TRUEYE™

Intrusion Detection for Theft Control using Video Analytics Technology

Video Analytics Case Study

vertexplus®

The Client

An Independent Power Producer, and a leading player in the Indian energy sector, the client is focused on Solar Power, Thermal Power and Hydro Power in alignment with India's Power Generation strategy.

The company has built a portfolio of 4 GW in Thermal and Solar Assets (in India and countries like Germany, UK, and Japan). With a current asset size of USD 2 billion, the company employs more than 1000 associates across different locations. Headquartered in New Delhi, the company has power generation assets in the states of Madhya Pradesh, Assam, Karnataka, Bihar and Tamil Nadu.

Apart from infrastructural development, the company is committed in catering to the needs of the most marginalized communities, with special attention to women, children, and local tribes. Its community programs focus on Sustainable Livelihood & Women Empowerment, Education & Capacity Building, Youth Development, Health & Family Welfare.

The Situation

Companies invested in power production owns massive size of power assets. They roll in and out billions of USD, thousands of employees and associates, through mammoth infrastructure, spread across many geographical locations.

Besides aiming maximum returns to stakeholders, they are consciously invested in contributing to infrastructural goals of the country and their own corporate social responsibility.

Technology enabled Intelligent management systems run like veins in the entire complex structure. Lot is at stake. Vulnerabilities and risks are as many.

Video Analytics is one of the many areas they look into to have a technology edge to smartly control potential risks and threats, lurking around the limitations and fallibility of security and surveillance systems installed.

Video surveillance is a very old task in security domain and has carried its itches. However, much water has passed under the bridge, from the times of human-monitored exclusive systems to current video analytics based solutions, where a human is needed to monitor the alerts generated by a video analysis system and decide what should be done, if anything.

The client needed a sophisticated and well-developed surveillance analytics system to achieve business security goals
– a system that integrates video analysis and other data, allowing automated in-depth analysis to a degree impossible for humans within a workable timeframe
– with the functionality offered by intelligent video analysis that could monitor and control the threat to their raw material preserved at the backyards of remote vendor locations.

The Challenge

Besides perimeter security, their backyards, mine areas, warehouses, storages, normally have hundreds of CCTV cameras installed throughout. These surveillance cameras observe the many processes within the area, and are mostly installed in a permanent, overt manner, with portable covert cameras being used on a temporary basis. The control room operators observe the general movement of objects and people, but with limited success. They have too many security cameras to monitor and cannot effectively highlight or detect unusual, high-risk or tell-tale events. This can betray suspicious activities, leading to thefts, huge loss of resources, and associated impact on related business activities.

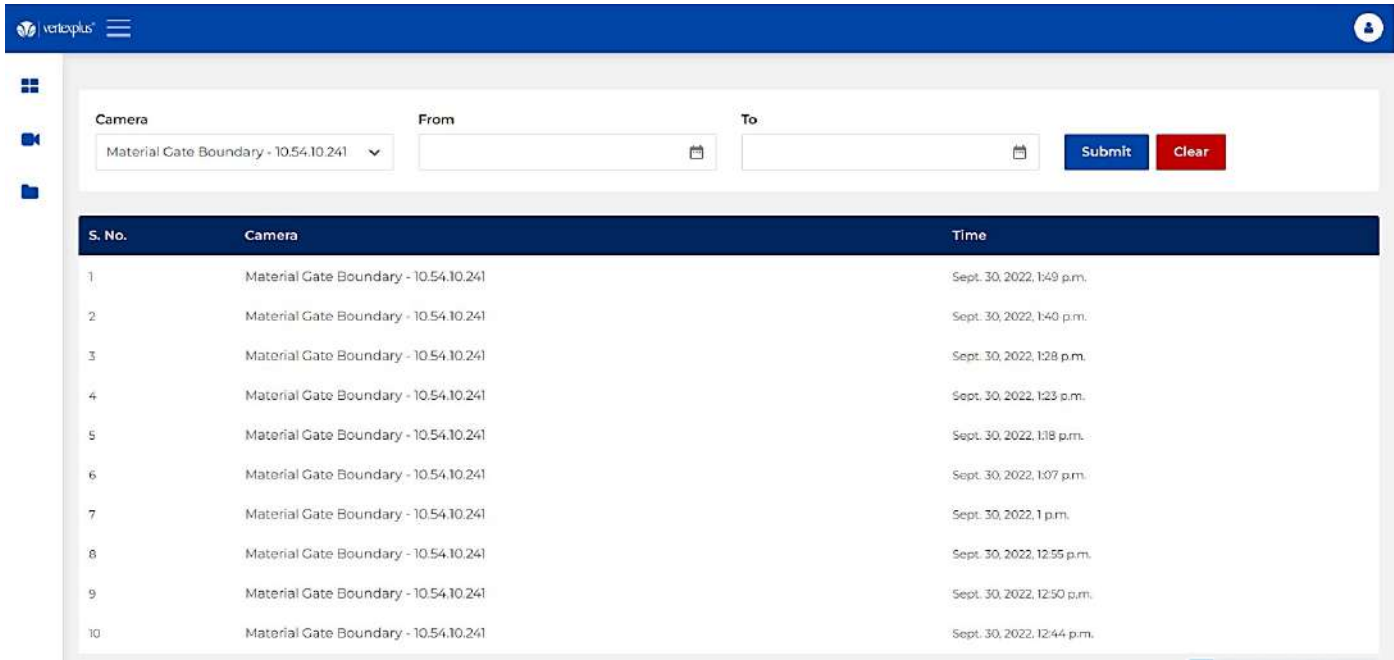
However, the maturely trained intelligent video management systems can provide strategic assistance and integrate with virtually any source of event data. Complex rules can be constructed to take into account related, but disparate events, which indicate impending failure or situations that warrant further investigation. These enable the video operator’s attention to be targeted much more effectively to potentially productive areas.

The Solution

We found that an intelligent Video Analytics software could contribute in a major way by providing means of accurately dealing with volumes of data, information and scenarios.

Our video analytics application was able to process high volumes of data, detect intrusions, monitor vehicle movement in real-time, and give relevant statistics to the client to be able to take actions in areas where suspicions were abundant, generating theft issues.

Vehicle counting, differentiating between models of vehicles, developing anti-theft mechanisms, training system on specific scenarios, generate high-value statistics were used to obtain insights about movements and activities that commit an infraction.



The Solution

The Scheme of How

Review video streaming sources and coverage area

To reveal the potential for adopting and adapting to systems in use at a mining environment we first needed to look at systems already employed. And to have a clear view of the entire area from various angles, where the events being monitored might occur.

Feeding the Video Analytics System

The data came from various video streaming sources such as CCTV cameras, Industrial IP Camera, Cloud Video Stream, Archived Video Stream etc.

Running the system

Video analysis software was run centrally on servers located in the monitoring station. This is known as central processing. Central Processing refers to where data is processed centrally or remotely.

Defining Scenarios

The scenarios to focus on, were defined. Such as processing Live Camera Stream from IP Camera and Archive Video Processing

Using pre-trained models / Training the models

We used pre-trained model as well as custom model which could be trained

Human Involvement

The system must provide valuable support to human operators by helping them , detect events that might otherwise be overlooked or take a long time to detect manually.

Models in our system that help in such use case scenarios

Intrusion Detection

In our surveillance applications, an intrusion might involve a person or object entering a specified restricted area during a specified time of the day. Our system takes the camera feed frame by frame in real time and analyze each frame, identifying instances of intrusion in the monitored environment This detection can trigger alerts or actions to notify security personnel or take preventative measures.

In the industry, if the closing time was 7pm; and if In case a person is detected on specified camera, an alarm is triggered. Mail is sent along with snapshot of the feed and other details like camera name, time etc.

Models in our system that help in such a use case scenario...

Crowd Detection

Crowd detection involves counting individuals within a scene by taking the feed. The user sets a minimum count threshold for crowd size, and if the number of people detected surpasses this threshold, the system generates alerts or notifications to prompt further investigation or action by security personnel.

The company didn’t want people to gather at one place during working hours. Gathering can be due to fight or staff just chatting around in groups. So, we set a maximum of 4, if people gathered more than that in frame, an alarm was triggered.

Safety Gear Detection

We designed algorithm to detect safety gear worn by individuals within the monitored environment. Operating in real time, the system analyses frame of the specific camera feed to identify specific safety equipment such as helmets, vests, and more. Thus, ensuring that the staff is wearing safety gears around tasks where there is threat to safety, in events of accidents.

Models in our system that help in such a use case scenario...

Fire and Smoke Detection

Our model operates by continuously capturing and processing real-time camera feeds, analysing each frame for the presence of fire or smoke within a designated area. Upon identification of such instances, the system promptly triggers alerts or predefined actions to notify security personnel.

In this industrial case, the company uses combustible substances. So if fire or smoke was detected, an alarm was triggered to stop it or control it at initial stage.

Camera Tampering and Tripwire Detection

In our surveillance model, it analyses changes in frame characteristics, such as sudden shifts in brightness, sharpness, or perspective, which may indicate tampering activities. Upon detecting such activity, the system generates alerts or notifications to prompt further investigation or action by security personnel. In case anyone tries to hide the camera view by blocking or disturb the camera by tilting it etc.; Also if someone cuts the wire of a camera, or there is some network issue such that we can't get the feed, alert is sent.

Models in our system that help in such a use case scenario...

Loitering Detection

We implemented algorithms to detect and track individuals exhibiting loitering behaviour, within specific areas of interest. System initiates tracking when someone remains within a designated area for an extended period more than the defined time, an alarm is triggered. If the duration exceeds a predefined threshold, an alert is triggered to notify relevant personnel or authorities.

Object Tagging and Tracking

Our system includes object tagging and tracking functionalities. The system detects and labels objects of interest within the camera feed, enabling precise identification and tracking. Utilizing techniques like bounding boxes and unique identifiers, objects are tagged for continuous monitoring as they move across frames. This real-time tracking facilitates accurate assessment of spatial coordinates, velocity, and other relevant attributes, empowering the system to detect anomalies and prompt timely alerts or interventions.

Indeed, video analytics solutions have the potential to benefit the manufacturing industry in numerous ways. Here are some key points highlighting the significance of video analytics in industrial scenarios:

Safety Monitoring:

Video Analytics can be used to detect unsafe behaviours or situations in real-time, such as workers not wearing proper safety gear, unauthorized personnel entering restricted areas, or potential hazards on the production floor.

Machine Failure Prediction:

By analysing video feeds from machinery, anomalies in operation can be detected early, allowing for predictive maintenance to prevent costly downtime due to unexpected breakdowns.

Quality Control:

Video Analytics can inspect products on the assembly line for defects, ensuring that only high-quality products make it through the manufacturing process.

Inventory Management:

By analysing video feeds of warehouse shelves, inventory levels can be monitored in real-time, helping to optimize stock levels and prevent stockouts or overstock situations.

Supply Chain Optimization:

Video Analytics can track the movement of goods within the manufacturing facility and throughout the supply chain, identifying inefficiencies and bottlenecks for optimization.

Energy Efficiency:

Analysing video feeds from the production floor can help identify areas where energy consumption can be reduced, leading to cost savings and environmental benefits.

Workforce Management:

Video Analytics can monitor worker productivity and identify areas where workflow can be optimized, leading to increased efficiency and throughput.

Security Surveillance:

In addition to traditional CCTV monitoring, video analytics can detect suspicious behaviour or intruders in real-time, triggering alerts for immediate response.

Overall, video analytics deployment at the industrial sites and scenarios offers several advantages, including improved safety measures, enhanced security, enhanced quality control, and optimized logistics management. By leveraging video analytics solutions, they can ensure compliance with safety regulations, reduce operational risks, enhance productivity, and feed their maintenance and levelling up of competitive edge in the market. As technology continues to advance, video analytics will remain a vital tool for optimizing manufacturing processes and driving business success.

Let's wrap it up...

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