

Solution Brief

Retail Analytics
Video AI Analytics
Spatial Intelligence Platform



Pathr.ai Delivers Intel-Enabled Spatial Intelligence to Help Improve Supermarket Operations

A major US grocery chain improves operational efficiency, customer experiences, and store profitability using the Intel® Xeon® processor-based spatial intelligence platform from Pathr.ai™.



“Leveraging the Intel® Distribution of OpenVINO™ toolkit and Intel® CPUs allowed us to deliver actionable and privacy-preserving insights to a major grocery chain in near-real time, helping optimize store operations and improve store profitability for our client.”

—George Shaw, founder and CEO, Pathr.ai

Supermarkets operate with slim margins and often face staffing constraints, so it is a challenge for an individual chain to provide a positive customer experience at an acceptable labor cost. One way of compensating for a persistent labor shortage is to deploy available technology to maximize the productivity of in-store staff efficiently so that customers’ needs are met.

However, such responsive service relies on a deep understanding of in-store traffic and customer behavior in the moment. Immediate solutions are needed for a variety of ongoing challenges:

- How can we use real-time entrance data to adjust staffing and improve employee productivity?
- What are the average queue lengths at the staffed checkout now, and what are the projections for the next 20 minutes?
- Which displays are driving the most traffic and dwell time?

Store managers need to recognize these signals and act quickly if they want to maximize store profitability while delivering a positive customer experience.

In-store video data can be harnessed to enable a deeper understanding of customer behavior and interactions with off-shelf displays, endcaps, specialty departments, and other areas of interest within the store. While transaction data informs a retailer of sales results for a particular product, it doesn’t measure the effectiveness of displays. Product categories may be displayed in multiple areas within a store, and sales results don’t differentiate between the different display areas. Likewise, transaction data will not reveal the popularity of categories or displays that customers considered but didn’t purchase.

Challenge: Video data may reveal little, risks compromising shoppers’ privacy

Most stores are already equipped with security cameras that are capable of capturing customer activity, but these capabilities are used primarily to identify theft and other suspicious behavior. With the help of real-time spatial intelligence, however, that same video data can now reveal valuable insights about customers’ traffic patterns and interactions with products and displays. Such insights can help store managers to adapt staffing, floor layout, product placement, and merchandising to improve traffic flow, enhance the shopping experience, and increase revenues while reducing costs.



It can be difficult to analyze customer behaviors quickly enough to support a prompt staff response, however. If the customer is waiting in front of a locked display, even a brief delay could make the difference between a happy customer and a frustrated one who may abandon the attempted purchase and avoid the store in the future. There are solutions that can provide near-real-time video analysis, but those systems typically rely on an up-front

purchase of hardware and sensors that some stores cannot afford, even if the potential return on investment (ROI) would be positive in the long term.

Constant monitoring of in-store video feeds can present another challenge to shoppers' privacy. Customers' identities must be fully masked to protect privacy and comply with regulations.

Solution: Pathr.ai spatial intelligence system yields actionable insights in pilot program

A pilot program conducted by Pathr.ai and a major US grocery chain demonstrates the potential for grocery retailers to overcome these and other challenges. The Pathr.ai solution used the store's existing video infrastructure to deliver actionable insights economically. Pathr.ai also provided analytics that helped improve operational efficiency and boost customer satisfaction, both in the moment and in the future. Because the cameras and infrastructure were already in place, there was no need for time-consuming, disruptive installations of additional hardware. The grocer engaged with Pathr.ai to address the following use cases:

- **Optimize** store operations by monitoring checkout and specialty department queue lengths and wait times
- **Understand** the value of endcap displays, off-shelf displays, and aisles based on customer traffic and dwell time
- **Measure** true sales conversion rates with group sizes to identify cost savings or profit improvement opportunities

Pathr.ai relied on the Intel® Distribution of OpenVINO™ toolkit and Intel® Xeon® processors, resulting in performance of up to 405 frames per second (FPS), according to Pathr.ai's internal benchmarks.¹

Pathr.ai's solution, which uses predictive data analytics tools powered by artificial intelligence (AI), is fully compliant with the General Data Protection Regulation (GDPR) and California Consumer Privacy Act (CCPA).

Pathr.ai solution supports potential for cost savings and added revenues

The Pathr.ai spatial intelligence solution empowers supermarket owners and managers to optimize in-store operations and make better use of labor resources without compromising customer service. For example, Pathr.ai issues alerts in near-real time when dwell times or queues exceed a defined threshold. The store manager can respond immediately by directing staff to resolve the issue or offer help to customers who need attention. Such operational insights can enable managers to prevent lost sales and allocate their staff to their best and highest use.

Analytics gleaned from the Pathr.ai solution can also support new or improved revenue opportunities. For example, customer traffic patterns and other behaviors can indicate relative interest in products and product categories and assess the impact of product placement within departments, at end caps, and in the aisles. Armed with a thorough knowledge of category shopping behavior, store managers can adjust product positions and merchandising to drive incremental purchases. Spatial intelligence also helps store owners and managers to understand and differentiate between impulse buys and considered purchases, identify critical products, and test options for flow redirection and point-of-sale displays.



Figure 1: Pathr.ai's platform turns raw behavioral and spatial data into actionable insights that can be accessed from mobile and other devices.

*“Today, it’s critical to deliver exceptional customer experiences and find ways to differentiate ourselves in a competitive grocery landscape. Pathr.ai introduces a practical solution to integrate with our existing cameras and produce insights that help us better understand how our shoppers are behaving inside our store. **The real-time alerts that Pathr.ai deployed for us have made the biggest difference to our store operation teams.** These alerts help us meet customer satisfaction expectations while making it efficient for our teams to take immediate action.”* —Executive, major US grocery chain

Spatial analytics deliver near-real-time insights

Pathr.ai’s AI-powered spatial intelligence solution is designed to turn raw data into actionable insights at big-box retail stores, grocery stores, commercial office buildings, and industrial warehouses, among other locations. Businesses can use the platform to understand the different traffic patterns, interactions, and other behaviors within their physical spaces and use those insights to help improve operations and financial results.

Figure 2, below, shows how Pathr.ai collects data and turns it into actionable insights.

Data collection: Data is collected from existing loss prevention and security cameras. The platform can also collect data from other cameras and sensors.

Location extraction: Using pretrained models from the Intel® Distribution of OpenVINO™ toolkit, Pathr.ai can detect customers and staff in the video feeds.

Spatial projection: To preserve privacy, each detection of a person is projected onto a floor plan, viewable only as an anonymous dot moving in the physical space. No personal information or socioeconomic, demographic, or visual data is collected.

Behavior engine: Pathr.ai’s behavior engine evaluates in near-real time the way people and objects move through and interact with their physical environment.

Actionable insights: Store owners and managers can use their preferred business intelligence software or custom dashboards to view the insights provided by Pathr.ai.



Figure 2: Pathr.ai’s unique spatial intelligence platform ingests data from a variety of sources and uses a machine learning-enabled behavior engine to provide near-real-time insights.

Video processing is optimized with the Intel® Distribution of OpenVINO™ toolkit

The Pathr.ai platform can be scaled and adapted for use in various retail settings, including at department stores, big-box stores, grocery stores, and specialty stores. Pathr.ai further optimized the Intel® Xeon® processor-based platform using resources from the Intel Distribution of OpenVINO toolkit:

- **Open Model Zoo**, part of DL Workbench, provided pretrained, out-of-the-box deep learning models to accelerate deployment.
- **Computer Vision Annotation Tool (CVAT)**, an open source tool, helped Pathr.ai annotate and label its videos.
- **OpenVINO™ Model Server** made it easy for Pathr.ai to deploy new model versions quickly and measure latency on each. It also provided support for AI accelerators.

Higher performance was achieved with the Intel® Xeon® processor-based configuration and subsequent optimizations, resulting in speeds of up to 405 FPS.¹

Key benefits

- Reduce labor costs by optimizing staffing levels at checkouts and in specialty departments
- Assess true sales conversion rates by identifying groups or families as single customer units
- Drive incremental revenue by optimizing merchandising and displays and improving the customer experience
- Save time and money with the use of existing cameras, sensors, and other infrastructure
- Protect customer privacy and comply with GDPR and CCPA regulations by anonymizing shoppers’ identities
- Facilitate rapid response with real-time alerts sent to mobile phones, PCs, or other endpoint devices
- Enhance analytics with data visualizations, using preferred business intelligence software

Data-driven insights help retailers optimize operations and improve customer satisfaction

To help supermarkets and other brick-and-mortar retailers to remain competitive, Pathr.ai offers an AI-powered spatial intelligence platform that uses existing camera infrastructure to observe shopper behavior and deliver actionable insights in near-real time, with full GDPR and CCPA compliance. Equipped with these insights, retailers can optimize staffing levels, improve customer service, understand in-store traffic patterns, and analyze the impact of merchandising and shelf placement choices.

For its recent deployments, Pathr.ai relied on models and optimizations made possible by the Intel Distribution of OpenVINO toolkit. The powerful, cost-efficient solution works with existing hardware and sensors and can be deployed in weeks.

Learn more

For more information about Pathr.ai solutions, visit pathr.ai.

To contact Pathr.ai about this solution, email info@pathr.ai.

To learn more about Intel® intelligent video technologies, visit intel.com/intelligent-video.



Intel® Distribution of OpenVINO™ toolkit

Pathr.ai relies on the Intel Distribution of OpenVINO toolkit to accelerate AI model training and deep learning inference. The free, downloadable toolkit helps developers and data scientists fast-track development of high performance computer vision and deep learning into vision applications. The toolkit enables deep learning on hardware accelerators and streamlined heterogeneous execution across multiple types of Intel® platforms.

intel.com/openvino

About Pathr.ai

Pathr.ai is the industry's first AI-powered spatial intelligence software company that uses anonymous location data from available and existing infrastructure to observe human behavior in any physical space. Its sophisticated technology turns raw behavioral and spatial data from existing sensors into actionable and applied business learnings, allowing companies to drive the business results that matter most to their growth in near-real time. Founded in 2019, Pathr.ai is headquartered in Mountain View, California.

pathr.ai

About Intel® Xeon® processors

Open Intel® architecture and reliable, optimized performance help to elevate business productivity. The Intel Xeon processor delivers scale and efficiency across a broad range of data center, edge, and workstation workloads.



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1. Test configuration: 1-node, 2x Intel® Xeon® Gold 5220R processors (Cascade Lake) with 265 GB DDR4 memory, Dell PowerEdge R740, BIOS/microcode=2.11.2/0x5003102, HT=True, Turbo=Enabled, Ubuntu 20.04LTS, Kernel 5.4.0-90-generic, OVMS version 2021.1, model person-detection-retail-0013. Tested by Pathr.ai on June 27, 2022.

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