intel®

Turning Video Analytics into Business Value

accenture

Introduction

Accenture Video Analytics Services Platform—enabling users to see business processes from a new perspective.

Uses real-time artificial intelligence (AI) to:

- Process video streams
- Detect objects specific to the environment
- Extract meaningful data

Includes an activity log to:

- Store data for long-term analysis
- Integrate data with other systems

Enables users to define business rules to:

- Generate alerts
- Drive corrective action
- Validate compliance

Helps users visualize what's happening in real time by:

- Delivering process status
- Enabling businesses to boost efficiency

Leverages Intel® solutions:

- Intel® Distribution of OpenVINO™ toolkit for developing applications and solutions that emulate human vision
- Intel® Movidius™ Vision Processing Unit (VPU)
- Intel® Programmable Acceleration Cards with Intel Arria®10 GX FPGAs

Authors

Jill King

Intel® Alliance Marketing Lead
Accenture

Stephen Lim

Sr. Manager
Platform Solutions Marketing
Intel Programmable Solutions Group

From Video Surveillance to Video Analytics

Video surveillance systems have been used for decades. Over the years, video surveillance technology has evolved; however, the data captured by today's surveillance systems are far too complex for humans to manage.

Which leads to video analytics software—created to analyze the constantly growing volumes of video feeds, and then help resolve and prevent incidents. With video analytics, organizations benefit from:

- More efficient surveillance systems

- Highly intelligent surveillance capabilities

- Better use of human security and management staff

Expanding the Value of Video Analytics

To answer the call for an advanced video analytics solution that provided more services and delivered greater value than traditional offerings, Accenture developed the Video Analytics Services Platform (VASP). Powered by the Intel® Distribution of OpenVINO™ toolkit, Intel® Movidius VPU processor chips, and Intel® Arria® 10 GX FPGAs, this comprehensive solution applies analytics to video data to reveal new business insights in today's data-centric world.

VASP receives video feeds from video cameras already installed, processes the video data, and then delivers insights that support fast, accurate decisions. With VASP, businesses can take appropriate action based on alerts generated by deep analytics and artificial intelligence (AI). With Accenture VASP, organizations can:

- See business processes from a new perspective

- Gain real-time insight into operations and interactions so they can take immediate action

- Leverage granular "ground truth" data for longer-term trend analyses

Providing everything required for a comprehensive video analytics solution, Accenture VASP includes five operational pillars in one integrated platform.

Uniquely Different Solution

Numerous video analytics solutions are available today, but only Accenture VASP:

- Includes model training, video ingestion, business rules, and visualizations

- Readily adapts to any client-specific use case

- Leverages existing video cameras; video inputs can be connected to VASP to extend the value of existing infrastructure investments

- Enables users to create business processes for:
  - o Alerts for immediate intervention based on objects, process adherence, and timing
  - o Validations of process pre-conditions and conditions
  - o Structured data sets for longer-term analysis/ optimization

- Supports flexible deployment in multiple modes—cloud, on-premises, and hybrid

- Leverages Intel® solutions:
  - o Intel® Distribution of OpenVINO toolkit for developing applications and solutions that emulate human vision
  - o Intel® Movidius™ VPU for deploying on-device deep learning and computer vision algorithms
  - o Intel® Programmable Acceleration Cards with Intel Arria®10 GX FPGAs—advanced multi-function accelerators for driving workload innovation
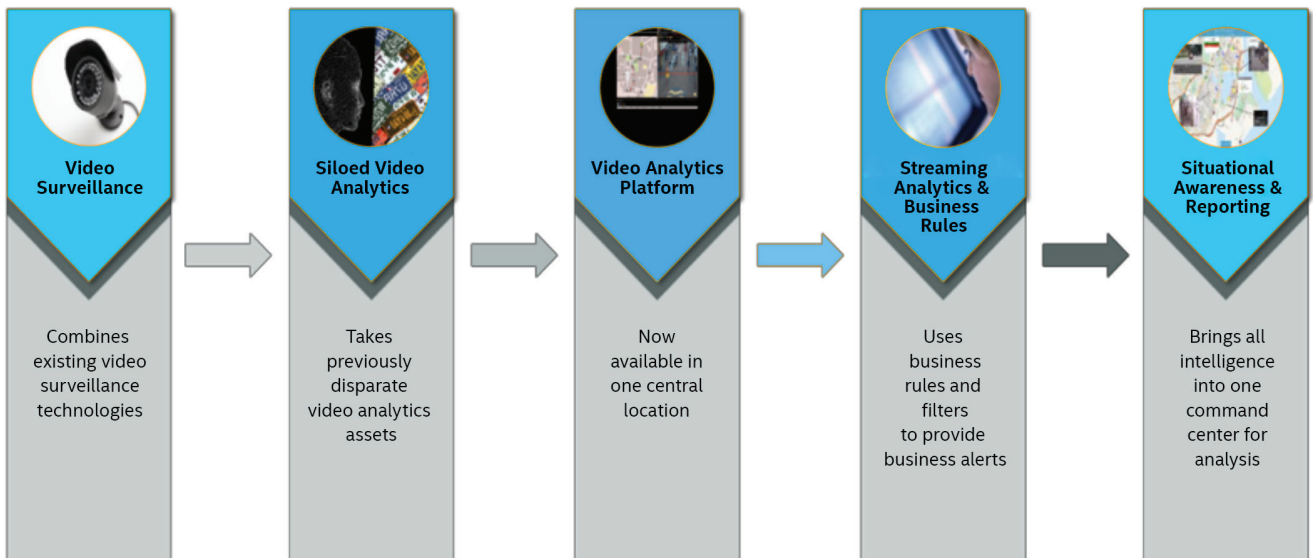

Video Surveillance	Siloed Video Analytics	Video Analytics Platform	Streaming Analytics & Business Rules	Situational Awareness & Reporting
Combines existing video surveillance technologies	Takes previously disparate video analytics assets	Now available in one central location	Uses business rules and filters to provide business alerts	Brings all intelligence into one command center for analysis

Figure 1. Five operational pillars, one comprehensive solution

Building on a Proven Foundation

As with any software solution, a critical component of Accenture VASP is the underlying architecture—which includes four complementary layers that work together seamlessly and can be managed as one:

- Video acquisition and distribution
- Video analytics processing
- Data and business analytics
- Visualization

Built-in Flexibility and Adaptability

VASP is designed to be tailored and to evolve, according to the unique needs of each business. The inherent flexibility of VASP is enabled by the Accenture Applied Intelligence Platform (AIP), which serves as VASP's underlying analytics engine. Using advanced AI capabilities, Accenture AIP enables businesses to do things differently and do different things. Through Accenture AIP and VASP, businesses can embed AI, automation, and analytics at the core of the enterprise to:

- Break down silos
- Create more agile and adaptive processes
- Support better decision making
- Identify and capture entirely new opportunities

Open and Extensible

To enable businesses to extend their video analytics environments to meet evolving business requirements, Accenture VASP is logically layered with non-proprietary communication between layers, which facilitates the addition of new functionality. VASP is also vendor-agnostic, enabling the solution to integrate diverse video analytics algorithms to foster innovation and reduce vendor lock-in.

Making What Was Once Impossible, Possible

Keeping pace with the technology advancements that are reshaping the economic landscape, Accenture VASP supports:

- Sensors found not only in cameras, but also across social media, mobile apps, fire alarms, building management systems, and more
- Real-time and predictive analytics to deliver real-time geo-coded business alerts, leveraging simulation and predictive analytics to assist in decision making
- Enhanced user experiences based on live video feeds and real-time alerts in an intuitive touchscreen Command & Control application for interactive walls, PCs, or tablets
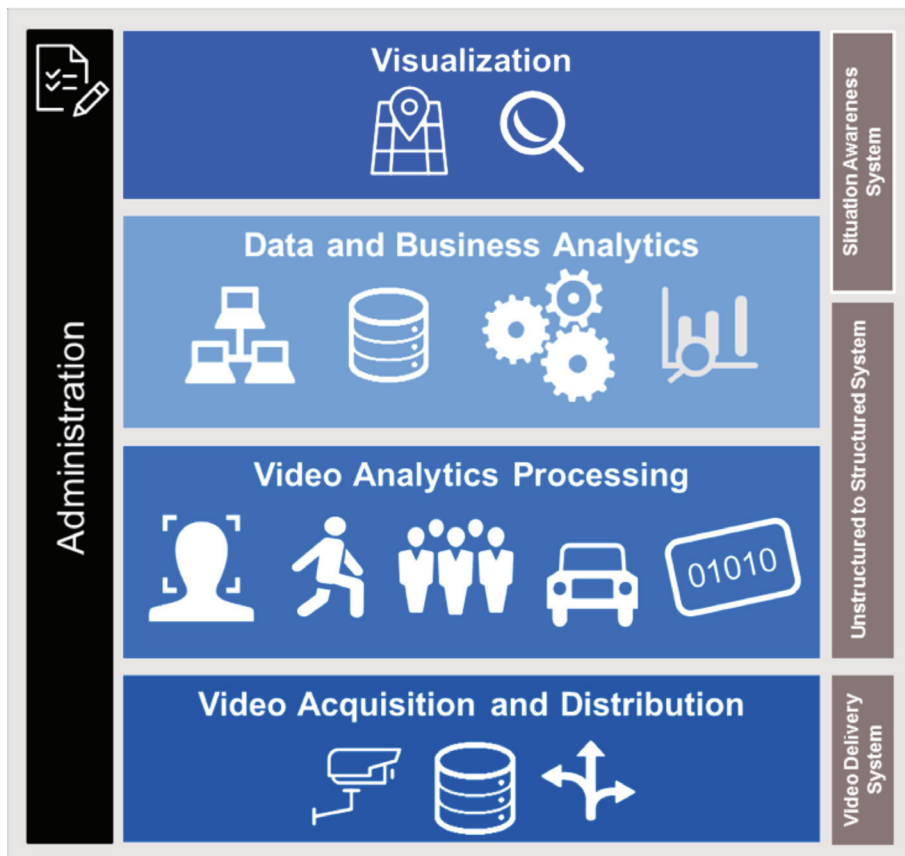

Figure 2. The VASP application architecture

Real-World Use Cases

While the use cases for Accenture VASP will expand over time, the most common use cases today include:

- Providing raw data from simple separate detections, such as face recognition, crowd counting, traffic monitoring, or license plate recognition

- Adding meaning to contextual events, such as footfall tracking, safety risks, incident detection, or suspicious behavior

- Leveraging big data to support real-world use cases, such as enabling the police to complete post-event analyses and cross-camera tracking

Accenture VASP supports the development of new business, and industry-specific use cases by providing an extensive library of algorithms. Using these predetermined, reusable visual algorithms, organizations can accelerate analytics project implementations that target people, vehicles, or objects as appropriate.

Solution in Action

A Singapore Government Agency selected Accenture to manage its Safe City pilot program. During the program, Accenture VASP was integrated into the existing video monitoring systems used across the city. Results of the Safe City pilot program include:

- 44 requirements trials, including operational use cases across six agencies

- Nine agile sprints

- 48 "live" feed sources integrated city-wide

- 12 simulation models built, with 150+ parameters (on average) defined for each model

- More than 20 aggregated business rules created, leveraging common data formats integrated from visualization to sensor

- Four integrated video analytics software solutions

"Our collaboration with Accenture in the field of big data analytics will contribute toward a deeper understanding of our public safety landscape and increase our ability to anticipate and respond better to public safety incidents and crises as they occur."

– Director of Capabilities Development and International Partnerships, Singapore Government Agency

Library of Video Analytics Processing			
	People	**Vehicles**	**Objects**
Establish Unique Identity (known and unknown)	• Facial recognition • Demographic characterization • Clothing color • Attributes, such as backpack or head coverings (in progress)	• License plates • Make, model and year estimation • Color and attributes, such as spoilers and wheels (in progress) • Logos	Unknown objects: • Detect abandoned objects • Identify objects in broad set of categories
Detect and Track	• Entering excluded zones • Track across cameras that may or may not overlap • Crossing thresholds (or virtual tripwires)	• Entering excluded zones • Track across cameras that may or may not overlap • Crossing thresholds (or virtual tripwires)	Identify specific objects: • Hard hats/safety equipment • Ability to train models to detect client-specific objects
Count	• While walking, sitting or standing • Waiting in a specific queue	• Count number of vehicles in an area (in progress)	
Heatmaps	• People movement	• Traffic movement (in progress)	

Figure 3. The VASP Algorithm Library

Accenture and Intel—Extending Video Analytics to the Edge

Collaborating for more than four years, Accenture and Intel deliver solutions that capitalize on their unique core competencies to drive business transformation. Combining Accenture's expertise in designing solutions with Intel's expertise in building infrastructure components yields advanced analytics offerings that boost performance and enable businesses to process vast amounts of big data in real time.

To extend video analytics capabilities from the camera to edge appliances to the data center/cloud, Accenture and Intel worked together to integrate the Intel optimized technology stack into AIP, and therefore, into VASP. These technology optimizations include:

- **Hardware acceleration—**Utilizing the latest generation of Intel Xeon® processors, FPGA accelerators such as FPGA-based Intel Programmable Acceleration Cards (PACs), and solid-state drives (SSDs), together with optimized virtual machines (VMs), achieve high performance, high throughput, and low latency.

- **Software—**Using Intel's OpenVINO and Deep Learning Deployment toolkits, VASP and AIP can support machine learning and AI use cases.

Why Intel Movidius

Intel® Movidius™ VPUs drive the demanding workloads of modern computer vision and AI applications at ultra-low power. By coupling highly parallel programmable compute with workload-specific hardware acceleration, and co-locating these components on a common intelligent memory fabric, Movidius achieves a unique balance of power efficiency and high performance. Movidius technology allows device makers to deploy deep neural network and computer vision applications in categories such as smartphones, drones, intelligent cameras, and augmented reality devices.

Why Intel FPGA Accelerators?

Intel® FPGAs provide flexibility for AI system architects searching for competitive deep learning accelerators that also support differentiating customization. The ability to tune the underlying hardware architecture, including variable data precision, and software-defined processing allows the FPGA to deploy state-of-the-art innovations as they emerge. Underlying application use include in-line image and data processing, front-end signal processing, network ingest, and I/O aggregation.

Intel FPGAs offer a cost-effective reprogrammable platform that allow for performance, low power, high-throughput, and low-batch latency that can be designed to your exact specification and enable acceleration of applications from the edge of the network to the data center. Programmable Acceleration Cards enable FPGAs to be easily deployed in a variety of servers.

Intel leadership in technology stands out in today's increasingly complex and heterogeneous computing world. Our mission is to deliver powerful and intuitive developer tools that can transform computer vision, deep learning and analytics processing capabilities into applications that help turn data into intelligent insights powering AI. The OpenVINO™ toolkit allows users to access various Intel architecture, the Intel® FPGA Deep Learning Acceleration Suite accesses Intel FPGAs for real-time AI by enabling a complete top-to-bottom customizable AI inference solution.

Why OpenVINO and Deep Learning Deployment Toolkits?

Intel helps companies such as Accenture to develop applications and solutions that emulate human vision with the Intel® Distribution of OpenVINO™ toolkit. Based on convolutional neural networks (CNN), Intel's OpenVINO toolkit offers software developers a single toolkit to accelerate their solutions across multiple hardware platforms including FPGAs. The OpenVINO™ toolkit:

- Enables deep learning inference at the edge

- Supports heterogeneous execution across computer vision accelerators—CPU, GPU, Intel® Movidius™ Neural Compute Stick, and Intel® FPGA—using a common application programming interface (API)

- Speeds up time to market via a library of functions and pre-optimized kernels

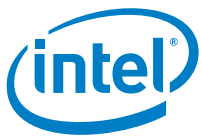- Includes optimized calls for OpenCV and OpenVX

Conclusion

Video surveillance technology has evolved from simple stationary cameras to wireless communications that deliver real-time security information to any mobile device. Managing the massive data generated by today's video systems requires video analytics software—able to analyze video feeds, and then help resolve and prevent incidents. To deliver more innovative services and greater value than traditional video analytics offerings, Accenture developed the Video Analytics Services Platform. Powered by the Accenture Applied Intelligence Platform and Intel processors,the comprehensive VASP solution enables today's businesses to:

- Gain real-time insight into operations and interactions

- Take appropriate action based on alerts generated by deep analytics and AI

- See business processes from a new perspective

- Leverage granular "ground truth" data for longer-term trend analyses

Learn More

Contact your Accenture representative today. Find out how the flexible VASP platform can offer real-time insight into your organization's operations and interactions—enabling you to make immediate course corrections to drive better business results. You can also visit accenture.com.

WP-01298-1.0