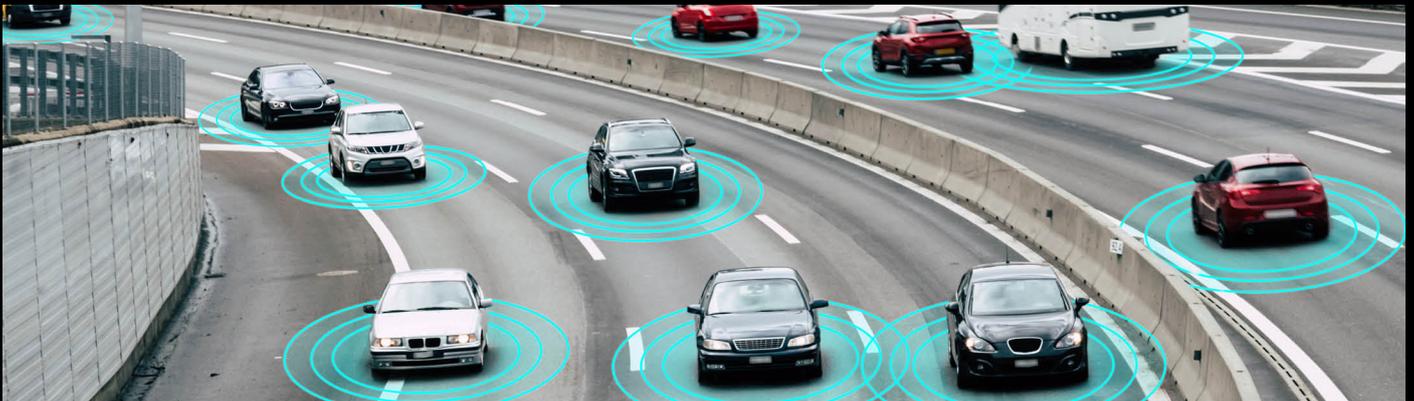



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VIDEO ANALYTICS— CONVERT VIDEO TO DATA YOU CAN USE

HPE Synergy with GPUs unlocks high-density, multi-stream video analysis



Video surveillance has been commonplace for decades and cameras are now ubiquitous. But it is expensive to view and analyze video streams to discern the content, and not to mention the countless hours spent to do so. In the last few years, video analytics utilizing deep learning (deep neural networks) has emerged across a wide cross-section of applications.

The applications for this technology are nearly limitless across healthcare, manufacturing, retail, construction, public safety, transportation, and security. The market is exceptionally poised for substantial growth and HPE Synergy, with market-leading GPU density, is an excellent platform for the deployment of video analytics applications.

The average 2018 market estimates for video analytics was \$2.6 billion. An average of five market estimates for the 2019 to 2025 video analytics is \$19.4 billion with a compound annual growth rate (CAGR) of 26.2%. It is essentially a large and rapidly growing market that the HPE customers are paying attention to.

WHAT IS VIDEO ANALYTICS?

In essence, a real-time or stored video stream is sent to a server that supports GPU acceleration. This stream is monitored for events that convert actual physical events to a data stream that can be analyzed and used to optimize whatever process is being observed by a video camera. Subsequently, a series of analyzable and actionable events are created. Analytics may create a timeline, identify anomalies, analyze human behavior, or measure a process. Video analytics can be applied to just about any problem that requires visual recognition of events.

Some examples include:

- Most of us have to deal with rush-hour traffic. Many cities, such as New York, deploy cameras monitoring freeways, tunnels, and bridges, adjusting traffic-light cycles to optimize flow and reduce congestion.
- Amazon's Go stores are another great example of using video analytics. With multiple cameras watching the shoppers, there is no need to check out; the shoppers check-in with their cell phones, are identified and tracked as they move throughout the store, and finally walk out when they have finished shopping.
- Video analytics is used in medical technology across practices such as oncology, cardiology, radiology, and in-patient status monitoring. For example, a radiologist or cardiologist can significantly increase their productivity by pre-screening X-rays, CAT scans, MRIs, or cardiographical sonography studies for a lesion, torn cartilage, or heart condition, thereby reducing the time for human interpretation. While not as accurate as top expert practitioners, artificial intelligence (AI)-based diagnostics are often good and can act as a pre-scan for a radiologist or cardiologist who can confirm a diagnosis and ultimately work with more patients in a day.

The role of TensorFlow

Google™ developed its TensorFlow technology to scan and recognize data in the billions of images (typically to identify individuals) on the internet. As noted earlier, the technology has broad applicability across a variety of applications. It is more efficient to use TensorFlow to identify and infer events instead of people as it allows you to monitor far more instances of processes or events with fewer actual eyes on the subject. The ROI for these projects is in improved efficiency and fewer mistakes.





CORE HARDWARE REQUIREMENTS FOR VIDEO ANALYTICS

The basic requirements for a video analytics solution incorporate four components:

- Fast CPU with high-core density to move data to/from a bank of GPUs
- A GPU that can handle multiple video streams in compute (as opposed to displaying graphics) mode and supports Tensor in specialized hardware
- High-performance storage
- Sufficient RAM to handle buffering the video streams

HPE SYNERGY FOR VIDEO ANALYTICS

HPE Synergy is an excellent platform for video analytics applications for several reasons:

- There are no limitations on CPU and GPU power or cooling. Typically, other form factors have limitations when CPUs and GPUs are combined in a server.
- It has a high GPU density per server. An HPE Synergy 480 Gen10 Compute Module supports up to 152 video streams with four NVIDIA® Tesla T4 GPUs in a GPU expansion module. NVIDIA Turing GPUs have specialized hardware support for Tensor image recognition as well.
- It supports up to 3 TB RAM.
- It also supports 32 Gbps Fibre Channel, or 100 Mbps Ethernet, which provides several storage options.

With four NVIDIA Tesla T4 per HPE Synergy 480 Compute Module host, a single HPE Synergy Frame can support up to 900 video streams in 10 rack units.



Solution overview

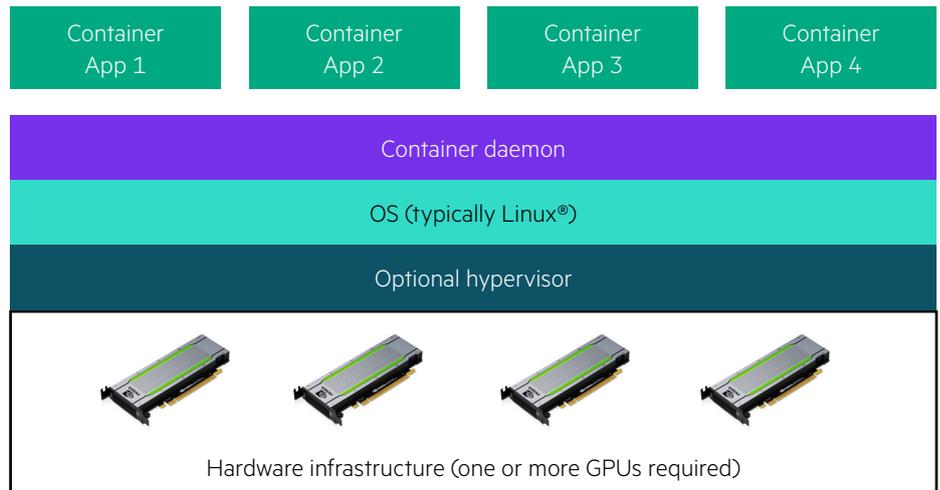


FIGURE 1: Sample video analytics software stack

UNDERSTANDING THE SOFTWARE STACK

Many video analytics applications have been developed in the last five years. They have been developed using techniques such as containers and orchestration in place of more traditional architectures like OS-based virtual machines. The most common container architecture for AI is some variant of containers with Kubernetes orchestration.

Docker containers combine both the application logic and OS resources tightly defined in the container. Analytics application frameworks such as TensorFlow are typically based on container architecture. Containers can be run on a variety of OS platforms, but Linux is the most popular.

Recently, we have seen many of the architectures are deployed on VMware ESXi™. For example, TensorFlow was developed as a containerized application with Kubernetes orchestration and GPUs in pass-through mode and many questions on why a hypervisor is needed since it adds additional processing overhead. Mainly, the hypervisor offers management, fault tolerance, and support features that are not yet common in container deployments and integrates with the data center management infrastructure.

With its support for high GPU and CPU core density, RAM, and storage options, HPE Synergy easily meets the hardware requirements and application support necessary to allow HPE to be a clear leader in video analytics. Given the market potential and the advanced processor and GPU capabilities, HPE should be positioning HPE Synergy for video analytics as another supported application.

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