

SOLUTION BRIEF

Intel® Vision Accelerator
Design Products
AI in Retail



Prevent Store Losses and Keep an Eye on Business: AI at the Edge

The Mindtree Smart Digital Vision Analytics System enhances security and reduces shrinkage with Intel® technologies

Executive summary

Managing retail profit margins is a huge challenge. Electronic retailers net an average of 5 percent,¹ while it's normal for grocery stores to operate at a 2.5 percent net profit margin.² Regardless of the goods being sold, it makes sense for every retailer in today's highly competitive, ever-changing landscape to find ways to maximize efficiencies and reduce losses.

Groundbreaking video and computer vision technologies offer retailers a way to solve long-standing problems by capturing visual data and turning it into valuable, actionable information and insights.

Daily operations is one area where computer vision has a wide range of uses. For example, for retailers, an ongoing challenge is inventory shrinkage and employee theft. Loss prevention specialists say that employees could cause more loss to a store than shoplifters,³ especially since the theft occurs repeatedly over long periods of time. Shrinkage due to internal factors, including employee theft, accounted for 24.5 percent of store losses in the US.⁴

Mindtree and Intel have partnered to create a next-gen solution, the Mindtree Smart Digital Vision Analytics System, that allows store owners to access AI and deep learning capabilities at the edge to reduce losses due to perpetrators in near-real time and prevent such activities in the future.

Challenges

Security cameras can help store owners keep an eye on business while they're not present and help deter employee theft, but up until recently, these systems could only capture footage. To be effective, such systems require that someone, usually another store employee, watch the footage live or review hours of video after a theft has occurred—a time-consuming, costly, and often ineffective way to combat the problem.

Many chain stores must also strike the right balance between reducing overhead, such as number of employees, with the cost of doing business, including shrinkage. Many stores must operate with unsupervised staff, which can lead to employee theft in several difficult-to-detect forms:

- A cashier rings up a return at the point-of-sale (POS) terminal when a customer is not present, but pockets the refund.
- Scan avoidance: One scan-avoidance scenario happens when a cashier acts as if conducting a sales transaction but instead performs a price check, which does not appear suspicious to a casual onlooker. The customer pays and leaves the store with the item. The employee then pockets the money.

Cloud-based vision analytics solutions have helped to detect such incidents, but their network bandwidth requirements and high cost make them difficult to implement and expensive for smaller chains.



Solution

The Mindtree Smart Digital Vision Analytics System can accurately identify individuals performing suspicious activities based on millisecond-fast activity detection and recognition capabilities. Its deep learning video-based algorithms process real-time CCTV-video and POS-transaction data to identify, record, and send alerts when events occur that are considered abnormal or suspicious.

And since it's an edge-based solution, latency is low. The solution incorporates the Intel® Distribution of OpenVINO™ toolkit, Intel® Core™ processor-based gateways, and Intel® Vision Accelerator Design for optimized speed, performance, and scalability.

How it works

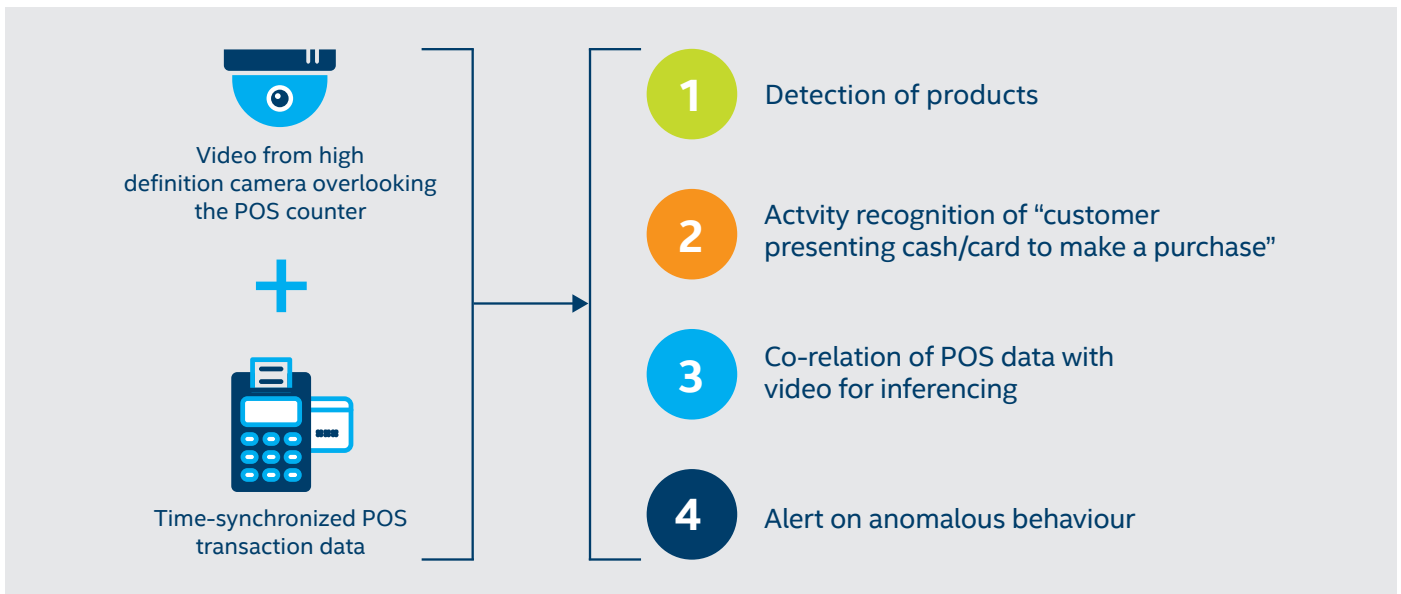
Deployment at a location is quick, consisting of the following steps:

1. A survey of existing infrastructure requirements and characteristics is conducted, such as camera specifications, positioning, occlusions, existing POS software, and video management systems.
2. Use case parameters (any object identification, areas of interest, or persons who should be excluded or included) are provisioned.
3. Activity recognition is set up.
4. The Mindtree platform and customer software are integrated, and then the resulting integrated system is tested and fine-tuned.
5. After testing, the system is implemented in one or several stores and then scaled across multiple locations.

Benefits of the Mindtree Smart Digital Vision Analytics System

The Mindtree Smart Digital Vision Analytics System helps retailers reduce financial losses due to theft by capturing a wider range of infractions that previously were not possible by manual surveillance means. Its ability to support high definition video and automated actions greatly supports security staff and leads to cost savings, process adherence, and improved compliance. The Mindtree System also includes these benefits:

- **Speed.** The Mindtree System is able to recognize and alert supervisors of a suspicious event within two to four seconds—nearly real time.
- **Scalability.** The same capabilities are possible at every store location across the enterprise. By containerizing the Edge Analytics services on the Intel gateway and connecting to the cloud, the same solution can scale for every store location across the enterprise.
- **Flexibility.** The Mindtree System can be customized to suit whatever capabilities are required for multiple use cases. It works with any camera, all leading Intel®-based edge devices, AI frameworks (Caffe*, Tensorflow*, Theano*, and more), and cloud platforms, such as Microsoft Azure*.



The Mindtree Smart Digital Vision Analytics System utilizes video, POS-transaction, and other data to recognize certain activities in a retail environment. The deep learning inference system alerts operators when unusual activity occurs.

OpenVINO™ toolkit

The Intel® Distribution of OpenVINO™ toolkit is a free, downloadable toolkit that helps developers fast-track the development of high performance computer vision and deep learning into vision applications. It enables deep learning on hardware accelerators and streamlined heterogeneous execution across multiple types of Intel® platforms. It includes the Intel® Deep Learning Deployment Toolkit with a model optimizer and inference engine, along with optimized OpenCV* and OpenVX* libraries and functions for computer vision. This comprehensive toolkit supports the full range of vision solutions, speeding computer vision workloads, streamlining deep learning deployments, and enabling easy, heterogeneous execution across Intel® platforms from device to cloud.

Conclusion

Using advanced Intel® architecture accelerated by the Intel Vision Accelerator Design and Intel Distribution of OpenVINO toolkit, Mindtree can provide customers a complete AI-based computer vision analytics solution, from the initial consultation to proof of concept to full implementation. The Mindtree Smart Digital Vision Analytics System helps retailers of all sizes “see” more of what’s happening on a day-to-day basis, reducing losses and improving staff efficiency.

About Mindtree

Mindtree [NSE: MINDTREE] delivers digital transformation and technology services from ideation to execution, enabling Global 2000 clients to outperform the competition. “Born digital,” Mindtree takes an agile, collaborative approach to creating customized solutions across the digital value chain. At the same time, our deep expertise in infrastructure and applications management helps optimize your IT into a strategic asset. Whether you need to differentiate your company, reinvent business functions, or accelerate revenue growth, we can get you there. Visit mindtree.com to learn more.

Learn more

Explore Intel® Vision Products at intel.com/visionproducts.



1. Goldsborough, Reid. 2015. “Profit Margins of the Makers of PCS and Handheld Devices,” Information Today Inc., November 15, 2015, <http://www.infotoday.com/LinkUp/Profit-Margins-of-the-Makers-of-PCS-and-Handheld-Devices-107588.shtml>.
2. <https://www.forbes.com/sites/sageworks/2016/10/03/the-15-least-profitable-industries-in-the-u-s/#47f8ef2c618a>.
3. <https://toughnickel.com/industries/10-Things-You-Didnt-Know-About-Retail-Employee-Theft>.
4. <https://www.retaildive.com/news/shrink-cost-retailers-100b-last-year/524460/>.

Performance results are based on testing as of September 2018 and may not reflect all publicly available security updates. See configuration disclosure for details. No product can be absolutely secure.

Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information about benchmarks and performance test results, go to intel.com/benchmarks.

Intel® technologies' features and benefits depend on system configuration and may require enabled hardware, software, or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer, or learn more at intel.com/iot.

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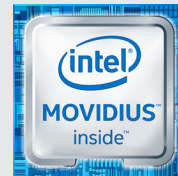
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Intel® Vision Accelerator Design with Intel® Movidius™ VPU

Intel Vision Accelerator Design products provide power-efficient deep neural network inference

for fast, accurate video analytics. Intel Movidius VPUs are capable of operating on customizable complex networks and network layers with high compute and ultra-low power consumption, resulting in industry-leading performance/watt/\$.

These VPUs are full-fledged systems-on-chip (SoCs), supporting ecosystem solutions for high-quality image processing, computer vision, and deep neural networks. They drive a demanding mix of vision-centric tasks in modern smart devices. Solutions can scale—simply by adding VPUs—while retaining their core efficiency. The elegant balance of performance and efficiency enables deployment for well-defined deep learning and machine vision workloads. Highly parallel programmable compute is colocated on a common intelligent memory fabric with workload-specific hardware acceleration.