



# HYPERMICRON VIDEO ANALYTICS & RECOGNITION SYSTEM



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## HYPERMICRON

### VIDEO ANALYTICS & RECOGNITION SYSTEM

HYP-VAR Hypermicron Video Analytics and Recognition - a next-generation, AI-driven video analytics platform designed to transform your security operations. Built on a robust AI analytics engine, this comprehensive solution delivers smart, real-time video analytics exploiting advanced IP camera network, boosting management efficiency while ensuring uncompromised security.

With its open, flexible architecture, the platform seamlessly integrates with a wide range of systems - whether it's CCTV, city surveillance, airport, railway, traffic management, intelligent transportation, and more. Leveraging advanced computer vision AI models and more. Leveraging advanced computer vision AI models

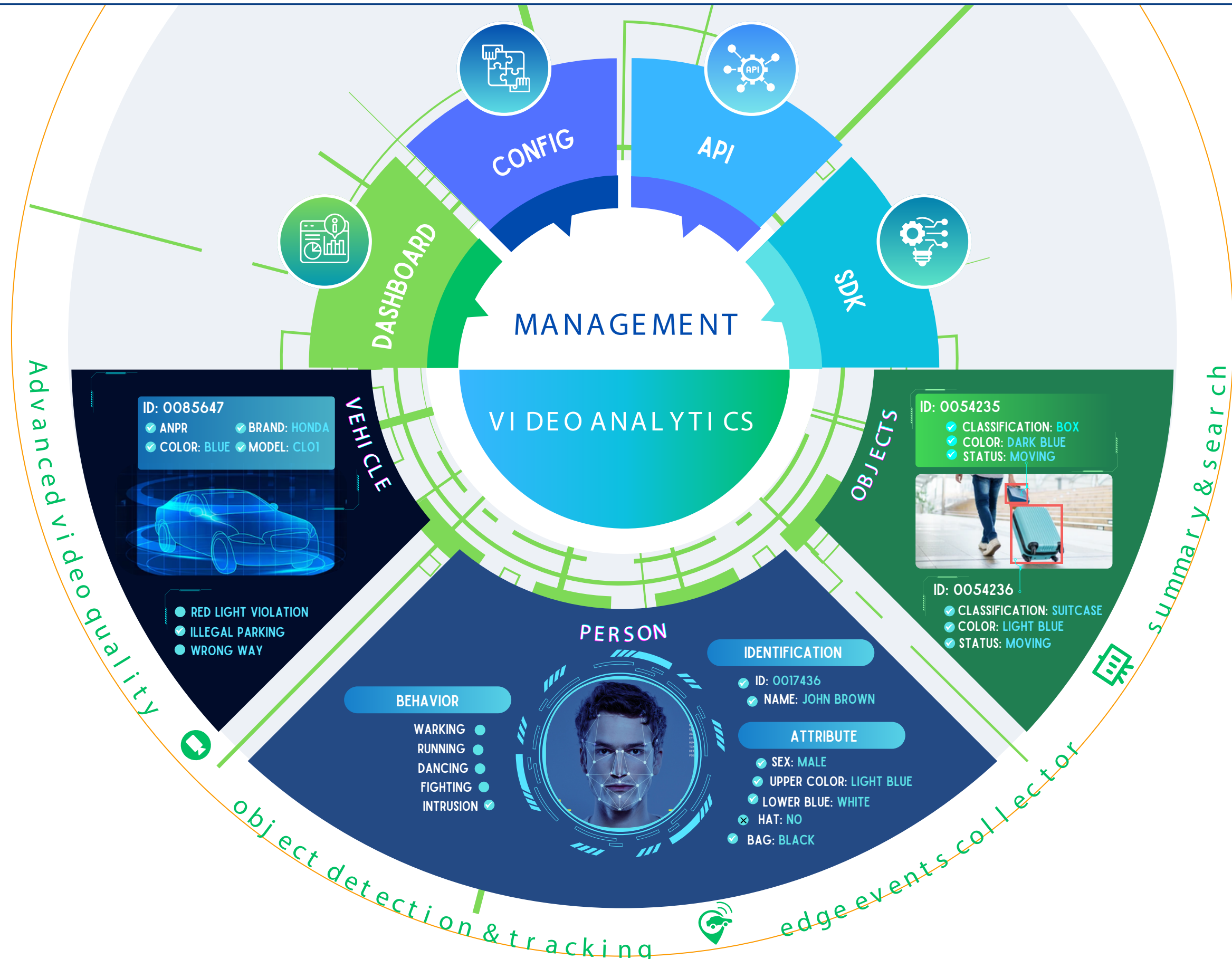
and cutting-edge image processing algorithms, it delivers impeccable accuracy in analyzing, detecting, classifying, and recognizing objects—including people, vehicles, and everyday items. It also identifies key attributes, behaviors, events, license plates, and faces with pinpoint precision.

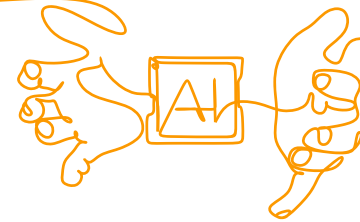
Engineered to adapt to diverse security landscapes, this dynamic solution meets the rigorous demands of critical environments—from traffic management hubs and secure buildings to airports, train stations, shopping centers, and other high-stakes zones—ultimately elevating your overall surveillance and security management to unprecedented levels.



# OVERVIEW

## VIDEO ANALYTICS & RECOGNITION SYSTEM





Experience the next evolution in security with HYP-VAR groundbreaking video analytics and recognition solution - a self-improving platform built on state-of-the-art AI, Deep Learning, and Self-Learning technologies. Continuously refining its ability to analyze images and recognize objects with remarkable precision, this system sets a new standard for performance that only gets smarter over time.

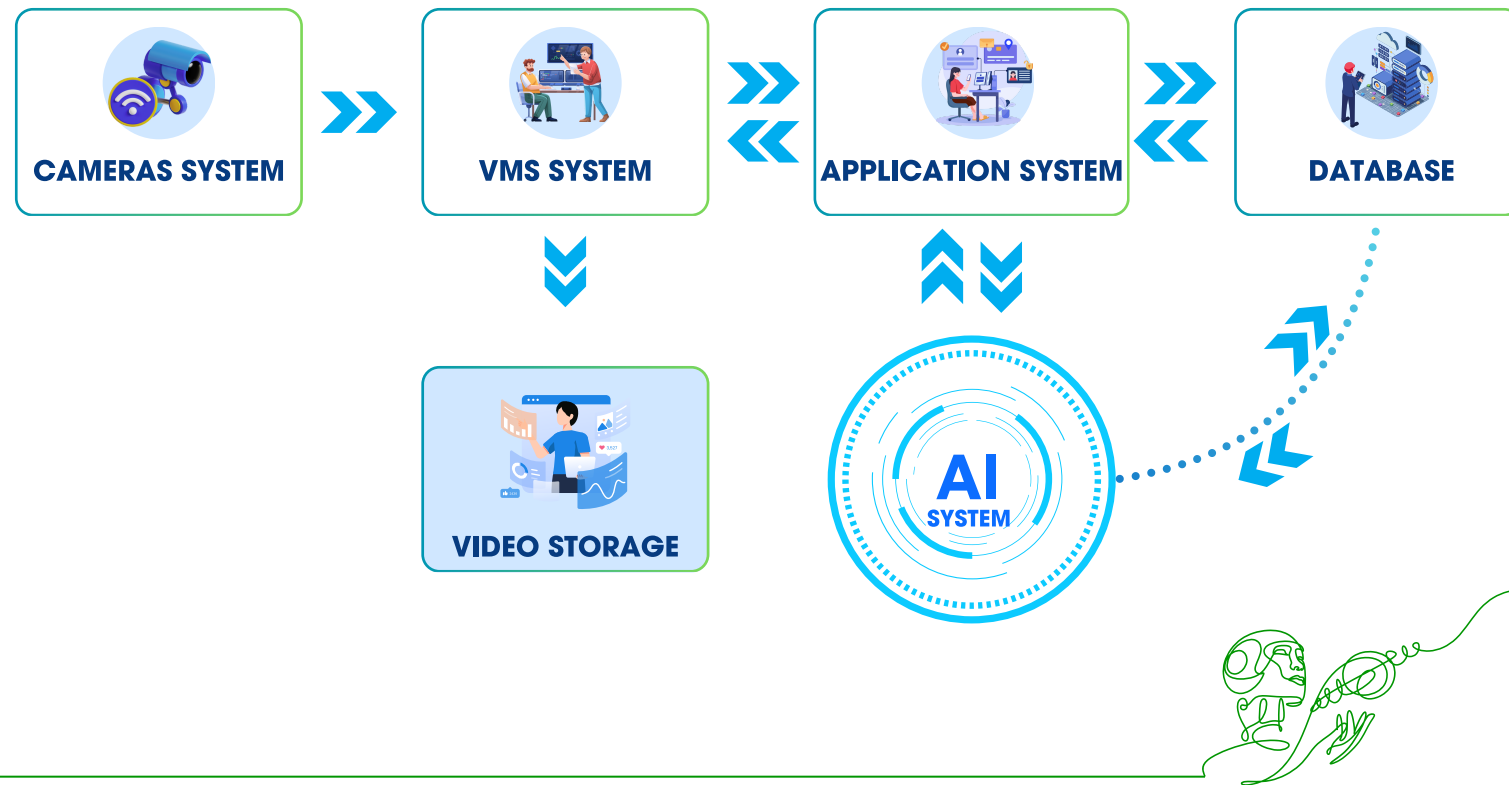
Seamlessly integrated with various commercial off the shelf Video Management Systems (VMS), HYP-VAR effortlessly taps into both live streams and archived footage, ensuring every object and event is analyzed with pinpoint accuracy. It automatically, detects, tracks, and alerts you to unusual activities, transforming raw data- timestamps, locations, images, and video clips -into actionable intelligence which securely stored and managed to provide for investigations and real-time decision-making.

### Key intelligent recognition features include

- In-depth analysis and recognition of human attributes
- Proactive identification and alerting of suspicious behavior
- Precision vehicle license plate recognition
- Seamless multi-camera object tracking
- Rapid detection, tracking, and classification of objects
- Advanced facial recognition for heightened security
- Comprehensive crowd detection and crowd management alerts
- Detection of vehicle violations such as improper parking and wrong-way driving
- Reliable fire, smoke, and flame detection with instant notifications Empowered

Every detail is captured with precision- all analyzed data, including timestamps, detection locations, event details, images, and videos, is securely stored, managed and interact with VMS. Event videos can be effortlessly filtered, searched, and even transformed into concise summary clips, empowering operators to quickly review, verify, and respond to any object or event with swift, informed decisions. Leveraging this robust data, our solution features a dynamic, user-friendly dashboard that delivers comprehensive monitoring at a glance. With capabilities to generate quantitative statistical reports and intuitive trend analyses - presented through visually engaging tables and charts - rapid assessments and strategic decision-making become a reality. This seamless integration of detailed analytics optimizes processes and resources, dramatically enhancing your overall operational efficiency.

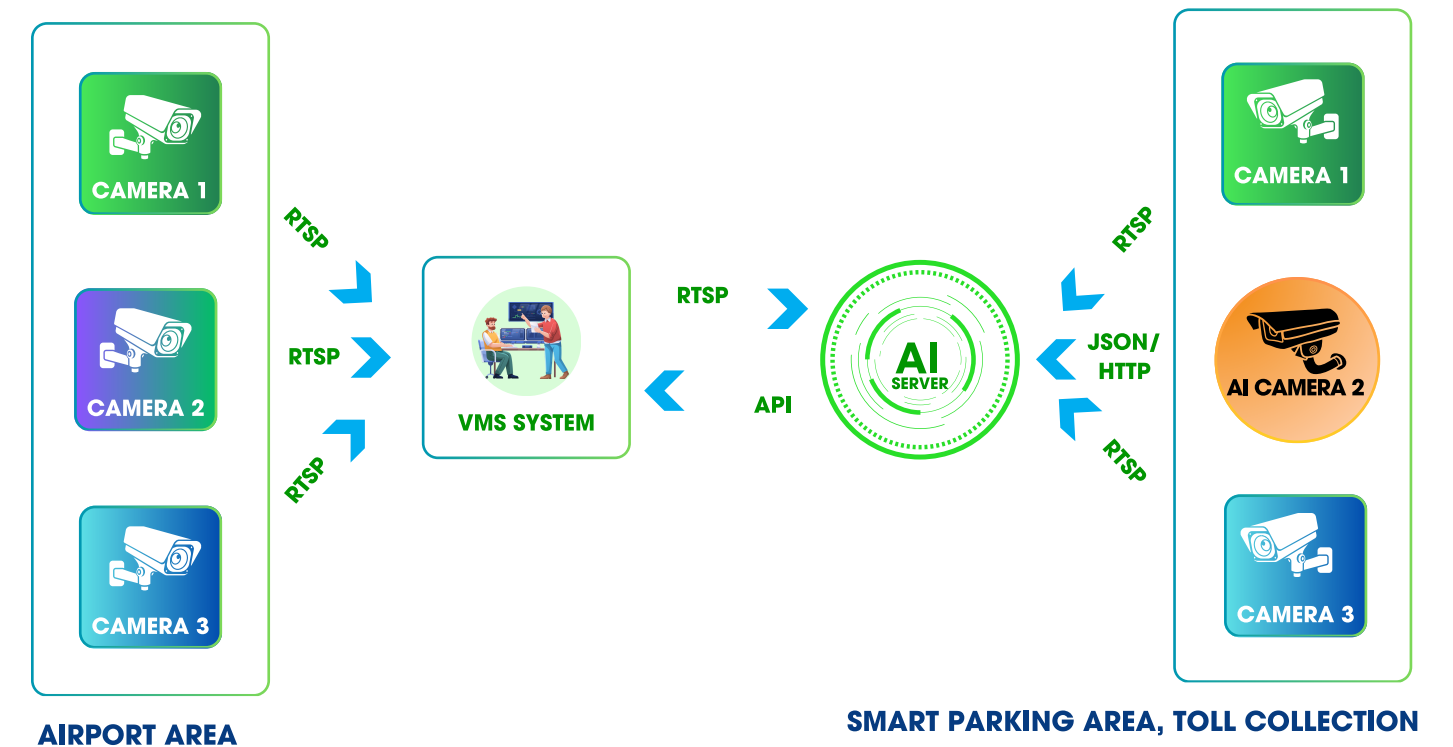
# SYSTEM ARCHITECTURE



Harnessing state-of-the-art AI technology and advanced image processing algorithms, HYP-VAR meticulously analyzes, detects, and recognizes objects, behaviors, and events. The ability to detect and accurately recognize objects, behaviors, and events will depend on the image/video quality (minimum resolution from 1080P, 15FPS frame rate). When it identifies monitored items or abnormal occurrences, alerts and notifications are instantly displayed on the surveillance interface and can be automatically distributed via email or SMS to the appropriate units. With deployment options available as both web-based applications and standalone client software, the user interfaces are crafted to offer intuitive monitoring, efficient management, and smooth operation - customized to meet the specific functional permissions and professional requirements of each user.

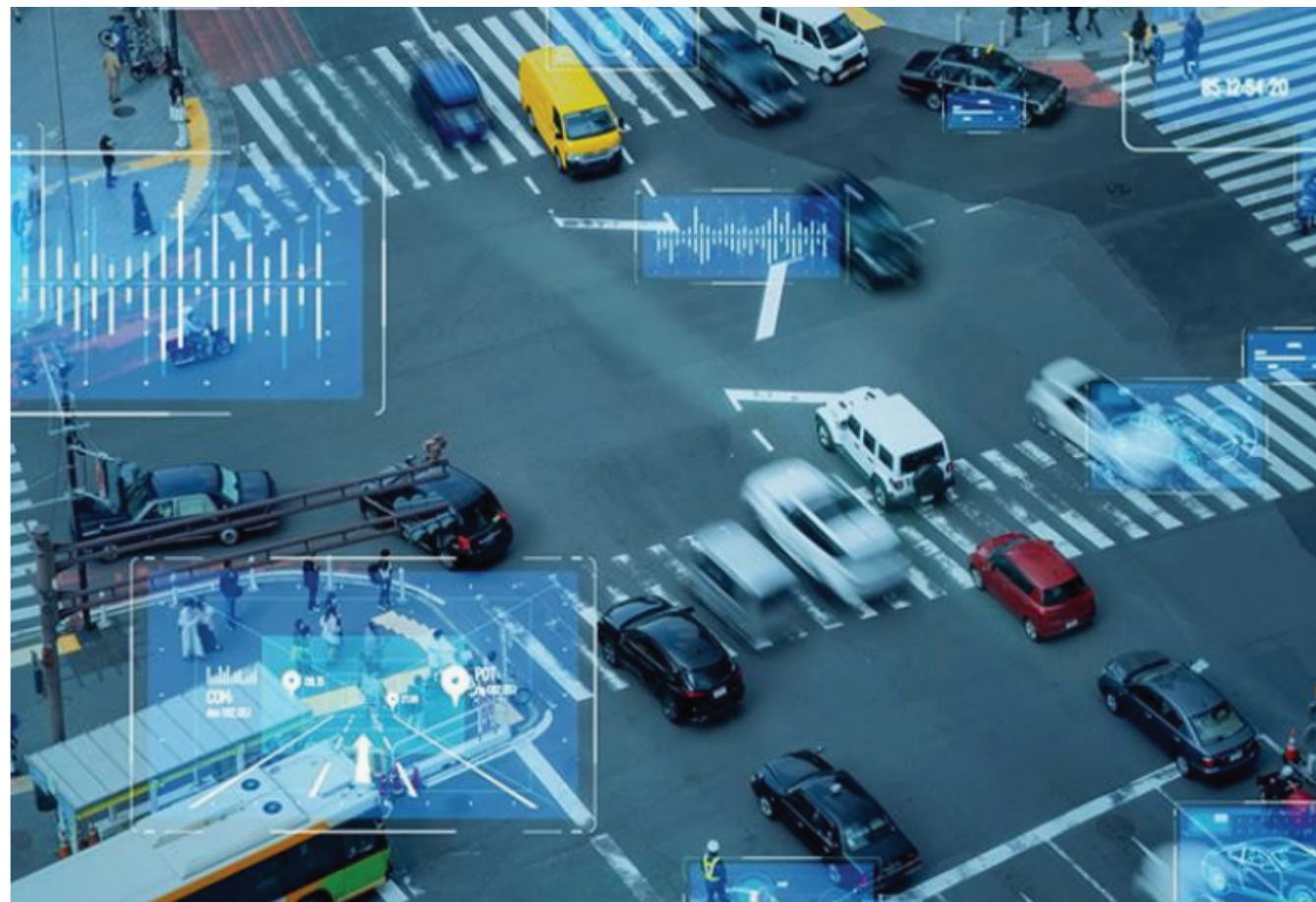
HYP-VAR video analytics and recognition solution delivers a robust and comprehensive framework that seamlessly integrates with a wide array of systems - ranging from VMS platforms and camera networks to database management systems and various hardware devices. By supporting ONVIF and leveraging versatile API libraries and SDKs, this high level of compatibility not only streamlines operational workflows but also enhances efficiency while bolstering safety and security.

Designed for flexibility, HYP-VAR supports integration with a diverse range of surveillance devices - including fixed, PTZ, and AI cameras - and is compatible with VMS solutions from many leading vendors. Whether cameras are connected via a Video Management System or linked directly to the analysis engine, they continuously provide video streams for real-time processing. The powerful SDKs and API libraries from VMS systems enable the central platform to seamlessly retrieve both live and stored video data for detailed analysis.



# KEY FEATURES

HYP-VAR video analytics and recognition solution is built upon a sophisticated image and video analytics engine that leverages AI-driven video analytics models alongside advanced image processing algorithms to execute complex analysis and recognition tasks at high speed. Designed for efficiency, HYP-VAR seamlessly updates and deploys new deep learning models, harnessing the latest advancements in AI and optimized algorithms. These models are systematically retrained and refined, continually elevating the accuracy of object recognition and detection. The result is a dynamically powerful system that delivers a comprehensive suite of functions for detecting and recognizing objects and critical events - catering effectively and flexibly to the demanding needs of security surveillance and traffic safety.

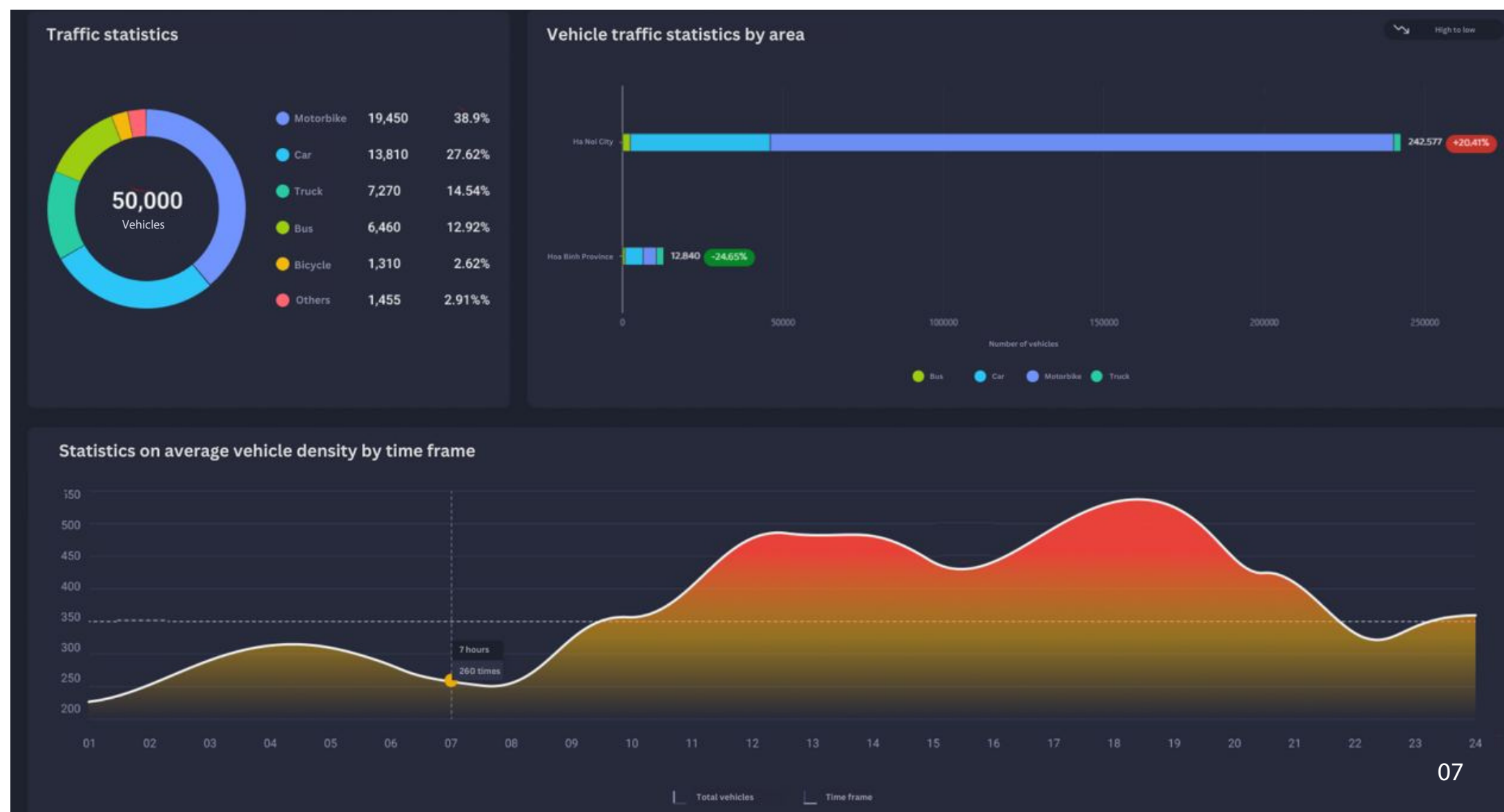


# KEY FEAKURES

## OBJECT DETECTION, TRACKING, AND CLASSIFICATION

Utilizing state-of-the-art Deep Learning and cutting-edge Image Processing techniques, HYP-VAR meticulously analyzes images and video streams to perform precise object detection and classification. Powered by the innovative object detection models, it adeptly recognizes and categorizes a variety of entities - including people, vehicles, animals, and everyday items such as handbags, suitcases, backpacks, boxes, and bins. Whenever an object appears within the frame, HYP-VAR automatically captures its presence and tracks its movement with precision.

By aggregating this detailed data, HYP-VAR intelligently counts objects by category—a critical function for alerting operators to potential congestion and providing analytical insights through statistical reporting. This robust capability not only enhances overall surveillance management but also delivers actionable intelligence for proactive decision-making.



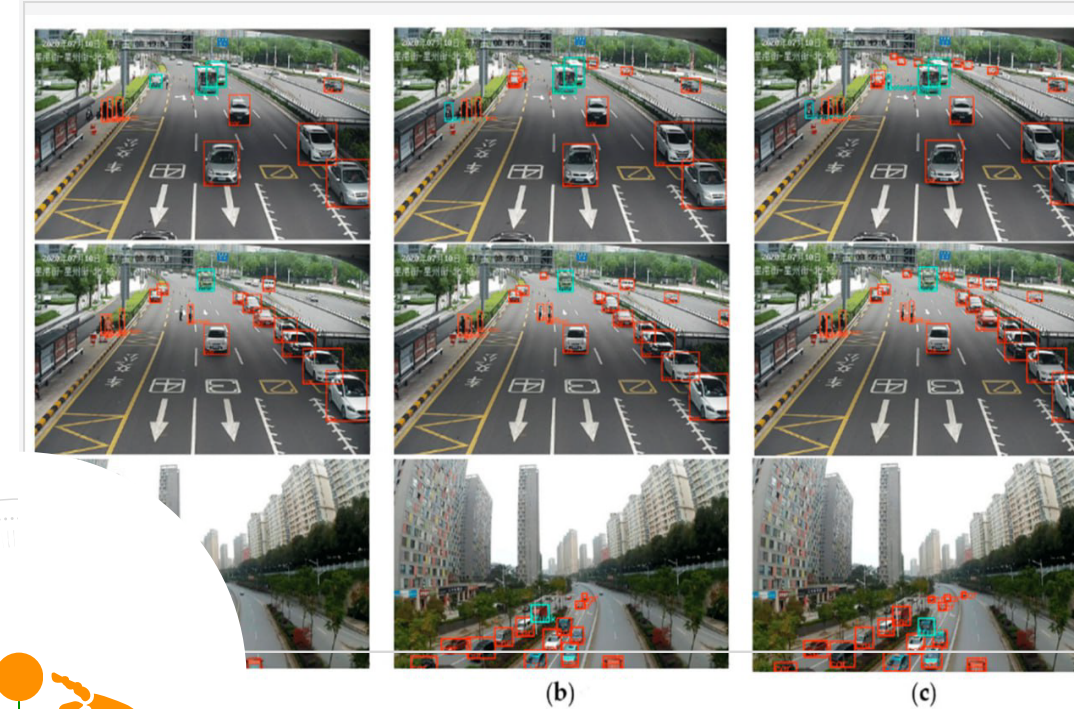
HYP-VAR harnesses advanced AI to accurately detect and analyze object features - including people, vehicles, and other items - by applying sophisticated multi-object tracking algorithms. This technology pinpoints and monitors object positions across environments equipped with multiple cameras. When a suspicious object is identified, HYP-VAR initiates a tracking function on the surveillance interface. It comprehensively captures features such as:

### 1 Apparel and Accessory Identification

Detecting details like clothing color and whether an individual is carrying a backpack or handbag, enhanced with facial recognition data for increased precision.

### 2 Movement Behavior Analysis

Evaluating movement patterns, speed, and direction to support precise tracking.



## KEY FEATURES

# OBJECT TRACKING ACROSS MULTIPLE CAMERA FRAMES

As objects move throughout monitored areas, the AI continuously updates their positions in real time, with all data securely stored in a database for future searches and analysis.

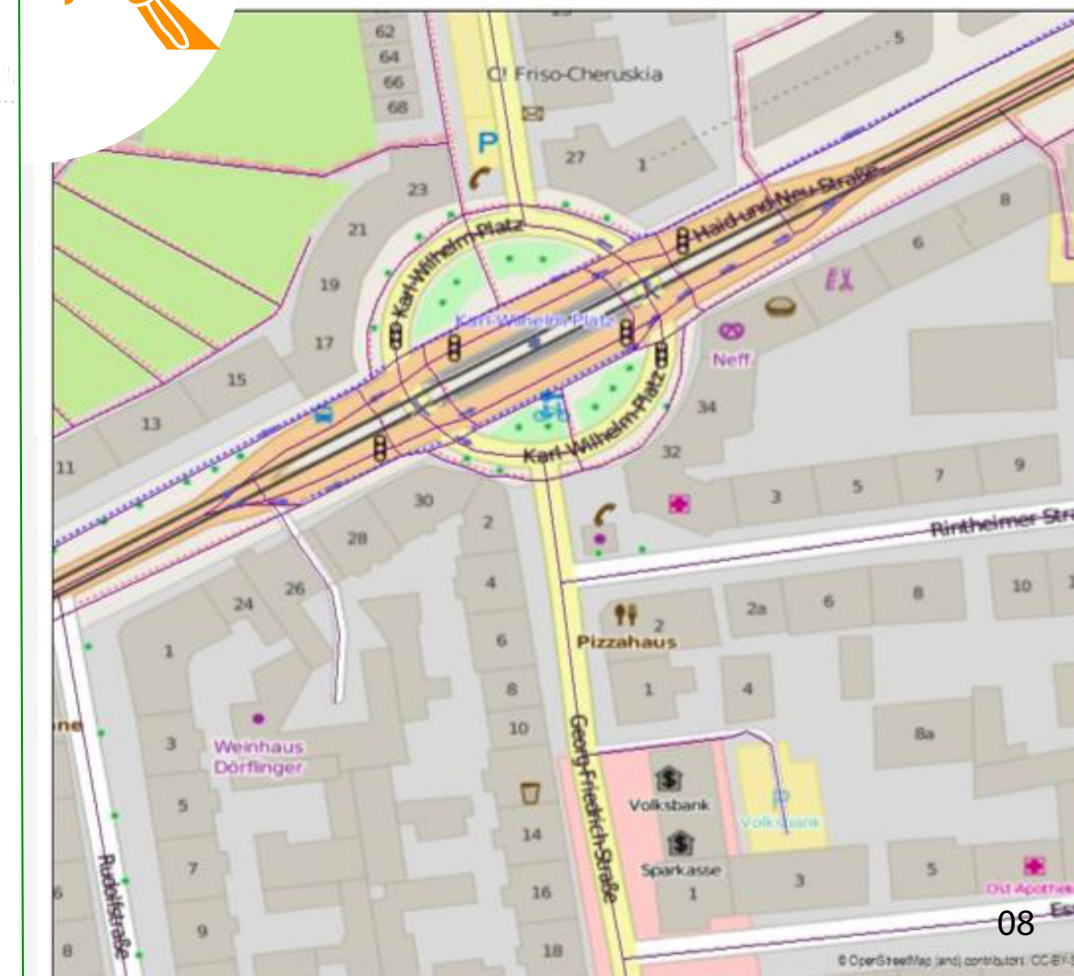
Furthermore, HYP-VAR provides an innovative historical movement feature through an interactive map. This map displays detailed location markers, timestamps, and images of each object's appearances, with multiple objects differentiated by distinct color codes. This powerful tool not only supports streamlined investigations and tracing but also enables a comprehensive review of an object's movement history at any given time.

### 3 Vehicle Features

Recognizing key attributes such as color, type, and manufacturer.

### 4 Object Classification

Categorizing items like handbags, suitcases, backpacks, boxes, and bins.





# KEY FEATURES

## DETECTION & ALERT OF SUSPICIOUS BEHAVIOR

HYP-VAR uses behavioral analysis technology based on human behavior patterns and continuous frame sequences to identify abnormal actions by individuals or groups. It analyzes human movement in video to determine behaviors such as standing, sitting, lying down, moving, running, fighting, or vandalism.

When a particular behavior is detected, HYP-VAR immediately records event images, extracts related information, and sends these data to the database. This information can then be used to alert security personnel, enabling prompt intervention.

Based on its ability to analyze human behavior, HYP-VAR can detect abnormal actions including:

### Running in Restricted Areas

HYP-VAR predefines zones with restricted access or no-parking areas. If a person is seen standing, walking, or running in these zones, it is identified as abnormal behavior.

### Moving in the Wrong Direction

HYP-VAR defines permitted and non-permitted directions within the frame. If it detects a person moving contrary to the allowed direction, it flags this as reverse movement.

### Moving Quickly (Running)

HYP-VAR distinguishes between standing still, walking, and running. If a running action is detected within the surveillance area, it determines that the individual is moving too fast.

### Remained in One Place for Too Long

In critical areas or zones that require strict security control, if a person remains in one place beyond a set duration, HYP-VAR will trigger an alert regarding that behavior.

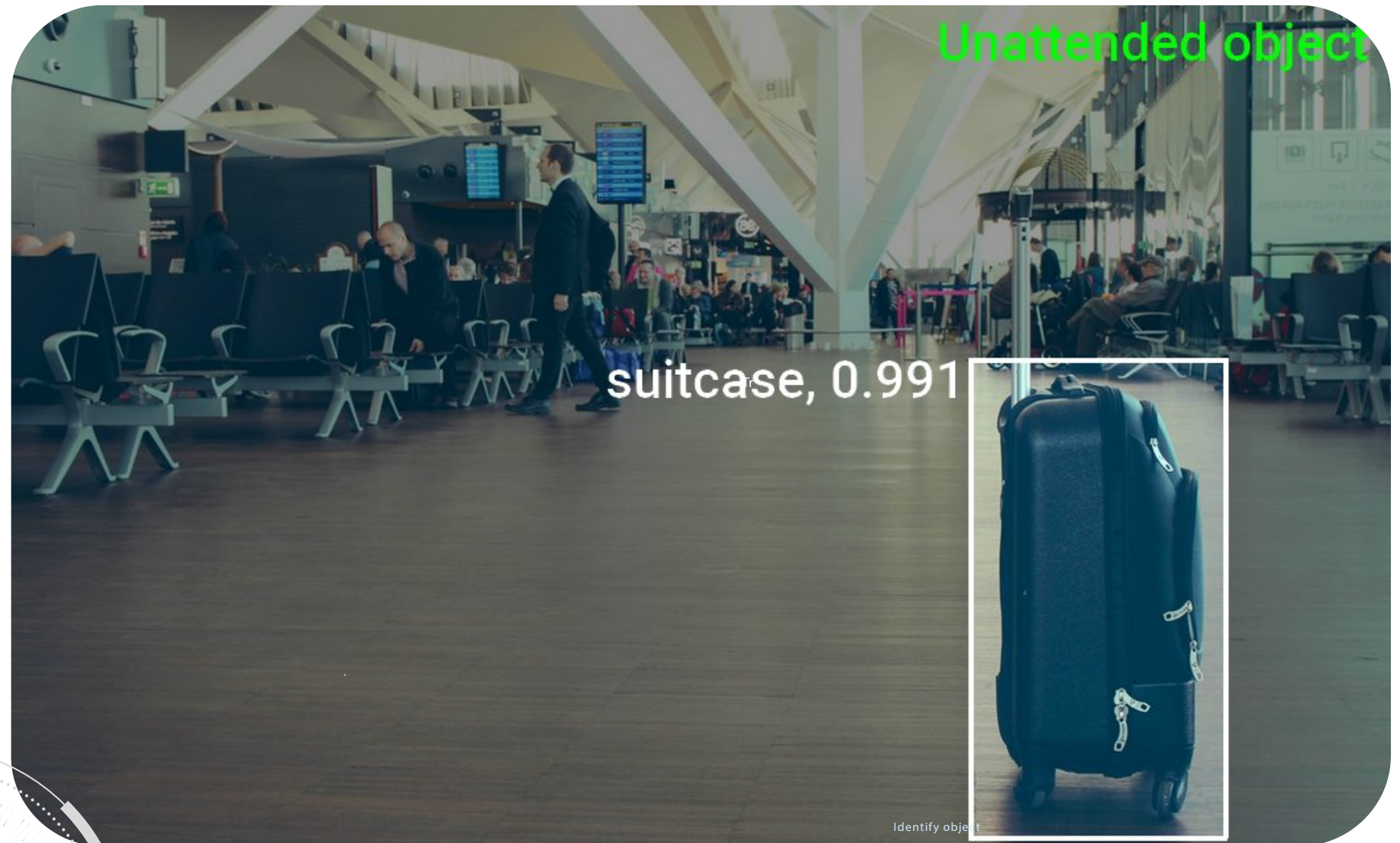


# KEY FEATURES

## DETECTION & ALERT OF ABANDONED OBJECTS

This function, based on AI in the image and video analysis platform, enables cameras to continuously analyze and automatically detect when unfamiliar objects or luggage (such as suitcases, handbags, bins, boxes, etc.) have been left behind in a surveillance area. Such abandoned objects can potentially pose security risks.

HYP-VAR collects image data from surveillance cameras for processing and analysis. It employs AI models and image processing algorithms to detect objects within the surveillance region. Once an object is identified, HYP-VAR monitors its status over a period to determine if it is accompanied by a person. If an object appears in the monitored area but remains stationary and shows no human interaction for a set period, HYP-VAR marks it as "suspected abandoned". Each detected object is timestamped to track its duration. A preconfigured time threshold (for example, 5–10 minutes) is used to determine suspected abandoned status. When such an object is detected, the operator interface displays a real-time notification and alert for immediate response.



# KEY FEATURES

## CROWD DETECTION AND ALERT



HYP-VAR provides an interface that allows users to define the Region Of Interest (ROI) for surveillance, set rules for automatically counting people entering or exiting the area, and record movements within the monitored zone. This function is typically set up in critical areas, restricted access zones, or areas where crowd density is regulated. If HYP-VAR detects that the number of people in a crowd exceeds the predefined threshold, it identifies the gathering as abnormal.

Moreover, HYP-VAR employs advanced deep learning models and image processing algorithms to detect and locate individuals, differentiate people from other objects (such as luggage or trolleys), and classify and recognize individuals based on different demographic attributes (adults, children, men, women, individuals walking alone, people carrying luggage, etc.). Using these data, HYP-VAR can count the number of people in a crowd based on recognized features.

In areas where crowding must be controlled, if the number of people present in the monitored ROI concurrently exceeds the preset limit for a defined period, HYP-VAR will trigger an alert on the operator interface for immediate action.



# KEY FEATURES

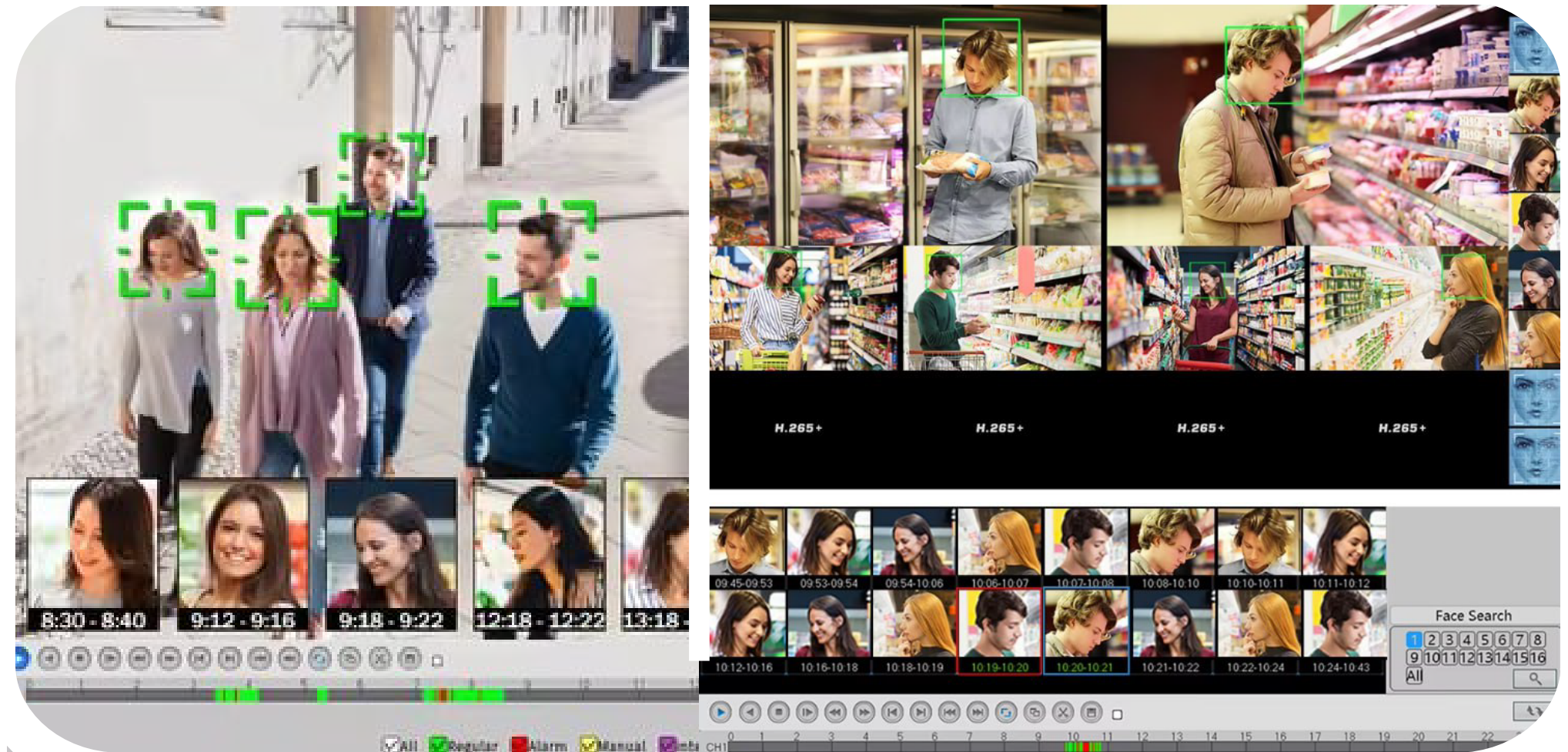
## ANALYSIS AND RECOGNITION OF HUMAN ATTRIBUTES

Any person entering the designated surveillance ROI is framed and tracked as they move through the scene. Based on pre-trained models for human features, HYP-VAR automatically classifies and recognizes individual attributes. These automatically identified attributes include:

- Object type: child, adult, or elderly
- Clothing characteristics: length, color
- Accessories: such as handbag, suitcase, backpack, bin, or box.

All detected and recognized human attribute data are recorded and stored in a database for further operational applications.

This function is ideal for investigations or tracing an individual within a specified surveillance area using archived video footage. HYP-VAR allows analysis of one or multiple video files of varying lengths to conduct searches.



The user can select the personal features to be analyzed, providing the basis for the evaluation. The analysis results return as a list of individual images with attributes similar to the preconfigured ones. Based on this information, HYP-VAR offers mapping functions to display the historical movement of the object by locations and time intervals during which they appeared in the analyzed videos.

# KEY FEATURES

## ANALYSIS & RECOGNITION OF VEHICLE ATTRIBUTES

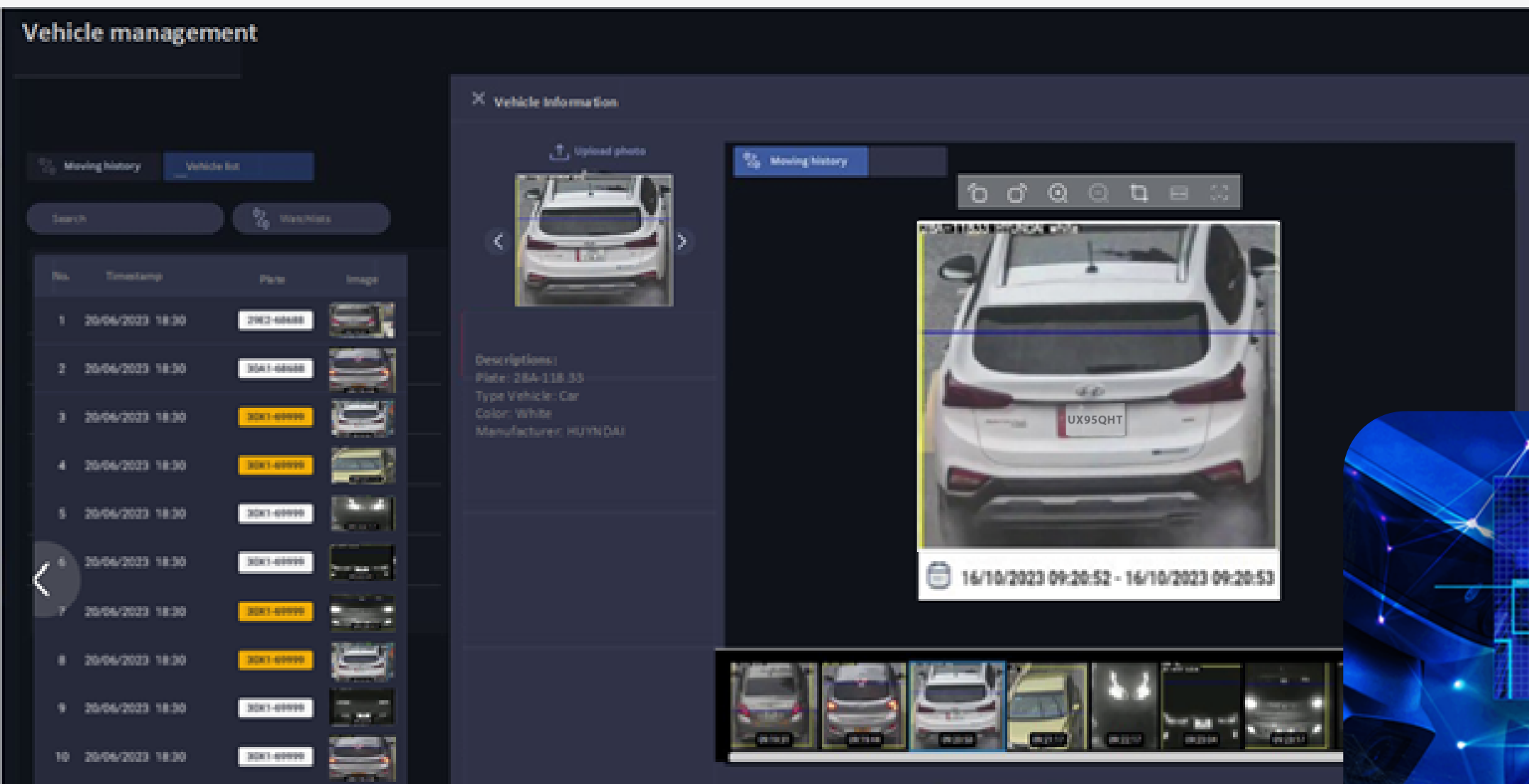
The image and video analysis system utilizes AI technology to detect and recognize vehicle characteristics. It connects to camera streaming feeds or extracts stored video files for analysis. Employing AI-based Object Detection & Classification, it identifies and determines the type of vehicle. Vehicle attributes are automatically recognized, including color, type, and manufacturer.

HYP-VAR is currently capable of analyzing:

- 14 basic vehicle colors;
- Differentiation of 4 license plate colors: blue, yellow, white, red;
- Classification of 10 types of vehicles;
- Recognition of over 10 car models;
- Recognition of over 30 vehicle brands.

These analysis and recognition capabilities can be further enhanced with larger training datasets and self-training through feedback from operators.

This function is suitable for investigating or tracking a vehicle within a monitored area using stored video footage. HYP-VAR allows analysis of one or multiple video files at varying lengths for search purposes. The vehicle features to be analyzed are selected per user requirements, serving as the basis for the evaluation. The analysis results in a list of vehicle images with recognized features matching the pre-configured ones. Based on this information, HYP-VAR provides mapping functions to display the historical movement of the vehicle by location and the time intervals during which it appeared in the analyzed videos.



# KEY FEATURES

## LICENSE PLATE RECOGNITION

The image analysis system can detect, recognize, and store license plate information when vehicles enter or exit controlled areas such as toll stations, parking lots, entry/exit gates, or restricted zones. Automatic License Plate Recognition (ALPR) technology uses deep learning models to quickly and accurately recognize the license plates of vehicles traversing these areas.

Each time a vehicle enters the designated license plate recognition zone, HYP-VAR analyzes and recognizes the plate based on the captured vehicle image. It supports license plate recognition under various environmental conditions (daytime/nighttime), distinguishes among plate types (color, numbering pattern, etc.), and can even recognize plates partially obscured by screws or scratches.

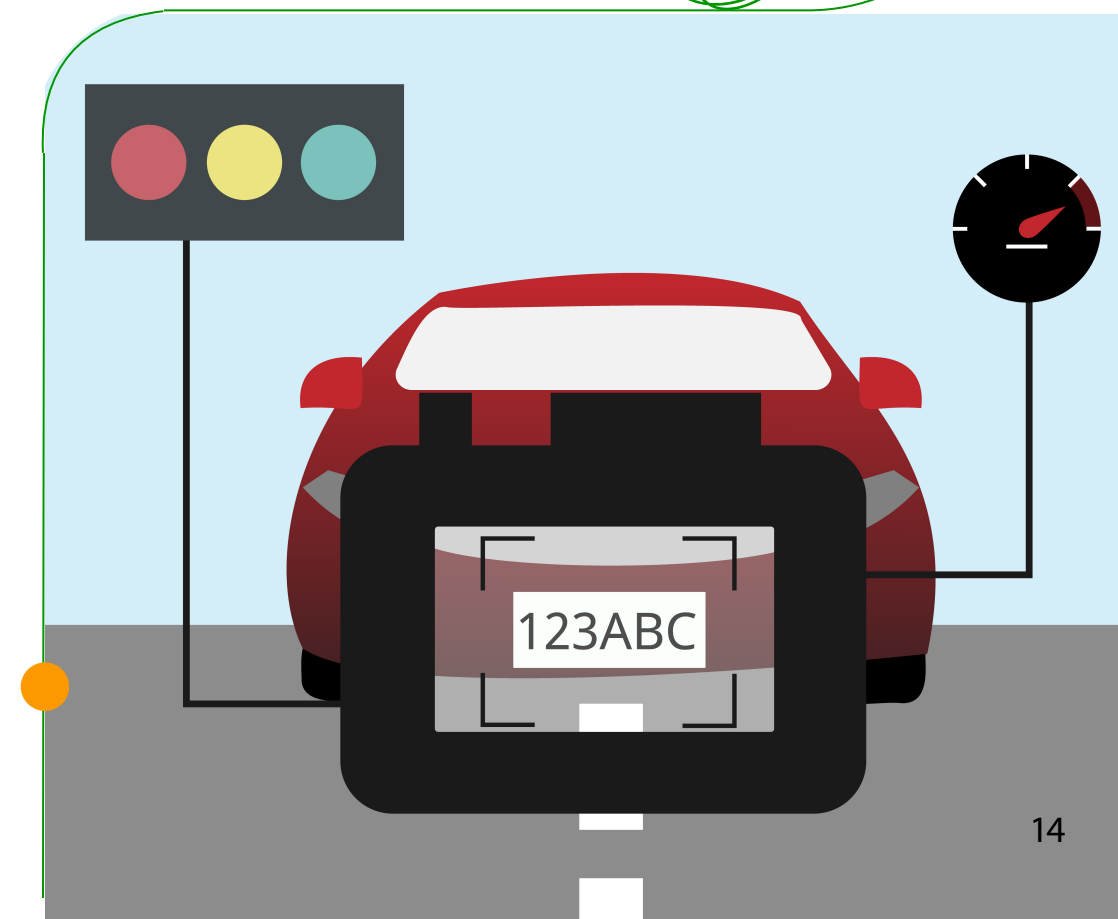
Intelligent image processing algorithms are employed to reduce noise, enhance sharpness, and improve the clarity of the characters on the plate. To achieve high accuracy, the surveillance cameras must meet configuration, technical specifications, and installation guidelines to ensure accurate recognition. High-resolution

cameras (HD or higher) are recommended to clearly capture license plates; infrared (IR) illumination or low-light sensors are preferred for nighttime capture, and be installed so that the plates can be clearly visible to the naked eye. The best license plate images shall be automatically selected to reduce negative effect from dirt, blur, glare, distortion, or partial/full obstruction to improve recognition accuracy.

License plate data is stored in a database to support tracking and analysis tasks such as:

- Tracking the entry and exit history of vehicles;
- Providing evidence for security incidents or violations;
- Alerting on vehicle density or congestion in a specific area.

The recognized license plates can be checked against watchlist or priority-list databases to trigger events or alerts to support security surveillance or business workflow. HYP-VAR can also generate statistical reports in the form of charts, dashboards, or trend analysis graphs regarding vehicle flow, or provide evidentiary data for investigations and tracking abnormal events.



# KEY FEATURES

## FACIAL RECOGNITION

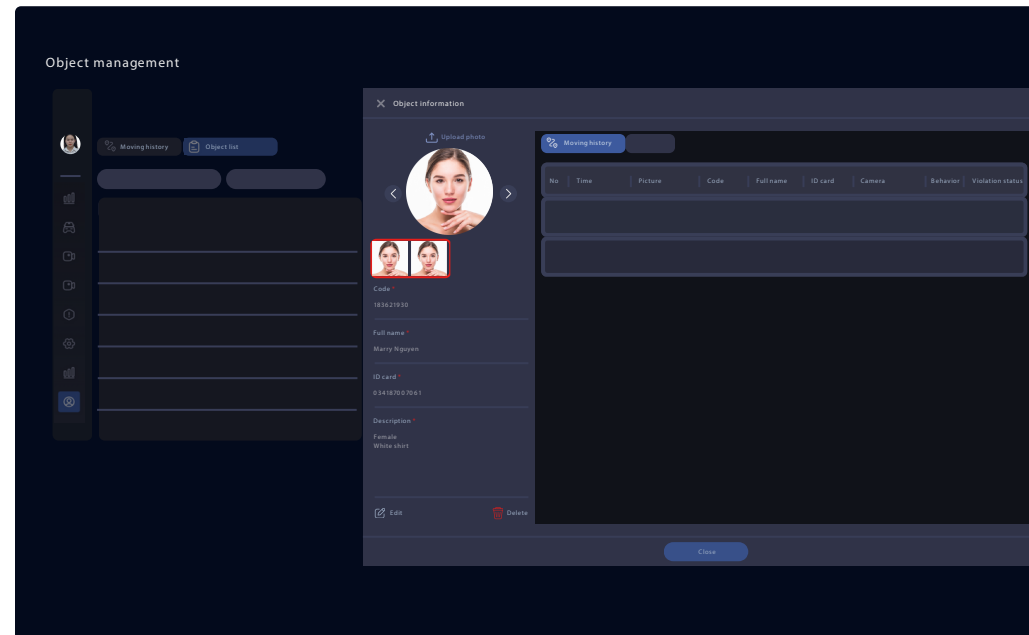
The image and video analysis system provides recognition models to analyze an individual's facial features. Based on these unique facial characteristics, the solution analyzes and searches for matching faces in the database to identify the person.

High-quality pre-trained models using Deep Learning technology allow HYP-VAR to analyze and recognize facial data at enhancing recognition accuracy. These models can be utilized with modern GPU to improve processing speed and facial recognition accuracy.

Facial image quality must meet certain requirements regarding camera installation, pixel density, face angle, and lighting conditions to achieve high accuracy recognition.

Camera installation recommendations for facial recognition include:

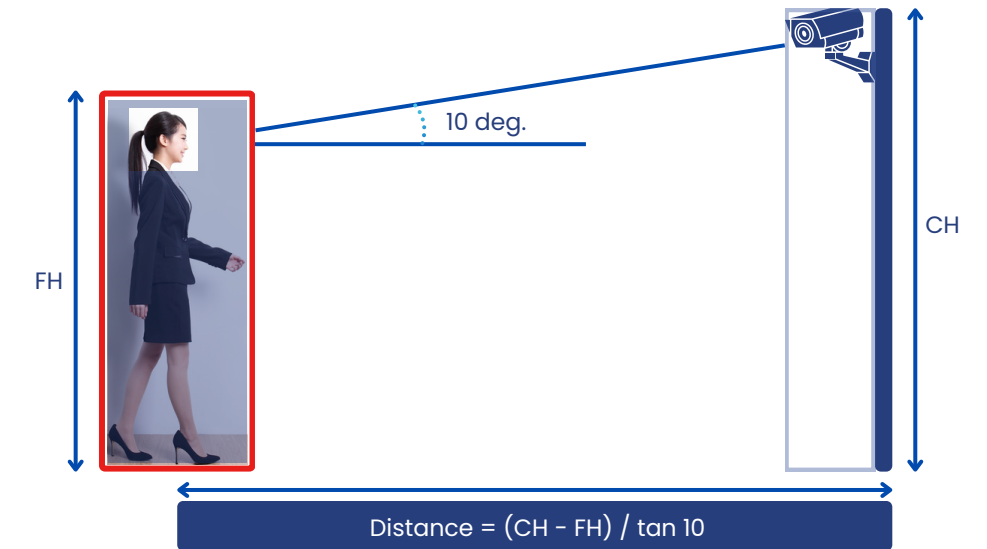
- Installing IP cameras at an oblique angle, facing the area where people pass by.
- Varying installation heights are acceptable, but the angle of incidence shall not exceed 10°.
- Image resolution shall meet DORI requirements for identification.
- Cameras must be installed to avoid excessive darkness or glare.
- Key facial features such as the eyes, nose, and mouth should not be obstructed.



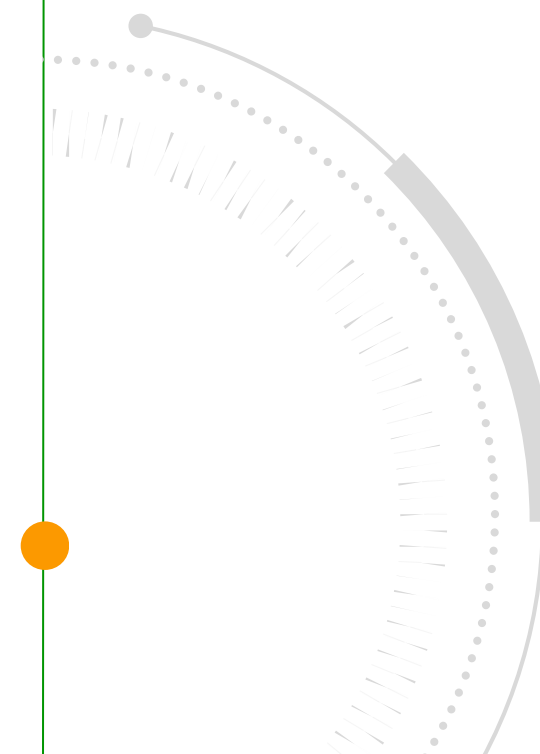
### Example scenarios

Typical calculations	Scenario 1	Scenario 2
Heights	2m	3m
Face height	1.4m	1.7m
Recognition angle	10 deg.	10 deg.
Distance	~ 3.4m	~7.3m

The facial recognition function can be applied to search for and trace faces from a watchlist. Faces may be automatically registered by integrating with biometric systems at security checkpoints or access control areas, or manually registered by users. HYP-VAR supports the analysis and search for specific facial images compared to the stored faces embedding in the database. The search results typically return a ranked list of potential matches based on similarity. The highest similarity match is then reviewed and used to make a decision.



Additionally, HYP-VAR – Hypermicron offers robust watchlist management capabilities. Through the surveillance network, if a detected face matches one on the watchlist to a permitted degree, the system will issue a real-time alert via the operator interface. HYP-VAR supports a watchlist of over 10,000 faces on high performance the database system's configuration.



# KEY FEATURES

## DETECTION OF VEHICLE VIOLATIONS

HYP-VAR provides a function to detect vehicle violations (wrong-way driving and improper parking) within a designated Region Of Interest (ROI). This function is typically applied in parking lots, one-way streets, or no-parking zones. Real-time alert settings for cameras in these areas are configured so that whenever one or more vehicles enter the monitored ROI, HYP-VAR automatically detects and tracks the vehicle's movement and determines:

- Wrong-Way Driving: If a vehicle is detected moving in the opposite direction of the pre-established flow.
- Improper Parking: If a vehicle is detected parked within the monitored area for a duration exceeding the preset threshold.

All data related to vehicle violation events are stored and sent to the application server to trigger alerts.

## FIRE AND SMOKE DETECTION & ALERT

The image and video analysis system defines a virtual Region Of Interest (ROI) for surveillance. HYP-VAR can be configured to capture images periodically at interval (approximately every few minutes) from the camera covering the ROI and uses an object detection algorithm to detect the presence of flames or smoke in the frame for at least a minimum duration predefined by the user. Upon detecting a fire, HYP-VAR immediately sends an alert to the operator interface for timely response.



<thank you>

