backed business decisions, such as employing more staff, enhancing marketing, and adding or closing drive-thru lanes. Viana for Drive-Thru follows the customer journey through the drive-thru as seen in Figure 1.

Figure 1. Viana for Drive-Thru collects data from multiple points of the customer's journey through the drive-thru providing the data that can be analyzed for insights and decision making.

Viana for Drive-Thru insights include:

- How many vehicles are entering the drive-thru lane
- How many vehicles leave the queue without ordering (abandonment)
- How many vehicles complete their order
- How much time is spent per window (ordering, payment, pick-up, etc.)
- How long is the average time to fulfill an order
- Queue size and queue times
- Busiest times of day and days of the week
- Number of transactions at windows compared to point of sale (POS) data

This data allows restaurant operators to identify choke points, order abandonment, and service times that are among the challenges that many drive-thru facilities struggle with.

In-Store Insights with Viana

Beyond drive-thru optimization, Viana is transforming in-store operations by using indoor security cameras to track customer flow, manage wait times, and understand in-store traffic patterns such as peak times and service bottlenecks — enabling businesses to make informed staffing and inventory decisions.

For employees, this means smoother workflows and reduced stress, while customers enjoy faster service with fewer errors, leading to a consistently positive dining experience.

IoT and AI Deliver Real Time Feedback

Viana collects data using an IoT module that is installed on a wide range of supported security cameras. Once collected, data is sent to the cloud. Before the data is transported, Viana processes the video and removes all PII from the video stream, including faces and license plates.

Once in the cloud, the data is processed and visualized using cloud-based data analytics and a data lake after which the results are made available to the customer on an online dashboard.

This data is organized into visualizations that make it easy to review the full depth of the data. View Figures 2 and 3 below to see what data are captured on the dashboard.

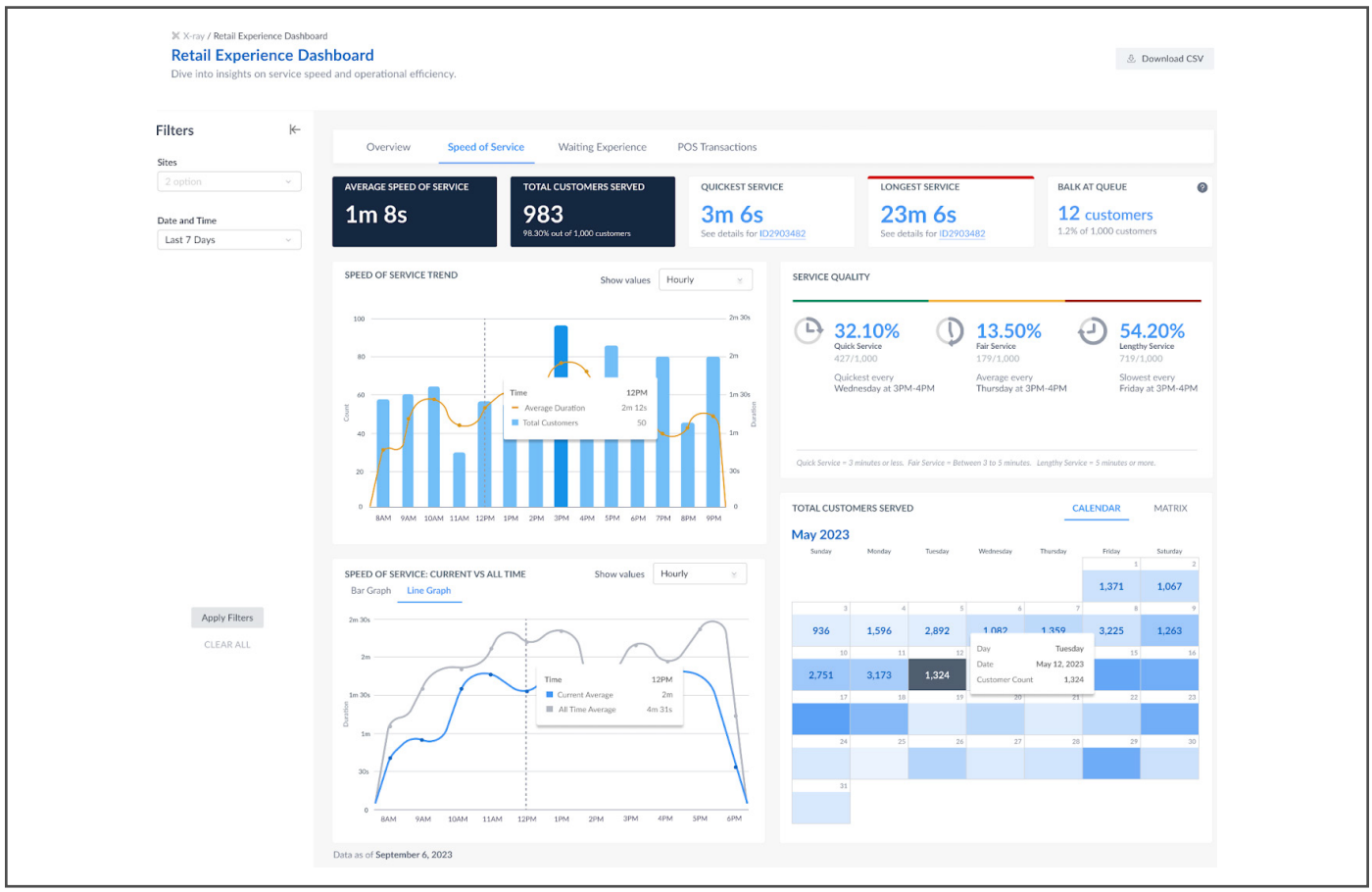

Figure 2. Viana dashboard showing speed of service metrics.

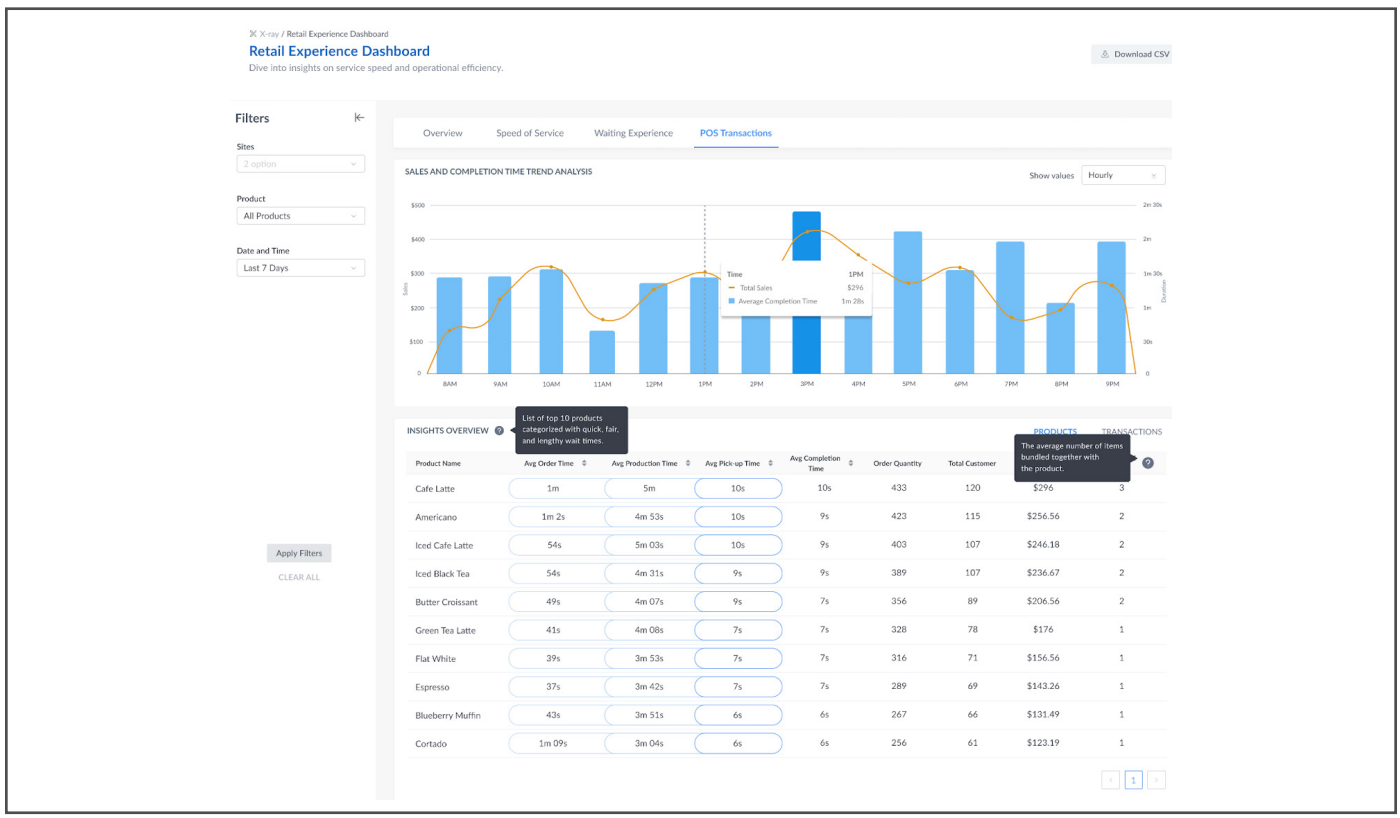

Figure 3. Viana dashboard showing order fulfillment times alongside corresponding point-of-sale metrics.

Viana's data is very accurate thanks to rigorous testing in both real-world and replica environments, easy to deploy and manage, with reliable and timely data and insights.

Privacy-First with Synthetic Training Data

Viana prioritizes privacy by training its AI models on synthetic datasets generated from 3D models, reducing bias and enhancing accuracy. The platform has been independently validated for compliance with privacy standards such as GDPR and ISO27001, ensuring that no personally identifiable information (PII) is collected or processed.

Edge Servers Based on Intel® Xeon® Processors

meldCX has based its edge server on Intel® Xeon® Scalable Processors. Using these processors, the meldCX solution is able to run the required edge processes of the Viana AI solution, including high-volume data processing, inferencing, and storage. The advanced processor features high core counts that deliver the performance to support meldCX computer vision deployments.

The CPU family meets the need for cost-effective, low latency compute at the edge, including delivering performance for AI applications, while meeting security, power and space constraints.

AI-performance boosting technologies available in these CPUs include:

- Intel® Deep Learning Boost (Intel® DL Boost) accelerates AI workloads by eliminating unneeded precision in calculations so they can be completed more quickly.
- Intel® Advanced Vector Extensions 512 (Intel® AVX-512) boosts performance for demanding requirements such as AI and 5G workloads with ultra-wide 512-bit vector operations that work on more data per clock cycle than predecessor technologies.

To boost inferencing speed, meldCX uses the open source Intel® Distribution of the OpenVINO™ Toolkit optimized for Intel Xeon Scalable processors. The OpenVINO Toolkit accelerates AI inference with lower latency and higher throughput while maintaining accuracy, reducing model footprint, and optimizing hardware use. It streamlines AI development and integration of deep learning in domains like computer vision, large language models (LLM), and generative AI.

Using the OpenVINO Toolkit, meldCX managed to squeeze out more frames per second (fps) from the same Intel hardware than before using raw trained models. Raw ML models normally running at 100% of CPU performance but were optimized to 65% average performance. Viana has also reduced its edge computing power requirement by 37 percent.[1]

Viana Delivers Key Insights for Leading U.S. Coffee Chain

A major U.S. coffee chain partnered with meldCX to harness Viana's vision analytics, with the goal of enhancing the efficiency and accuracy of order processing as part of their ongoing commitment to delivering exceptional customer satisfaction and quality products. Each location serves hundreds customers daily, yet management previously lacked detailed insights into customer behavior and service trends.

Using Viana for Drive-Thru, the chain now captures and analyzes key metrics in their drive-thru like vehicle abandonment rates, queue lengths, and POS transaction data. These insights empower the chain to make informed adjustments for improved operations. For example, by identifying bottlenecks, meldCX has been able to provide targeted recommendations that have led to significant improvements in service flow.

"The drive-thru can be the most profitable 100-200 feet of concrete for a QSR, but it's also a space that needs optimization in order to reach its full potential. Viana for Drive-Thru provides the data that QSRs need to make sound decisions that truly improve the customer experience," said Stephen Borg, meldCX CEO & Co-founder.

meldCX's engagement with the coffee chain began with a drive-thru solution and has since expanded to encompass multiple in-store use cases — all delivered within the same Viana platform. This allows the coffee chain to achieve holistic / end-to-end data analytics without the need for multiple vision analytics products.

[1] Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.

Conclusion

In the QSR industry, customers demand fast, accurate service while also expecting fresh food. However, long service times can lead to wait times, customer frustration, and abandonment, ultimately impacting sales and profitability. To help optimize the customer experience, meldCX provides vision AI modules that track both in-store and drive-thru operations through its Viana computer vision software.

Offering easy installation, Viana works with existing security cameras to collect anonymized traffic data that is compiled into visualizations that provide valuable insights. With edge computer vision processing based on Intel Xeon CPUs, the system delivers these insights in real-time.

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Video: Viana by meldCX for QSR

Intel® Xeon® Scalable Processors

Intel® Distribution of the OpenVINO™ Toolkit

Intel® Industry Solution Builders

[1] https://www.grandviewresearch.com/industry-analysis/edge-computing-market

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