

## Video analytics adds needed intelligence to body cameras

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The proliferation of video over the past several years has been nothing short of astonishing. Today, just about every event anywhere in the world seems to be captured on video by a security camera, smart phone camera or body worn camera. The number of devices with the ability to capture images has exploded. At the end of 2014, the HIS company estimated there were over 245 million operational surveillance cameras in production globally<sup>1</sup>, which is just a fraction of the total number of devices capturing video and current numbers are estimated to significantly increase. So with such a vast amount of information captured on these devices, what actually happens to these literally billions of hours of video footage? Honestly, not much. The majority of the video is rarely if ever looked at, *unless* something major occurs. But even when a critical incident does happen, collecting pertinent video and searching through it to find exactly what you are looking for can be extremely tedious and time consuming. Yet these billions of hours of video have locked within them a treasure trove of invaluable information: insight into terrorist activity in the planning stages, criminal activity in progress, clues that can become leads investigators, facts that can protect the innocent and confirm the guilty, just to name a few.

The use of body cameras, in particular, by public safety and law enforcement professionals is a hot topic as increasing number of agencies purchase equipment and set up new policies. These devices capture events from the officers' perspective and can record for whole or partial shifts depending on an agency's defined policy. This surge in interest and grant funding from the U.S. federal government is intended to improve the safety of officers and to better protect the general public.

### Managing all that video

The cost of the cameras alone is the tip of the iceberg, as the implications of using them are far reaching and raise several questions. From a practical perspective how and where do we store all this video? How do we ensure it has not been tampered with? How do we access it and search it? From a policy and legal perspective, how do we handle privacy issues? How do we distinguish and identify pertinent information on the video? How do we balance compliance between the Freedom of Information Act (FOIA) -- which makes publicly collected information available to the general public -- and Criminal Justice Information Standards (CJIS) requirements, which govern the handling and management of criminal information?

Two examples illustrate the magnitude of some of these issues:

- A recent RFP issued by the New York City Police department intends to put body worn cameras on 35,000 officers. If you assume that the camera will be turned on for 5-6 hours a day, you can quickly calculate that the program will generate over 1 million hours of video per week.

- Another proposal to outfit 7000 officers for the City of Los Angeles estimated they would need to allocate 122 full time people to manage the video, the majority sworn officers. Because of this the city council decided to put a hold on the project until they can look at manpower and cost saving alternatives

These are just a few examples of the challenges in body worn camera programs that law enforcement agencies are wrestling with as they look at how to balance the benefits of these devices with ongoing costs. However, a solution is available to help with the video management questions and challenges. It falls in the realm of what is known as *vision computing or intelligent video analytics*. Video analytics can greatly assist law enforcement and public safety by revolutionizing how video and multimedia data are searched, tagged, used and managed. Video analytics add intelligence to the video data collected by body cameras.

For more than 15 years, IBM has been working in the area of analyzing video captured by static cameras such as those used for monitoring traffic, closed-circuit television (CCTV) and surveillance. Over 30 researchers and PhDs working in the IBM Watson Research labs in Yorktown, New York and Haifa, Israel in combination with software engineers in Raleigh, have patented unique capabilities to interpret and index all the events captured in the camera's field of view. For example, imagine a sophisticated engine that can automatically find and return instances of an individual or event matching a certain description. And, it can detect events and behaviors – for example, a person entering an off-limits area or leaving a bag unattended -- and send alerts in near-real time. Unlike other such solutions, the IBM vision computing engine can handle millions of attributes and events from multiple streams of video. In short, IBM has patented detection based algorithms which allow passive recording cameras to become interconnected and intelligent.

## Applying advanced analytics to video data

IBM's experience and expertise and its continuing research in this area are now being applied to body cameras in law enforcement. Unlike surveillance cameras, body cameras are in motion which presents new *computer vision* challenges to create effective analytic algorithms.

And what does this mean in the practical world? How can analytic technology help optimize how the valuable video captured by body cameras can be efficiently searched for, retrieved, and used effectively in criminal and internal investigations. Consider a few scenarios illustrating the possibilities:

**Rapid searching for individuals:** Video analytics can make searching for suspects or potential threats simpler. For example, consider a scenario in which a suspect has been identified by an eyewitness. A video analytic tool can search hours of footage to look for a certain set of characteristics -- hair color, baldness, head covering, glasses and skin tone – and other attributes such as clothing colors or pattern. Searching for these kinds of attributes is done automatically and the search can be applied to video produced by many cameras. This capability can save the time and labor that would otherwise be required of an officer to view all the footage manually.

**Redaction for meeting compliance requirements:** Body cameras on law enforcement officers can capture all kinds of people, objects and activities in the course of an officer's duties and responses to calls. The public or media may make FOIA requests for some of this video footage. Intelligent video analytics enables police or

public safety agencies to use a technique called *redaction* to help ensure that video supplied to fulfill FOIA requests continues to comply with CJIS and privacy requirements. Redaction enables the agency to set up the criteria to automatically blur out images of minors, victims, confidential personal information and other sensitive images that may have been captured by the camera lens. Manually performing such as task would be quite labor intensive task, but automated redaction can significantly reduce the time and labor required to release video footage in compliance with the FOIA.

**Face capture and recognition for lead generation and risk assessment:** Some faces captured by body cameras could prove helpful to investigators when run through facial recognition tools. Not any image of a face will do, however. The challenge is ensuring that the facial image on the video footage meets the best criteria possible to generate matches through recognition engines. Profiles or top down angles that don't give a clear view of features aren't good candidates for facial recognition. Video analytics can be used to automatically find good facial images to feed into recognition engines, saving time and personnel costs. The 'good' facial images from the body worn cameras could then be linked to a wealth of criminal information data through IBM's i2 COPLINK offering, helping generate investigative leads or helping officers quickly assess risks associated with situations they may be walking into.

Today's mainstream dialogue around the body worn cameras is focused only on eyewitness accounting and the costs associated with the storing and managing requirements for video. Realizing that the value of the video captured in this manner is not just in capturing it, but also in finding it and using what is in the footage is equally important.

## Meeting the needs of public agencies

IBM is well positioned in the realm of video analytics to respond to the current needs of law enforcement and public safety. It is building on its more than 15 years of research and development experience, 10 years of production offerings worldwide and set of innovative patents. IBM will continue to invest in and drive innovation that can help unlock additional knowledge and insight that is contained in the hours of video collected by body cams while helping to increase cost-effective management of video data to comply with government standards and policies.

1. IHS, June 11, 2015. <https://technology.ihs.com/532501/245-million-video-surveillance-cameras-installed-globally-in-2014>