DARSHAN

AI VIDEO CONTENT ANALYTICS

INTRODUCTION:

Installation and use of CCTV Cameras for security & surveillance is a no-brainer. Cameras are considered a fundamental commodity for setting up any surveillance infrastructure, but at the same time, 24×7 monitoring of hundreds or thousands of video feeds by operators doesn't serve the purpose of providing proactive surveillance and quick response to breaches.

PROBLEM:

Software-based Video Content Analytics (VCA) provides a certain level of reprieve by raising real-time alerts for a slew of breaches like left baggage, motion detection, etc. However, till date, VCA has had in-accuracy and false-positives issues that far outweighed the potential benefits, to an extent that most of the operators disable these analytics to avoid the innumerable false alarms.

SOLUTION:

With advent of Artificial Intelligence (AI) and Deep Neural Networks (DNN), new-age software is being trained to detect, identify, and distinguish various objects in video by exposing them to a large number of tagged examples. In addition to AI-based object classification, computer vision algorithms are also being used to extract data such as absolute speed and size, direction, colour, path, and area. This data can then be searched to concentrate the video analytics effort on relevant information.

INTRODUCING DARSHAN – REVOLUTIONISING VCA WITH AI

The sheer volume of video content being created and consumed daily is staggering and DARSHAN helps in understanding the insights hidden within this vast sea of videos. Darshan pushes the boundaries of video content utility, driven by the power of artificial intelligence.

AI IN SURVEILLANCE:

The objective of Darshan is to analyse the video stream in live feed, one frame at a time, and create a structured database of information out of the unstructured video data. Darshan accepts the raw video stream and converts it to a comprehensible format. It then processes the same using computer vision & deep learning technology.

As part of this processing, it performs the following critical tasks:

- Monitor transit traffic using occupancy detection, crowd heat mapping and queue management, parking management, and wait and transit time analytics
- Object detection, segmentation, tracking, recognition and classification.
- Attendance Capturing
- Unusual Movement in restricted area intrusion detection and Virtual Fencing
- Identify and respond to aggressive or suspicious behaviour brawl detection
- Ensuring Proper Personal Protection Equipment (PPE).
- Tracing crouch and fall detection, identifying Left behind Objects
- In and out Count and track vehicles, and search for specific vehicles using
- license plate and make/model recognition
- Prevent machinery/production stops and detect unattended machinery in operation
- Immediate alerts to leaks, sparks, abnormal equipment activity, and smoke and fire
- Track and count inbound/outbound objects and detect custom object types (full pallet vs. partial pallet, object colour, package type, etc.)
- Improve patient care and safety–even when staff can't be physically present

- Optimize facility use and management with accurate insights into occupancy of waiting rooms, rooms and beds, and procedure and operating rooms
- Ensure Proper Maintenance Routines
- Detect movement of objects and inventory to prevent loss

In addition to the above operations, the various object attributes like time stamp, colour, and size are also extracted and saved as part of the metadata. Deep learning classification & recognition algorithms are used here to ensure higher accuracy. This metadata is then processed to perform various kind of analytics.

Some fascinating use-cases with DARSHAN are:

Object Detection, Recognition and Alert

Accurate detection and recognition are very critical in identifying vehicles, items, animal entry, known / unknown people of interest and is also helpful in post-incident investigations. Broadly, some of the benefits of Recognition application are:

- Automatic attendance
- Automatic recognition of authorized individuals or re-identification of unknown people
- Automatic alert for blacklisted/barred people or no-go zone breach
- Protect infants from potential theft or unauthorized visits using access control,
- RFID readers, and Facial Recognition (FR)
- Known / unknown vehicles entry
- Animal entry
- In factory or a kitchen, hairnet / helmet detection.
- Reduction in physical security deployment in campuses
- Customizable MIS reports (alerts / movements / area-access / area-usage)

Precise face recognition rapidly pinpoints people of interest in real-time using digital images extracted from the video, external image sources and pre-defined watch lists.

Unique face features are extracted and coded into a feature vector that represents a specific face. This feature vector is stored in the database and is used to compare it to the watch list when faces are searched for. With the advancement of darshan AI-based deep learning algorithms, FR Systems can now be trained with DNN models with many sample faces. In addition, the advancement of GPU technology has ensured that facial recognition can be done at a large scale and in real-time.

Traffic and Safety inside the premises

Darshan can detect violations accurately and automatically inside the premises. The availability of a large set of video data and computational resources have enabled the respective DNN models to be trained effectively. Here are some of the use cases

- Triple riding detection
- License Plate Detection
- No-Seatbelt or Mobile Usage detection
- Over-Speeding Detection

Other interesting benefits of DARSHAN includes:

- **Intrusion Detection** - Alerts unauthorised entry or suspicious behaviour and within defined boundary lines.
- **Abnormal Activity Detection** - Unusual activities like loitering, left objects, erratic behaviour, gestures, time-based tracking, deviations like vehicle speed.
- **Crowd Management** - Crowd counting, monitors and alerts real-time crowd density.
- **Object Tracking** - Follows movement while they move through a scene; anticipates future position based on trajectory

- **Event and Alarm Management** - Generates notifications to predefined events; raises alarm based on significance for resource attention
- **API Support** - Integrate with third-party software and hardware
- **Meta-Data Extraction** - Adds contextual information to enhance search and retrieval, embedding time and location in video streams
- **Heatmaps and Analytics** - Visualise hotspots within a monitored area; optimise store layouts, product placements. Marketing Strategy help for retail outlets.
- **Privacy and Compliance** - Allows blurring or redacting sensitive areas or faces; integrate GDPR and CCPA compliance on video data
- **Scalability** - Handles large volumes of video streams from multiple cameras; Deploy over cloud
- **Reporting and Dashboards** - Real-time dashboards and customisable reporting
- **Machine Learning** - Allows users to train to recognise specific objects or behaviours; adapting to environment and improving accuracy over time.
- **Fast Retrieval and Search** - Search based on object, action or metadata; Provides quick access to relevant video footage

CONCLUSION :

Darshan AI is the next evolution in Surveillances System. This improves the detection accuracy without increasing the hardware cost exponentially. For end-users, it greatly reduces the workload of security staff and brings significant benefits by detecting unusual incidents and solving a lot of video forensic problems. Moreover, it enables them to use the massive amount of CCTV video data generated for system training purpose instead of getting overwritten over a period.