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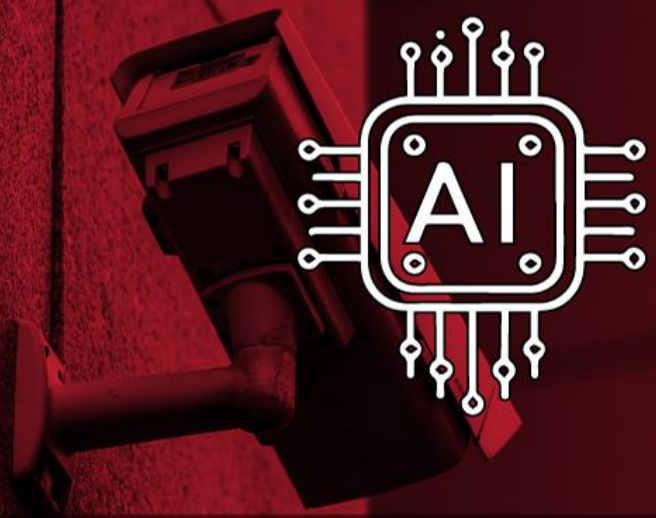

'BETTER' AI VIA DAILY AUDITS
NO MORE DATA WALL

100+ TOPICS - AIRPORTS TO ZOOS

GAUTAM D. GORADIA

SURVEILLANCE VIDEO PLAYBACK REVOLUTION

KILLING THE PLAYBACK NIGHTMARE

WELCOME

IF PLAYBACK IS EASY, EVERYONE WILL AUDIT SURVEILLANCE FOOTAGE DAILY

PREAMBLE

The proliferation of surveillance cameras in public and private spaces has led to an unprecedented amount of video footage generated daily. From airports to zoos (A to Z), surveillance systems are in place everywhere, 'promising' enhanced security and monitoring. But are they truly living up to that promise? Unfortunately, the reality falls short.

As the number of cameras increases from various sources (CCTV, Drones, UAVs, Body-Worn, Dashcams, and even Mobile Phones), so does the volume of video footage. According to recent estimates, over 2.5 quintillion bytes of data are generated each day, much of which comes from surveillance cameras.

Despite this deluge of data, only a minuscule fraction of it is ever watched or reviewed, leaving vast amounts of potentially critical information unnoticed and unutilized. The promise of enhanced security and other benefits like compliance, better operational efficiency, risk mitigation, business continuity, health and safety conformity, etc., through comprehensive surveillance falls short when video footage remains unwatched or improperly analysed.

STUDIES: MORE THAN 95% OF VIDEO IS WASTED

Multiple studies and research papers have highlighted a startling fact: over 95% of surveillance footage goes unwatched. Multiple reports suggest that the vast majority of video data is archived, only to be deleted later without ever being reviewed. This represents an enormous waste of potential insights, evidence, and security enhancements.

This failure to utilize surveillance footage effectively is not just a problem of scale but also of human and technological limitations. When faced with the sheer volume of footage, it is unrealistic to expect users to review it manually without the right tool. Traditional DVRs, NVRs, and VMS systems struggle with playback and accessibility issues. This represents a significant missed opportunity for achieving the optimal outcomes that surveillance video promises.

WHY IS NOBODY WATCHING OR RATHER AUDITING THE FOOTAGE DAILY?

The primary reason that surveillance footage goes unwatched—or rather unaudited—is because the current systems for reviewing or auditing video footage are inefficient and time-consuming. Traditional DVR, NVR, and VMS systems store large amounts of video data, but the process of reviewing and auditing hours of footage is daunting.

The playback experience offered by traditional DVR, NVR, and VMS systems is sluggish, choppy, and difficult to navigate, with long loading times and poor responsiveness. Moreover, operators must manually search for important events, making it nearly impossible to audit all the cameras in real-time or even post-event. The inability to carry out even basic tasks like efficient zoom and pan during playback further exacerbates the issue, discouraging regular and thorough auditing of the footage.

To achieve the best value from surveillance footage, it is critical that it be audited daily as part of a standard operating procedure (SOP), and that the findings are documented in a standardized template. Doing so delivers valuable business intelligence allowing users to take quicker corrective and preventive actions in areas of concern, leading to continuous improvement (Kaizen) across all operations.

HOW VIDEO IS MADE: I-FRAMES, P-FRAMES, AND B-FRAMES

Generally, surveillance video uses compression formats like H.264 or H.265. In this case, video is constructed using a combination of frames: I-frames (Intra-coded frames), P-frames (Predicted frames), and B-frames (Bidirectional predicted frames). These frames are used in compressed video formats to reduce file sizes and optimize storage.

- I-frames: are complete images, containing all the data needed to display a scene. They are the largest and most data-intensive frames.
- P-frames: store only the changes from the preceding frame, making them smaller but dependent on other frames for playback.
- B-frames: store changes from both preceding and subsequent frames, further compressing the video but requiring more computational effort to decode.

These frames are arranged in a sequence known as a Group of Pictures (GOP). The GOP structure determines the frequency of I-frames relative to P-frames and B-frames, directly impacting the quality, size, and playback efficiency of the video. However, this structure also introduces complexity, as P-frames and B-frames cannot be displayed without first decoding the I-frames and

other surrounding frames they reference.

WHY PLAYING BACK JUST THE I-FRAMES WON'T WORK

One potential solution to improve playback speed is to rely solely on I-frames, but this approach is flawed. While I-frames are complete and do not rely on other frames, they appear infrequently perhaps every second or so in most video streams. This results in a disjointed, choppy playback experience, where important movements or actions that occur between I-frames are lost. For example, in surveillance footage, critical moments like a person entering a room or a theft taking place might happen between I-frames, meaning you'd miss crucial information. Therefore, solely relying on I-frames compromises the integrity and usefulness of the video. This approach would compromise the integrity of the footage, making it inadequate for serious surveillance and forensic analysis.

HOW COM-SUR SOLVES THE PROBLEM

COM-SUR, the world's only CCTV video footage auditing, smart backup, and standardized intelligent incident reporting software, takes a radically different approach. Instead of relying on traditional video structures with I-frames, P-frames, and B-frames, COM-SUR captures and stores a single image every second from all active cameras. This image contains the full visual data available at 'that' second, effectively 'freezing' the scene as it appears at 'that moment' in time. For instance, in a setup with 16 cameras, COM-SUR creates a 4x4 grid of images every second, providing a clear and comprehensive snapshot of the entire scene. The key here is that COM-SUR captures the final visual output—what is actually seen on the monitor—abstracting away the complexity of dealing with individual frames at the technical level.

Since COM-SUR operates at the level of capturing what is rendered on the screen, it doesn't matter whether I-frames, P-frames, or B-frames are used in the video stream. COM-SUR focuses solely on the visual output at the moment when these frames converge, regardless of the specific frames involved, thus eliminating the need for complex frame reconstruction during playback. The software captures the image that represents the final 'visual truth' as processed and displayed by the video system.

While it may seem that COM-SUR is simply recording the screen, this is not the case. COM-SUR works by locking onto the specific 'Window' of the VMS (Video Management System), ensuring that even if the scene on the monitor changes (for example, if an email client or browser is opened), COM-SUR continues to work only with the 'Window' it is locked to. This approach ensures that COM-SUR is not affected by changes in the monitor's display but stays focused on capturing the designated video stream.

Here's how COM-SUR's approach solves key problems:

1. Effortless Playback: By capturing the "finished product" of a video scene every second, COM-SUR makes playback effortless. No more sluggish, choppy playback caused by decoding frame dependencies. Using COM-SUR's 'smart' media player, users can quickly navigate through

footage in a smooth and responsive manner.

2. Seamless Re-conversion to Video and Integration into PowerPoint: COM-SUR's advanced engineering allows users to effortlessly re-convert stored images back into video on demand. This means that while secondary storage is efficiently managed in the form of images, these can be swiftly reconverted into video whenever needed. Furthermore, these videos can be automatically embedded into PowerPoint presentations, streamlining the process of reporting and sharing.

3. Playback of Multiple Pre-recorded Videos and Frame Matching: Law enforcement agencies often struggle with the challenge of playing multiple videos side by side during investigations. This limitation hinders their ability to piece together events from different angles or sources, making it difficult to join the dots and see the entire scene at once. Investigators face the tedious process of manually toggling between videos—playing, pausing, taking screenshots, pasting them, and repeating this cycle repeatedly.

Adding to this complexity is the need to match frames across videos, especially when timestamps are inaccurate due to faulty DVR/NVR/VMS settings. COM-SUR effectively addresses these challenges, enabling synchronized playback of multiple videos and facilitating frame matching, even when the video timestamps are incorrect.

4. The 'Entire' Picture: Unlike automated technologies that are limited to detecting only what they have been programmed to find, COM-SUR provides a comprehensive view of the 'entire picture,' and does so in a remarkably short time. This enables users to gain a full perspective, uncovering both known issues and unexpected insights that automated systems might miss.

5. Significant Data Size Reduction: COM-SUR's method of capturing a single image every second significantly reduces the data size compared to traditional video files. This makes long-term storage of footage much more manageable.

6. Efficient Use of Resources: Without the burden of complex decoding, the system becomes much more resource-efficient, requiring less computational power and memory, which allows for faster access and playback.

7. Critical Information Retention and Fallback to Original Video: COM-SUR's approach ensures that critical moments are captured and easily accessible, without the need for complex and time-consuming playback operations. By capturing key moments every second, COM-SUR ensures that essential information is always preserved. In cases where even greater detail is required, users can easily refer back to the original video for a more in-depth review.

WHAT CAN ONE WANT TO DO DURING PLAYBACK?

During playback, users often need to perform a variety of tasks that are either difficult or impossible with traditional systems. Operators often need more than just basic review functionality. Traditional systems fall short in providing advanced tools for surveillance, but COM-SUR steps up to meet those needs.

Below is a comparison table of features that users might want during playback and whether they are possible with traditional systems versus COM-SUR.

Wish List	Possible with Traditional Systems?	Possible with COM-SUR?
Zoom into specific areas of interest in multiple cameras	No	Yes
Pan across multiple camera views	No	Yes
Adjust brightness or contrast	Yes – in some cases	Yes
Apply forensic (false) colors	No	Yes
Playback in both directions	No	Yes
Go back and forth frame by frame	Yes	Yes
Add a 'picture-picture' utility	Yes – in some cases	Yes
Bookmark important frames	Yes – in some cases	Yes
Flag common exceptions in different 'colors' to build a story	No	Yes
'Set aside' some frames for next steps – like quick reporting	No	Yes
Stitch relevant frames into a video	In some cases – but cumbersome	Yes
Present the same scene in different colors	No	Yes
Create an institutional library of important findings duly categorised by subjects	No	Yes

COM-SUR enables users to seamlessly carry out the above tasks giving surveillance operators unique control and flexibility during playback.

THE MOBILE PHONE/DIGITAL CAMERA ANALOGY

To understand the revolutionary nature of COM-SUR, consider how we interact with photos on our smartphones or digital cameras. Users manually flip through pictures one by one, deciding which ones to keep, delete, share, or edit. Similarly, film editors sift through hundreds of hours of footage, selecting the most relevant moments to create a coherent narrative.

COM-SUR brings this level of intuitive control to the world of surveillance. Instead of struggling with bulky video files and slow playback, users can quickly scan through snapshots of their footage, instantly identifying key moments, bookmarking them for later, and editing the most critical parts into a coherent presentation.

AI BUILT ON TOP OF COM-SUR: A SMARTER SOLUTION

1. Site-Specific: COM-SUR's approach also opens the door for AI-based solutions. By storing key images every second, 'site-specific' data can be analysed more efficiently by AI systems. These images provide a focused, relevant data set that reduces the need for heavy computing power and complex algorithms to sift through large, unfiltered video files.

2. Continuous training of AI: In addition to the immediate benefits, the true strength of COM-SUR lies in its ability to facilitate continuous training of AI models. COM-SUR's playback feature makes it easy for users to review footage and discover missed or previously unknown events. These findings can be fed back into the AI system, allowing it to learn from real-world scenarios. This continuous loop of feedback ensures that the AI evolves over time, improving its accuracy and adaptability. As a result, AI systems built on top of COM-SUR become more intelligent, as they are continuously trained to detect new patterns, anomalies, and behaviours based on localized data. This integration empowers surveillance systems to not only act in real-time but also to learn from the past, making them more proactive and effective.

COM-SUR AS THE FUNDAMENTAL KERNEL: REVOLUTIONIZING SURVEILLANCE

At its core, COM-SUR serves as the kernel that revolutionizes video surveillance. It solves the key issues of playback, data management, standardized reporting, and investigation by offering a simple, powerful, and effective solution:

- Effortless Playback: Smooth and responsive navigation through video footage.
- Data Size Reduction: Capturing images reduces data size and makes storage efficient.
- Disaster Recovery: COM-SUR's methodology supports easy disaster recovery with less data to manage.
- Powerful Investigation Tool: COM-SUR provides exceptional tools for forensic analysis, especially when comparing video from multiple sources.
- Site-Specific Data Generation: COM-SUR enables users to create precise, location-specific data sets for targeted analysis and AI

model training.

CONCLUSION: WAKE-UP CALL FOR THE SURVEILLANCE INDUSTRY

The surveillance industry stands at a crossroads. The inefficiencies of traditional systems are no longer sustainable in a world where data is growing exponentially. COM-SUR represents the next generation of surveillance technology—a solution that makes video playback effortless, eliminates data waste, and enhances the overall effectiveness of surveillance efforts.

It is time for the industry to wake up, embrace the future, and harness the full potential of surveillance video with COM-SUR.