



The usage and limitation for AI features of IPC





1

Smart Motion Detection

2

Basic AI features

3

Advanced AI features

4

Special AI features



1 Smart motion detection

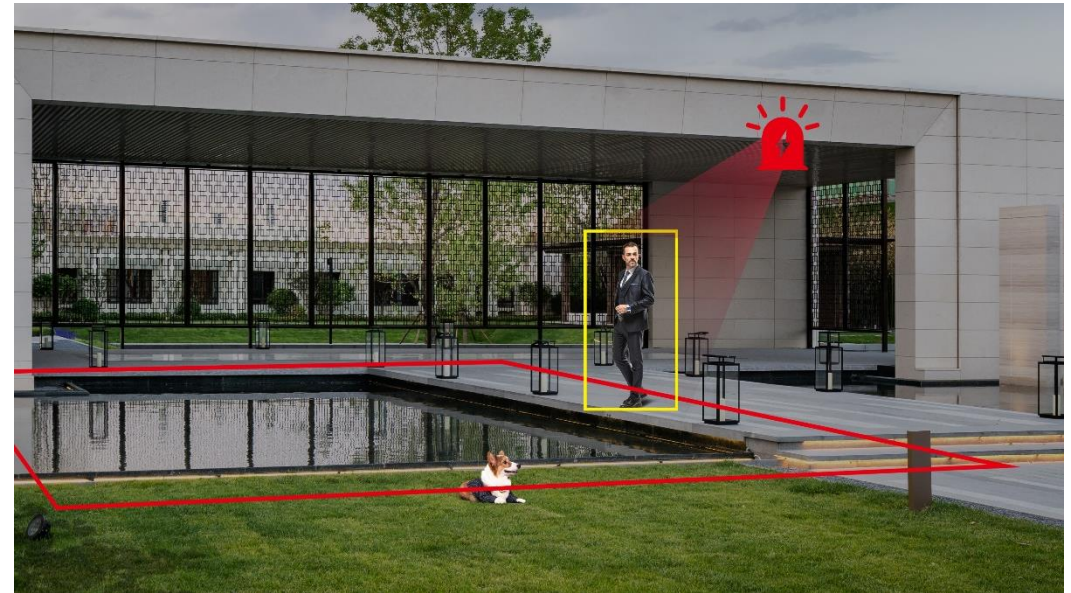
Scenario

Support motion detection filter target alarm, greatly improve the accuracy and user experience

Description

- ①when target type is selected: people, vehicles appear on the screen, and the moving speed reaches the preset sensitivity, the system alarm triggered.
- ②when target type is not selected: it is used for ordinary motion detection.

*Currently, only S4L-C/S4-C,E3B-A have the ability of SMD





1

Smart Motion Detection

2

Basic AI features

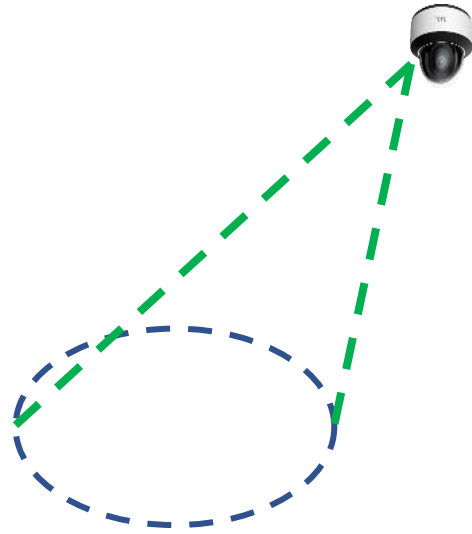
3

Advanced AI feature

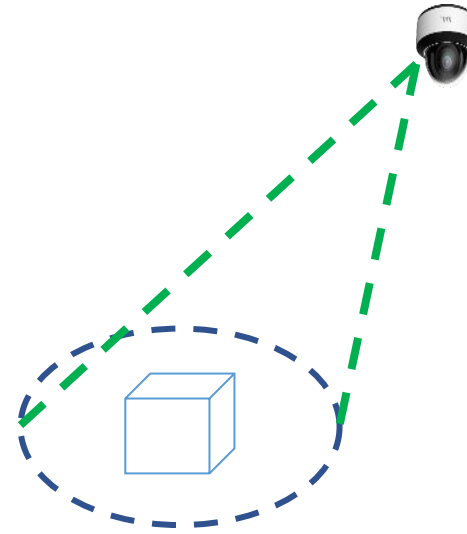
4

Special AI features

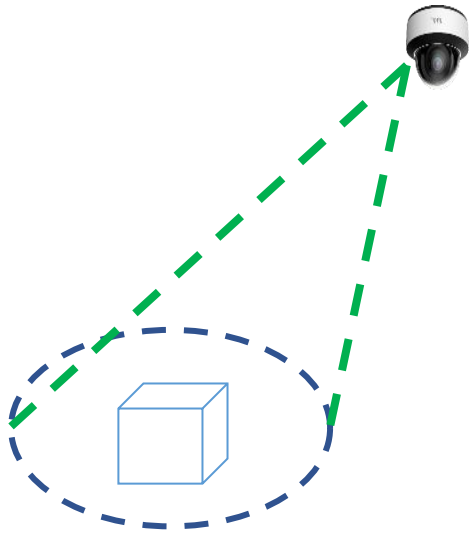
2 Basic AI feature—Object abandon and missing



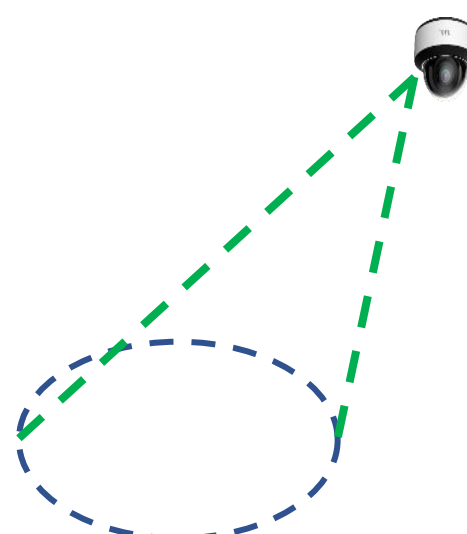
Object abandon



Object abandon: An alarm will be triggered when object be abandoned in specific area for a period of time.



Object missing



Object missing: An alarm will be triggered when object be missed from specific area for a period of time.

2 Basic AI feature—Object abandon and missing

Config Home ▶ Event ▶ Object Abandoned/Missing

Detection Config Area Schedule

Enable

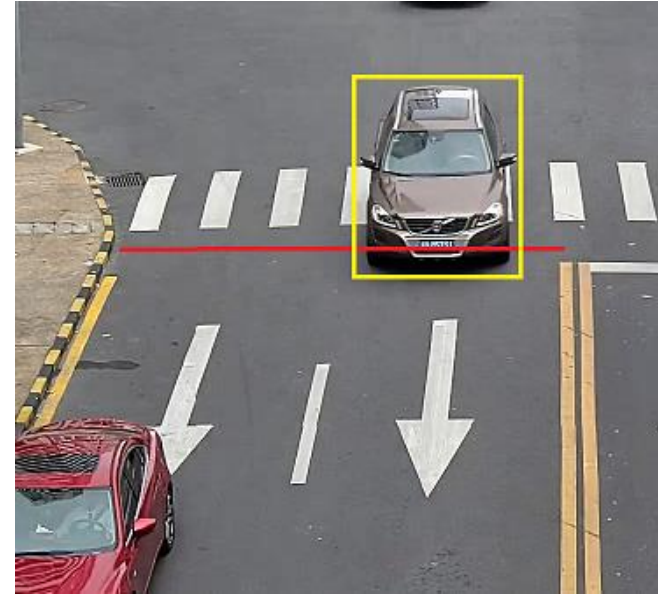
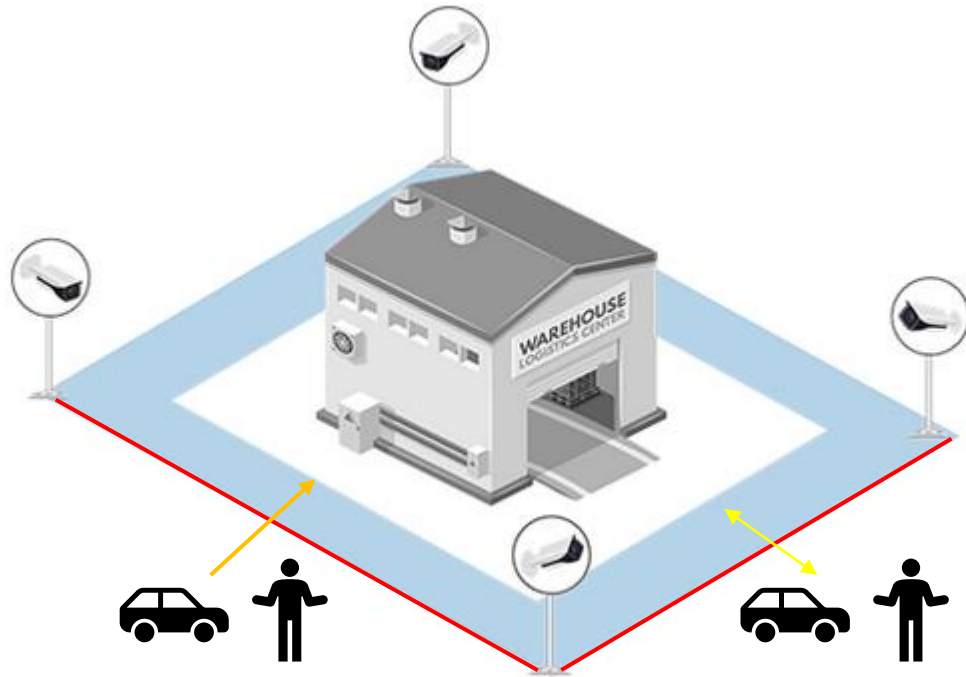
Enable Abandoned Object Detection

Enable Missing Object Detection

Duration of Delay Second

For TVT side, **apart from S4L series(including S4L-C), all other series camera** can support **object abandon and missing feature**

2 Basic AI feature—Line crossing



Work logic: Alarm will be triggered when target passes though this line(the direction can be set).

2 Basic AI feature—Line crossing

Config Home ▶ Event ▶ Line Crossing

Detection Config Area Schedule

Enable

Save Original Picture To SD Card

Save Target Picture To SD Card

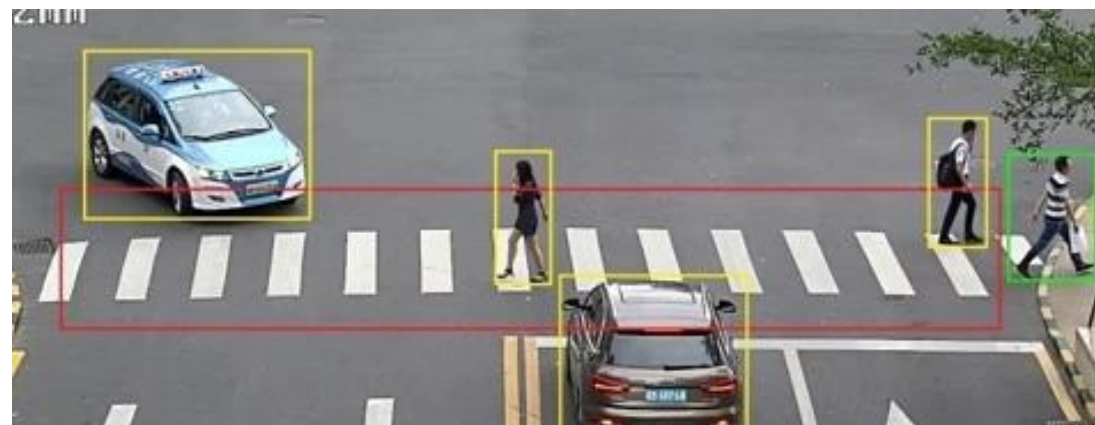
Detection target and sensitivity

Target	Sensitivity	
<input checked="" type="checkbox"/> Human	<input type="range"/>	50
<input checked="" type="checkbox"/> Motor Vehicle	<input type="range"/>	50
<input checked="" type="checkbox"/> Motorcycle/Bicycle	<input type="range"/>	50

Alarm Holding Time 3 Seconds ▼

All TVT cameras support line crossing, but **S4L series** can NOT have line crossing based on targets; **Other series** can have line crossing based on targets to reduce false alarm

2 Basic AI feature—intrusion



Restrict/private area

Work logic: Alarm will be triggered when target entry into the area, until the target leaves from that area. **So the alarm triggered by region intrusion is continuous.**

2 Basic AI feature—intrusion

Config Home ▶ Event ▶ Region Intrusion

Detection Config Area Schedule

Enable

Alarm Holding Time 20 Seconds ▾

Trigger Email

Trigger FTP

Config Home ▶ Event ▶ Region Intrusion

Detection Config Area Schedule

Enable

Save Original Picture To SD Card

Save Target Picture To SD Card

Detection target and sensitivity

Target	Sensitivity
<input checked="" type="checkbox"/> Human	<input type="range" value="50"/> 50
<input checked="" type="checkbox"/> Motor Vehicle	<input type="range" value="50"/> 50
<input checked="" type="checkbox"/> Non-motor Vehicle	<input type="range" value="50"/> 50

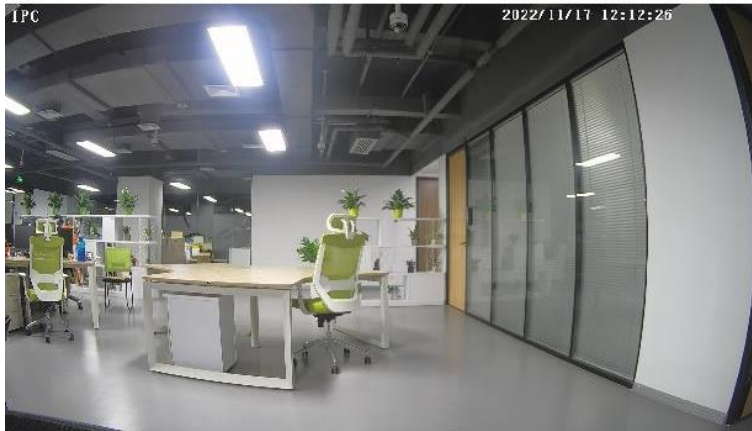
Alarm Holding Time 20 Seconds ▾

All TVT cameras support region intrusion, but **S4L series** can NOT have intrusion based on targets; **Other series** can have intrusion based on targets to reduce false alarm

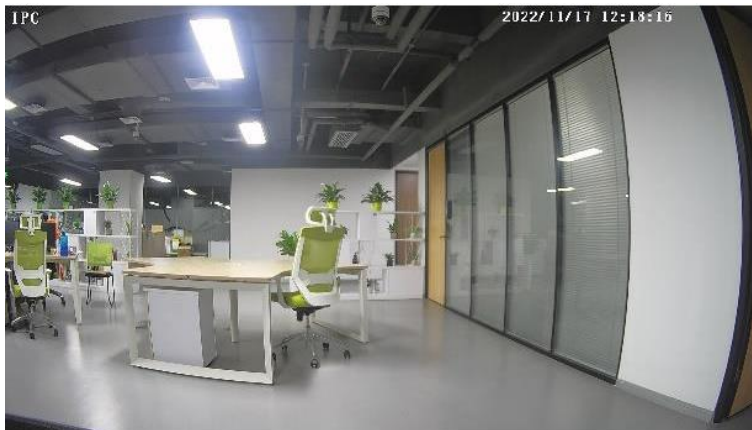
2 Basic AI feature—video exception

Video exception: There are 3 kinds of situations for video exception.

(1) Scene Change: Due to factors such as the **camera's field of view** and **angle** being artificially moved, the main area of the video screen may experience a certain degree of **screen deviation** or **foreign object occlusion**, resulting in scene transformation compared to its initial scene



Screen offset



Foreign object occlusion

2 Basic AI feature—video exception

Video exception: There are 3 kinds of situations for video exception.

(2) Video blur: The phenomenon of blurred image caused by **improper focusing** in the camera video



2 Basic AI feature—video exception

Video exception: There are 3 kinds of situations for video exception.

(3) Abnormal Color : The phenomenon of color deviation in the video caused by **poor contact with the camera circuit, external interference, or camera malfunction**



2 Basic AI feature—video exception

Config Home ▶ Event ▶ Video Exception

Detection Config Sensitivity

Scene Change Detection

Video Blur Detection

Abnormal Color Detection

Alarm Holding Time 20 Seconds ▼

Trigger Email

Trigger FTP

Save

Video exception is basic AI feature, **all TVT cameras** have this feature.



1

Smart Motion Detection

2

Basic AI features

3

Advanced AI feature

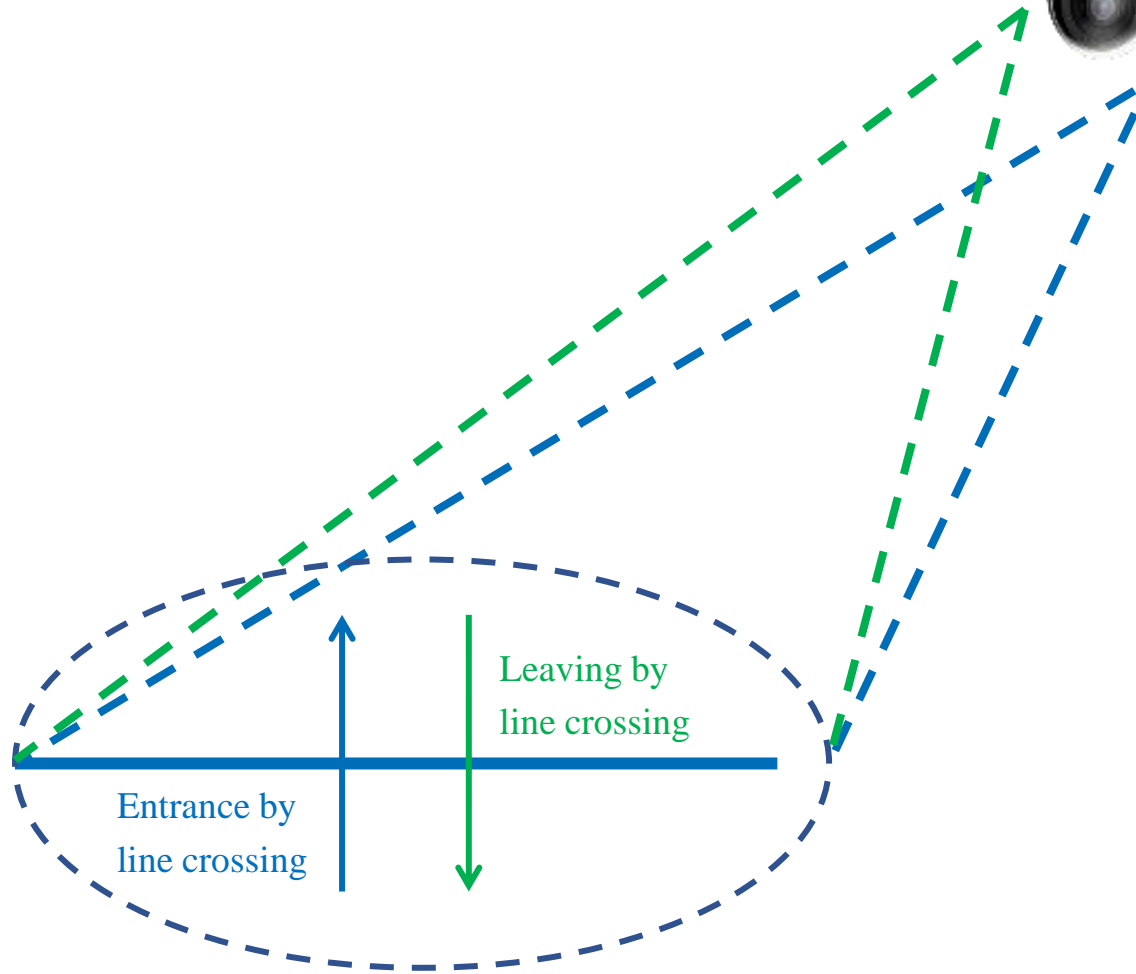
4

Special AI features

3 Advanced AI feature—target counting

Work logic

E3/E3B/M3/C2-PA-4MP/C2H-PA-8MP Series

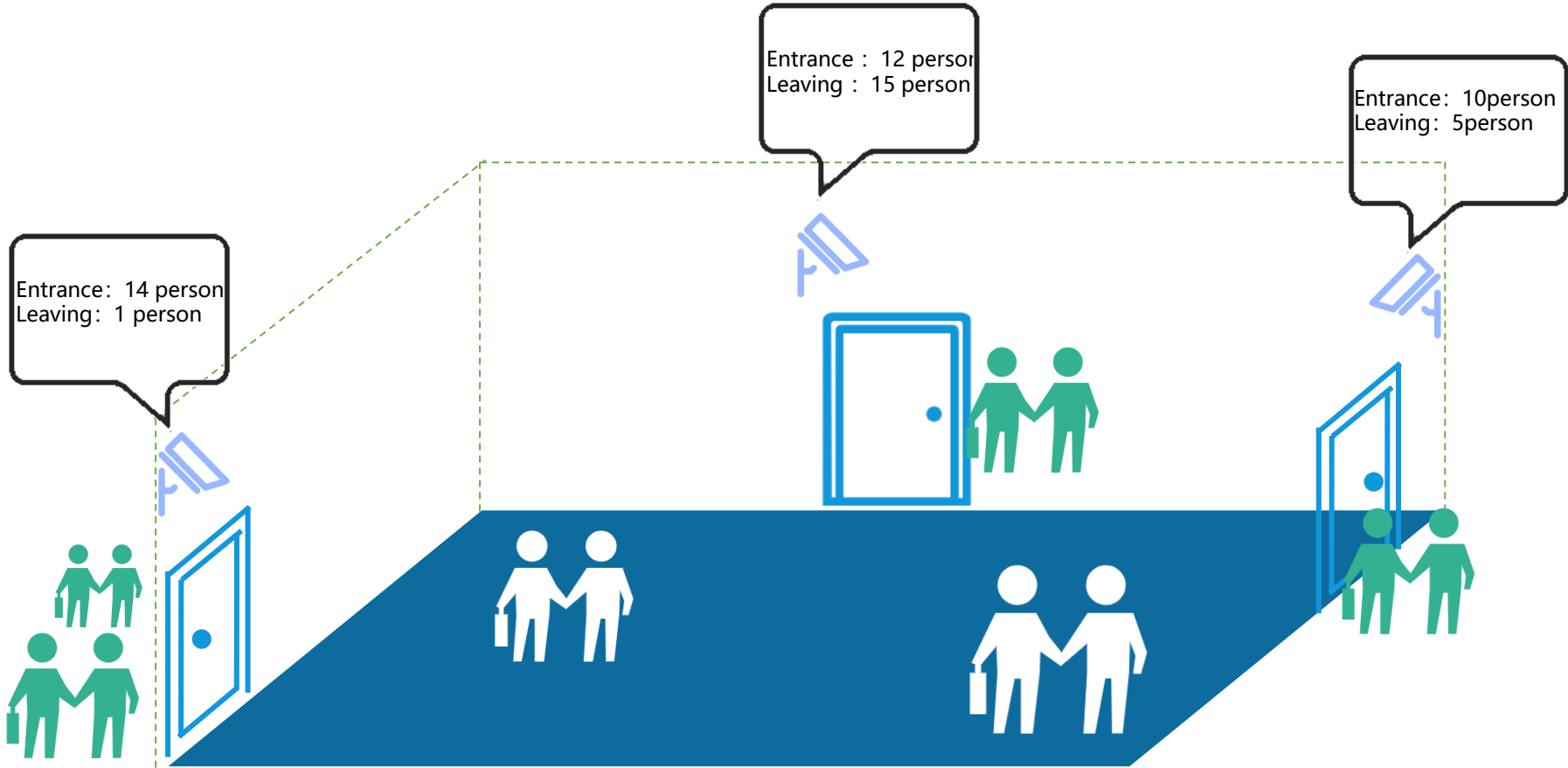


Entrance: Target goes through the detection line with blue direction, the system will count entrance.

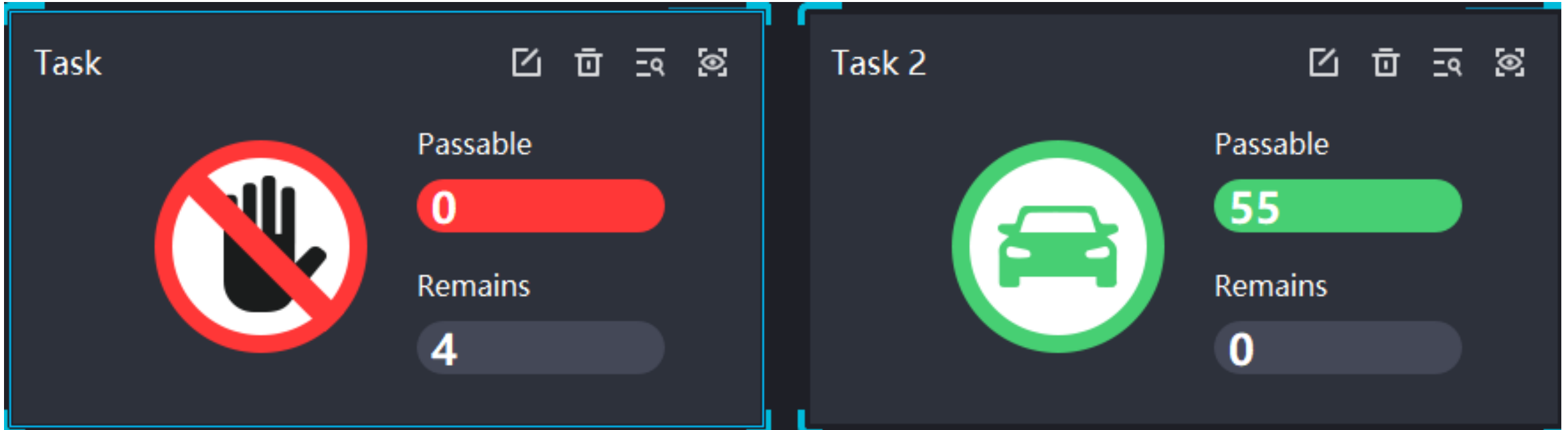
Leaving: Target goes through the detection line with green direction, the system will count leaving.

Stay: The difference between entrance and leaving, which means the net statistical count.

3 Advanced AI feature—target counting



3 Advanced AI feature—target counting

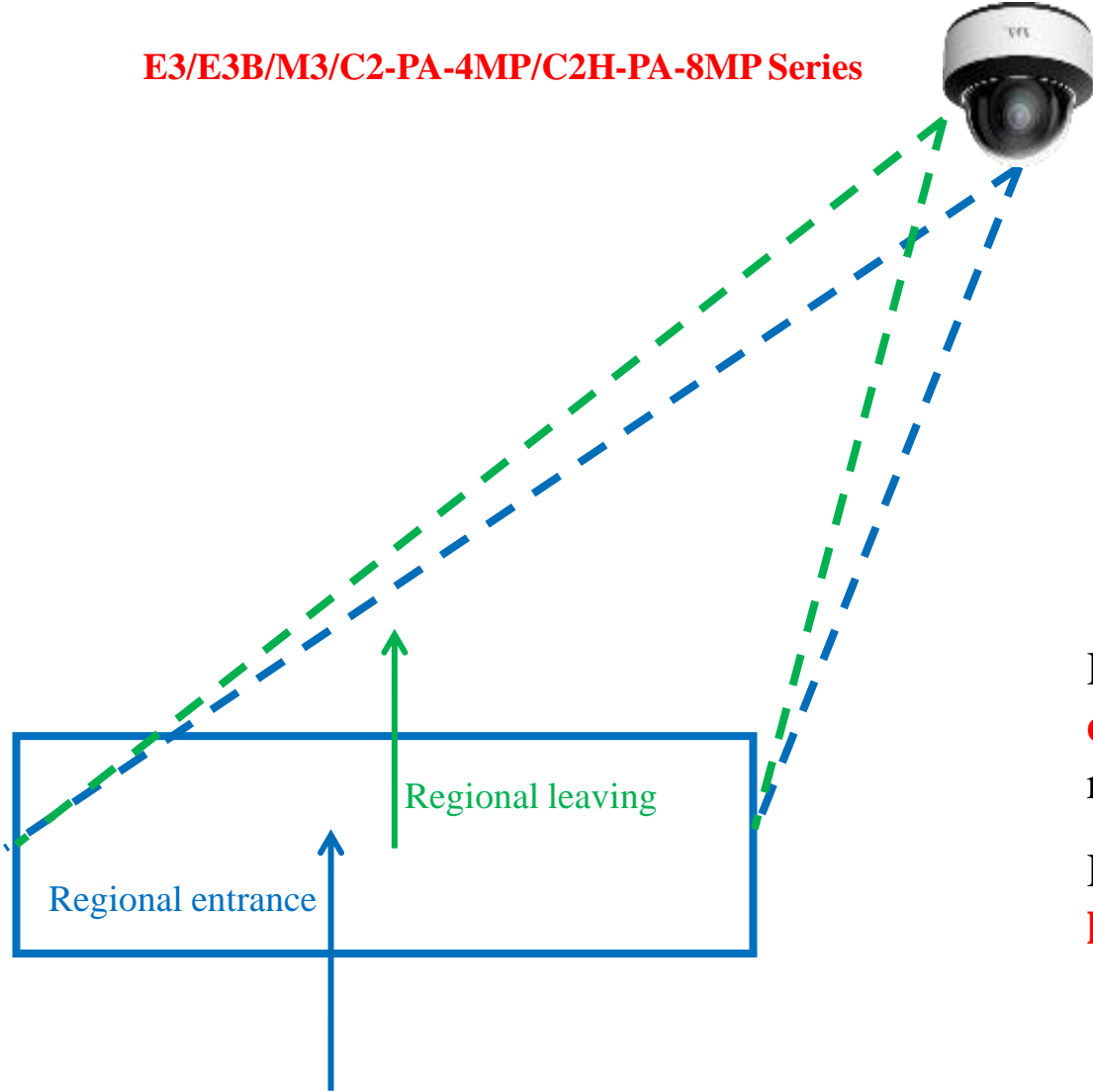


Combination with NVMS Flow control module, the system can output in time alarm when the stay number over the set threshold. So users can know that the site has accommodated enough target, and no any other target can be allowed to entry/access this site.

3 Advanced AI feature—regional entrance



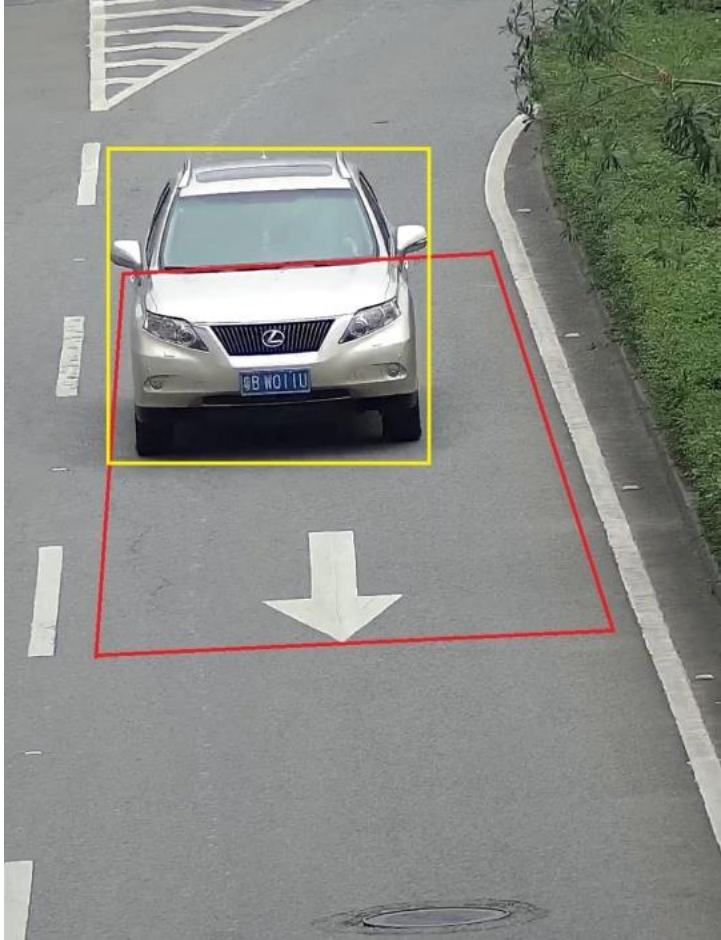
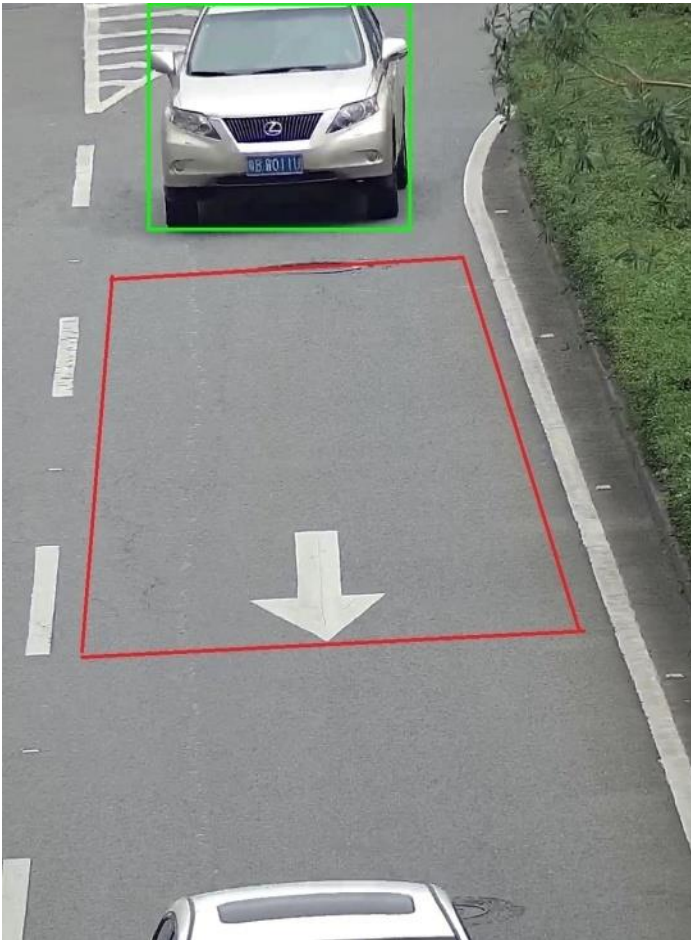
E3/E3B/M3/C2-PA-4MP/C2H-PA-8MP Series



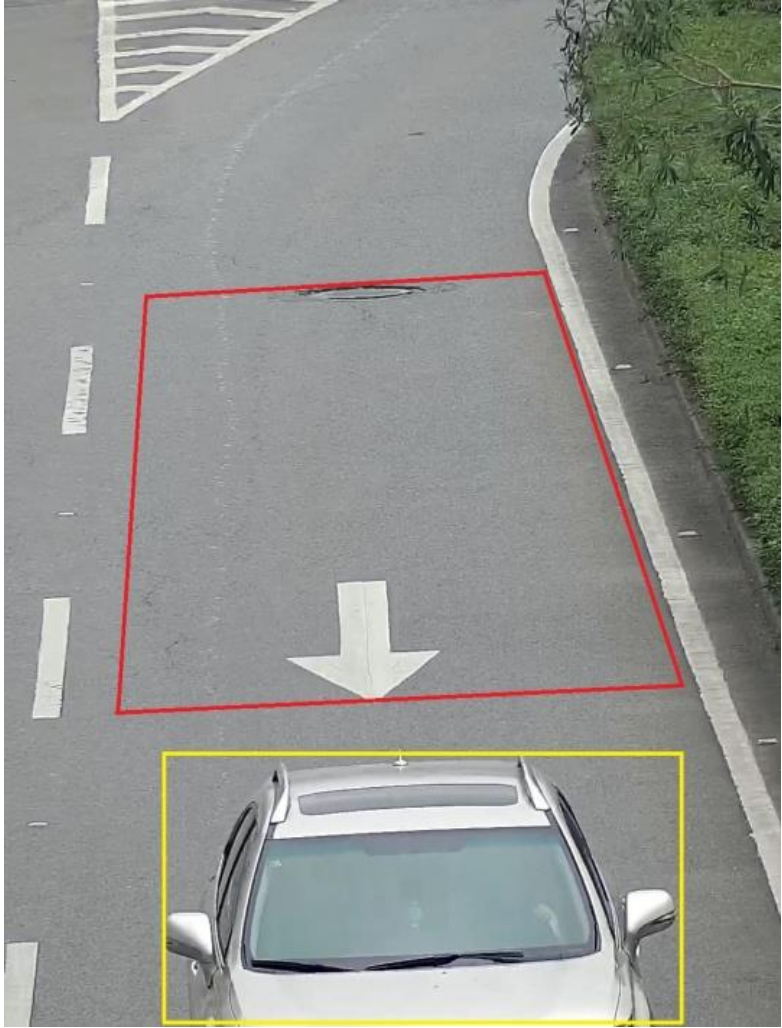
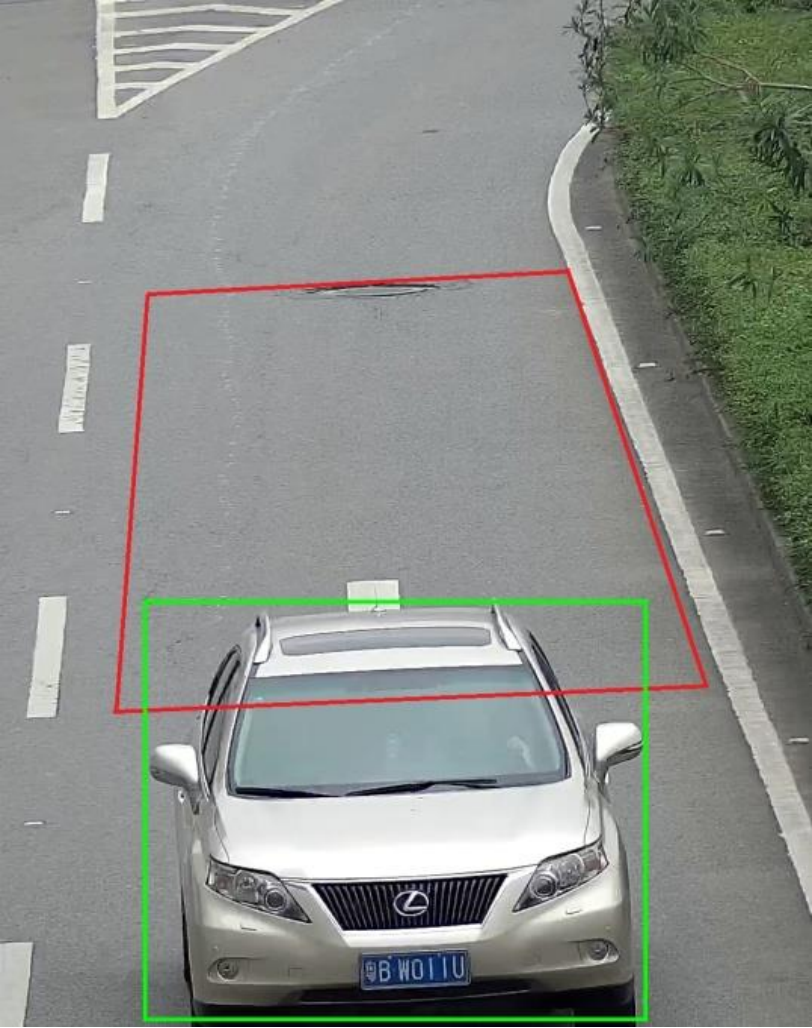
Regional entrance: An alarm will be triggered when target **enters region from outside to inside**, overlap with region..

Regional leaving: An alarm will be triggered when target **leave region from inside to outside**.

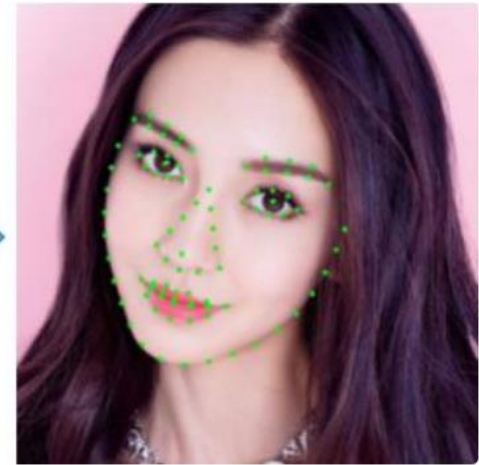
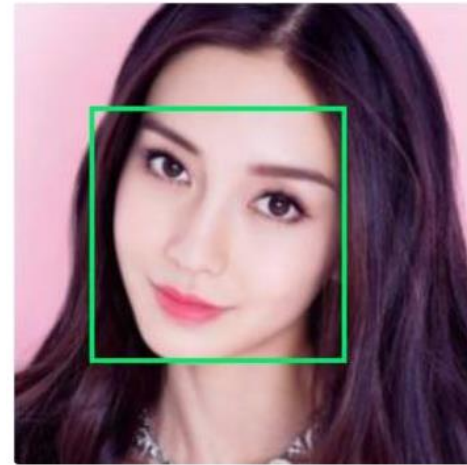
3 Advanced AI feature—regional entrance



3 Advanced AI feature—regional leaving



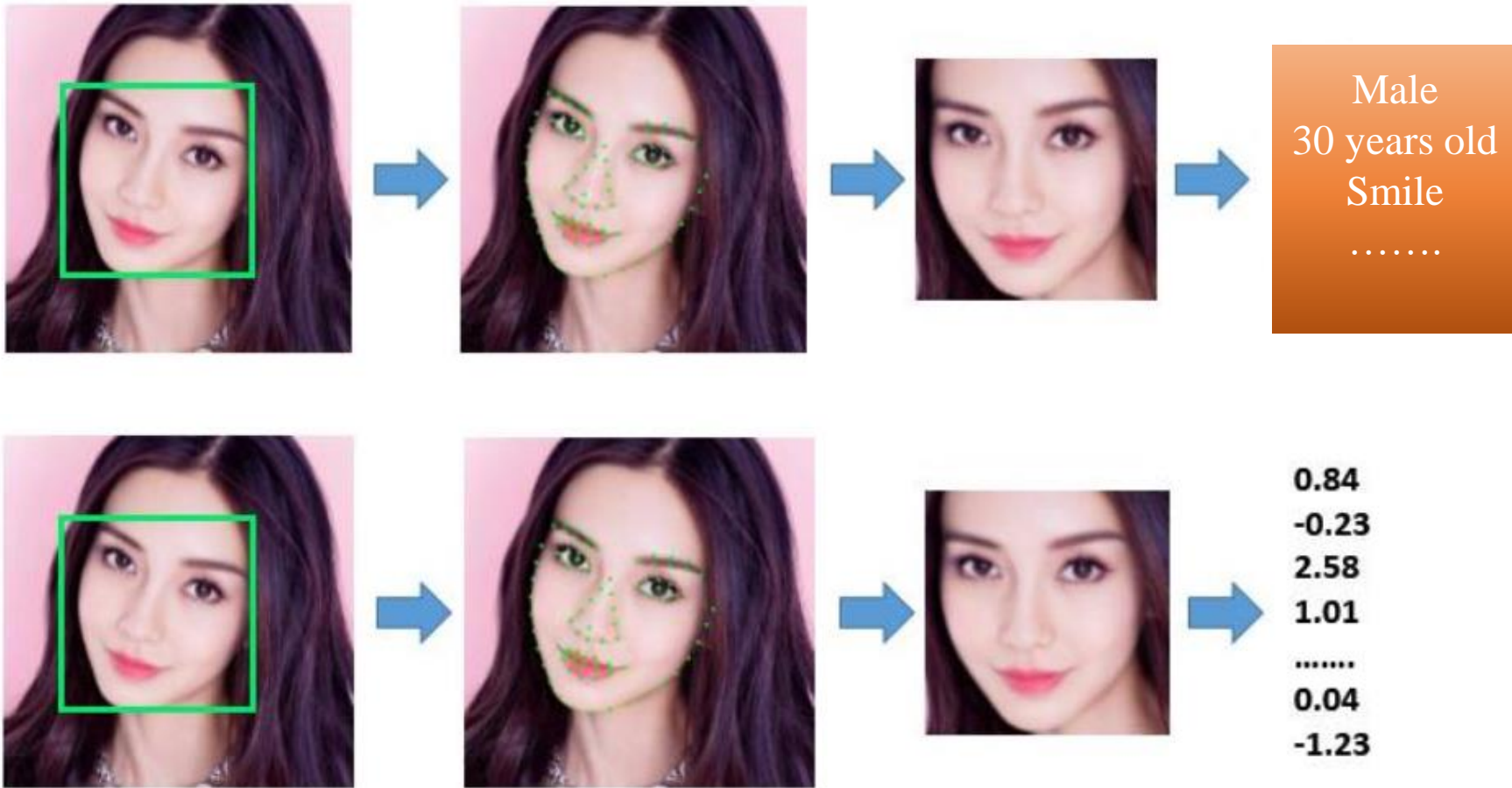
3 Advanced AI feature—face detection



Face Capture: from the image to **detect the position of face**.

Face Alignment: Locate the **coordinates of key facial features** on the face

3 Advanced AI feature—face detection



Face Attribute: based on face alignment, **extract the face attributes** .

Face Feature: convert facial images into a **fixed length string of numerical values**.

3 Advanced AI feature—face detection

Config Home ▶ Event ▶ Face Detection

Detection Config | Area | Advanced | Schedule

State: Working

Enable

Save Source Information To SD Card

Save Face Information To SD Card

Trigger alarm condition: All

Alarm Holding Time: 20 Seconds

Trigger SD Card Snapshot

Trigger SD Card Recording

Trigger Email

Trigger FTP

2023/11/16 06:03:46

ID:32
Male
Youth
No Glasses
Mask Off
2023-11-16 06:02:35

ID:32
Male
Youth
No Glasses
Mask Off
2023-11-16 06:02:34

1584Kbps

TVT **E3/E3B/E3B-A, A3-FC, C2-PA-4MP, C2H-PA-8MP, C1-5MP, M3** series can support face detection feature.

3 Advanced AI feature—heat map

Camera provides heat map functionality displaying hot and cold areas based on customer flow, allowing for enhanced business analysis.

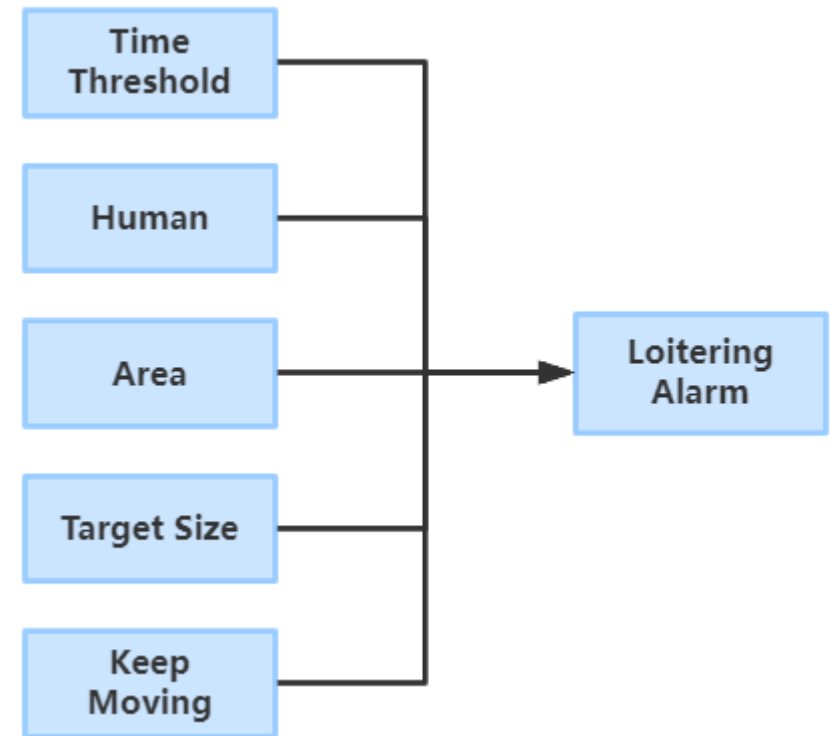
Highlighted, intuitive display of the concentration of people and the frequency of activity within a certain period of time, combined with the actual geographical area



3 Advanced AI feature—loitering detection

Loitering detection is a feature designed to detect **human that loitering in a particular area and stays longer than time threshold**. Once the IPC detects loitering behavior, it can trigger an alarm or alert the surveillance operator to take action.

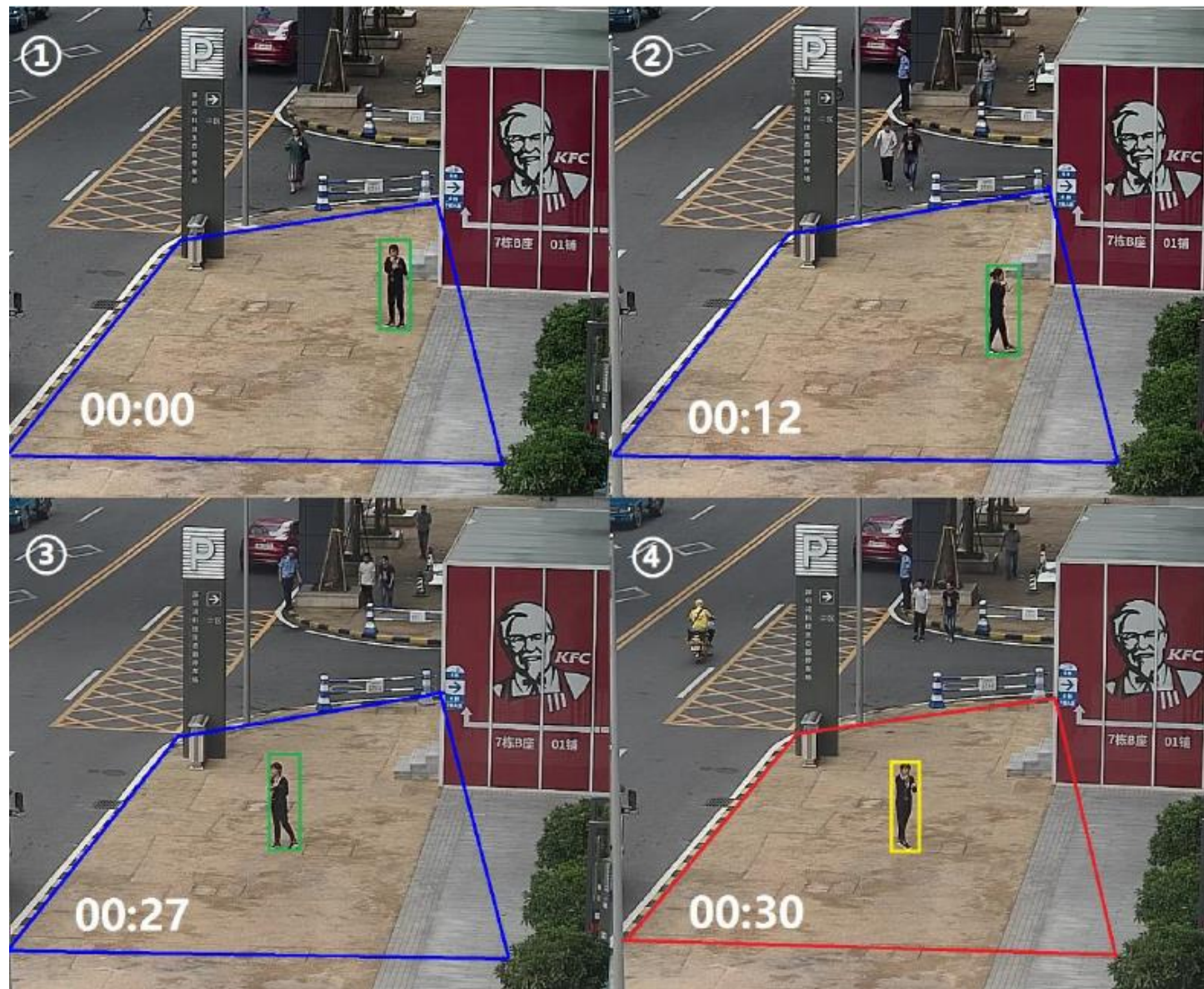
This feature helps to prevent the risk of having thieves or malicious person in some place(house, office, building) who loiter and are intend to make unfriendly behavior



3 Advanced AI feature—loitering detection

Event Logic

- ① Target enters the zone
- ②③ Target keeps moving
- ④ Achieve time threshold, trigger alarm



3 Advanced AI feature—loitering detection

Event Configuration

Config Home ▶ Event ▶ Loitering Detection

Detection Config Area Schedule

Enable

Save Original Picture To SD Card

Save Target Picture To SD Card

Sensitivity 50

Time Threshold Second

Alarm Holding Time ▾

Trigger SD Card Snapshot

Trigger SD Card Recording

Trigger Email

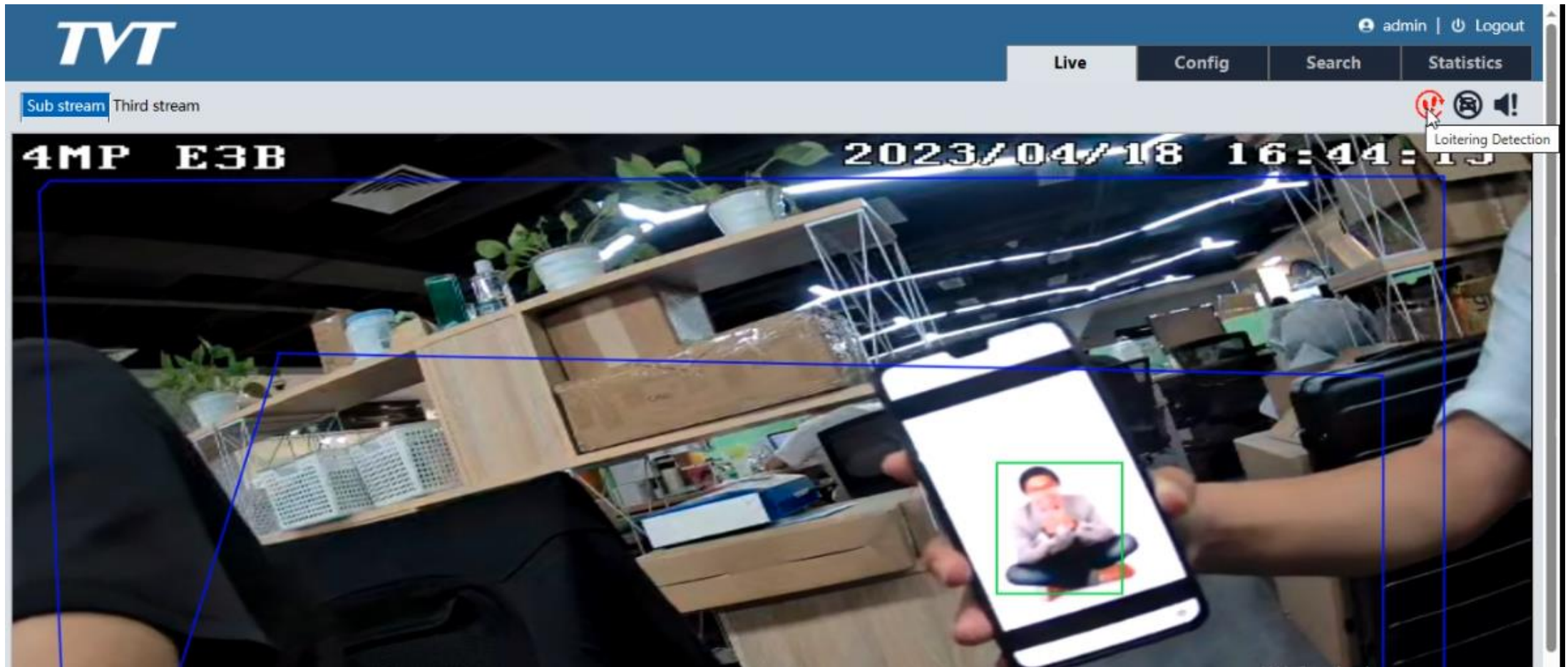
Trigger FTP

Save

Target in detection area stays more than the time threshold and moves, Loitering alarm will be triggered

3 Advanced AI feature—loitering detection

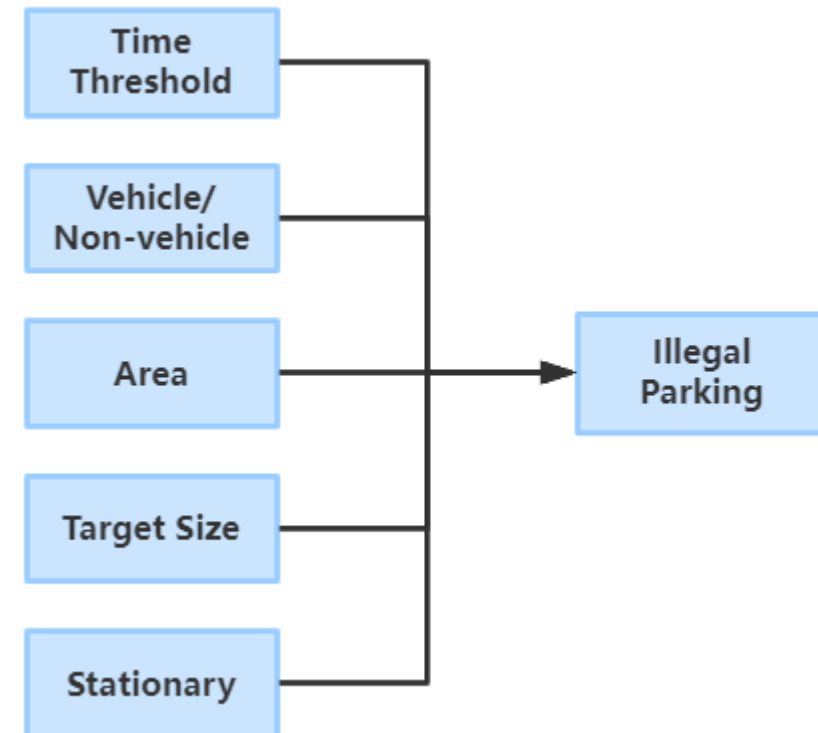
Event Snapshot



3 Advanced AI feature—Illegal parking

The illegal parking detection is new AI feature to detect and alert when there is a **vehicle that is parked illegally in a particular area.**

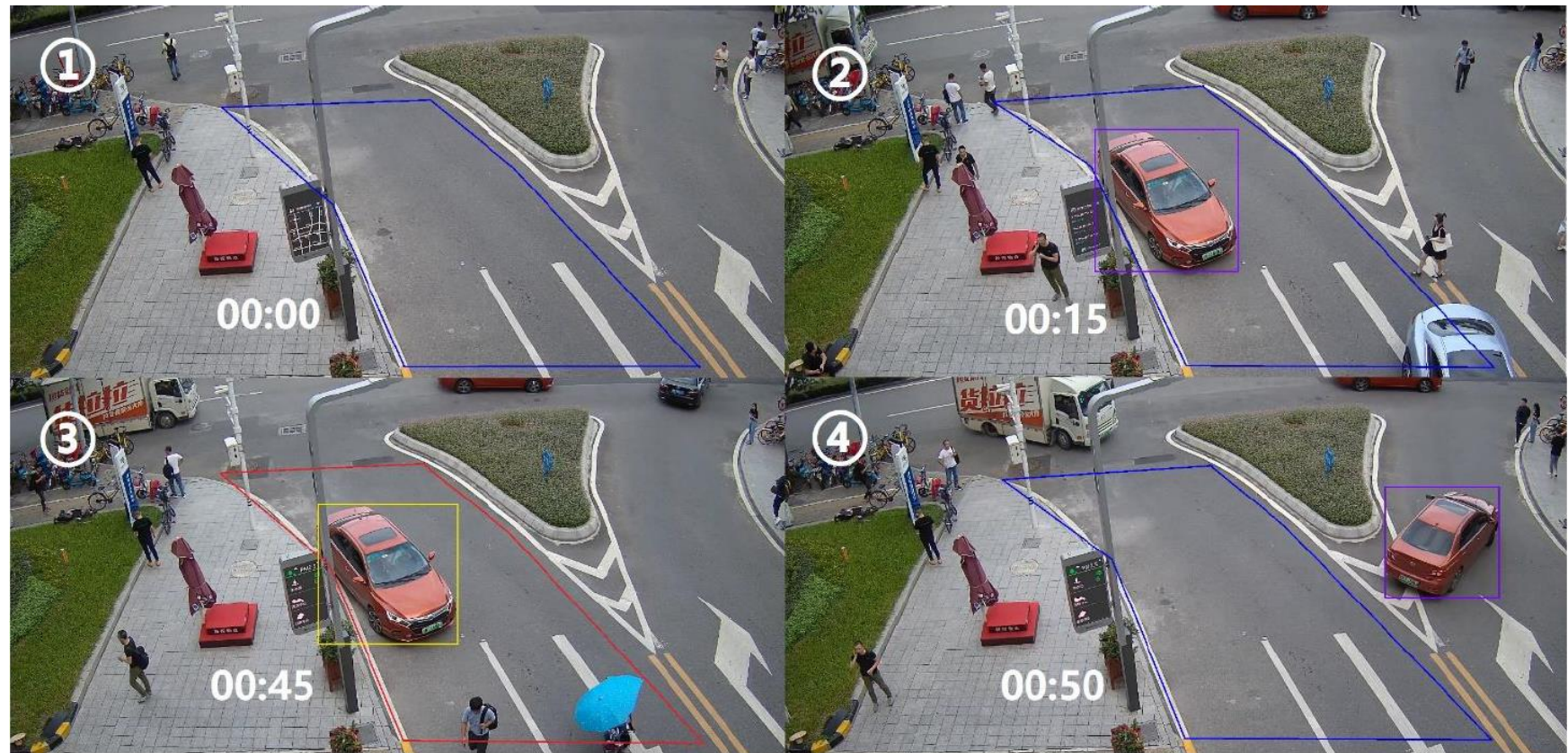
This function is typically used in parking lots, public streets, or other areas where parking is regulated or prohibited. The IPC uses video analytics algorithms to analyze the video footage and identify vehicles that are parked in violation of local parking regulations.



3 Advanced AI feature—Illegal parking

Event Logic

- ① Target enters the zone
- ② Target stops moving
- ③ Achieve time threshold, trigger alarm
- ④ Target leave, alarm stop



3 Advanced AI feature—Illegal parking

Event Configuration

Config Home ▶ Event ▶ Illegal Parking Detection

Detection Config Area Schedule

Enable

Save Original Picture To SD Card

Save Target Picture To SD Card

Detection target and sensitivity

Target

Motor Vehicle

Motorcycle/Bicycle

Sensitivity



50



50

Time Threshold Second

Alarm Holding Time Seconds

Trigger SD Card Snapshot

Trigger SD Card Recording

Trigger Email

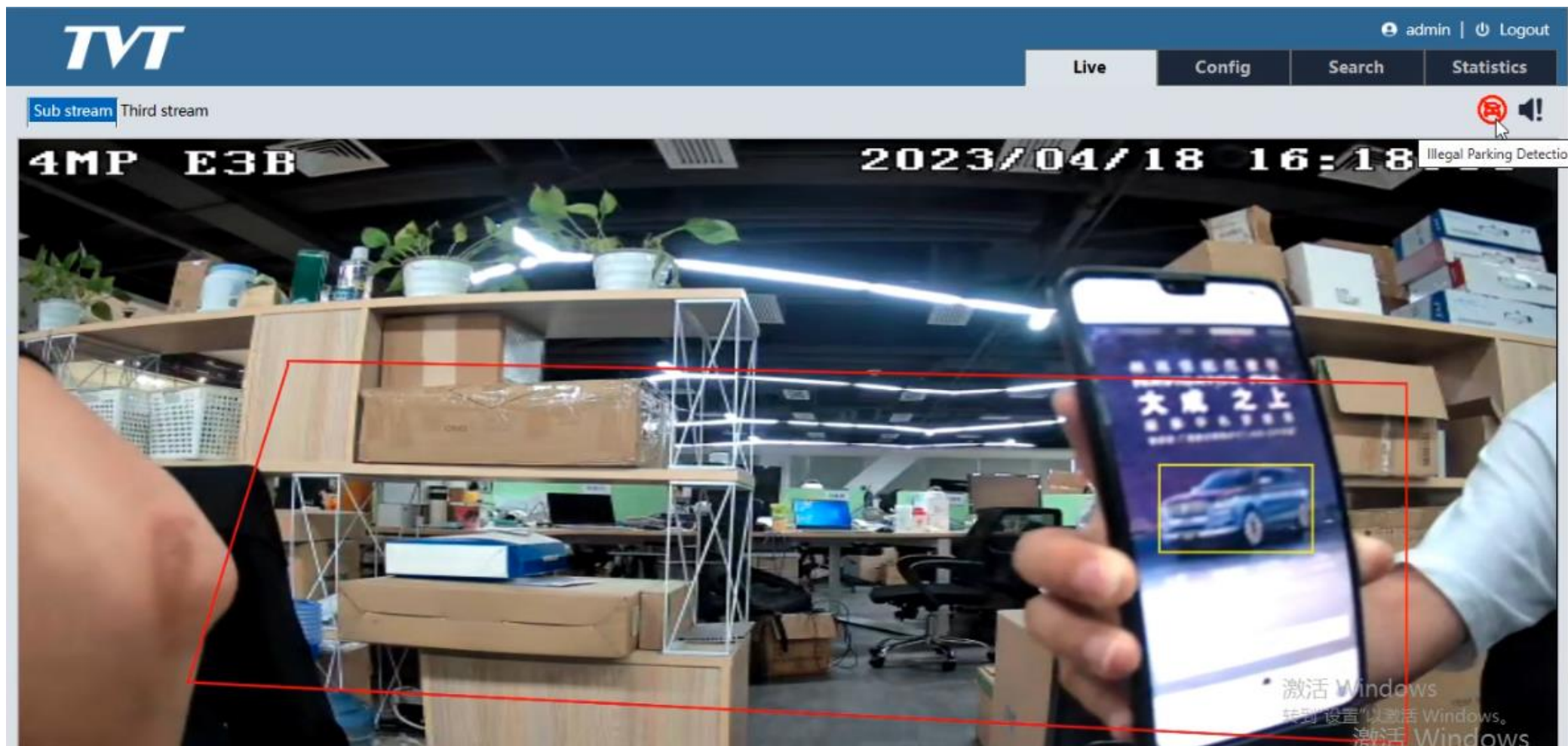
Trigger FTP

Save

Vehicle in the detection area stays more than the time threshold, Illegal Parking alarm will be triggered

3 Advanced AI feature—Illegal parking

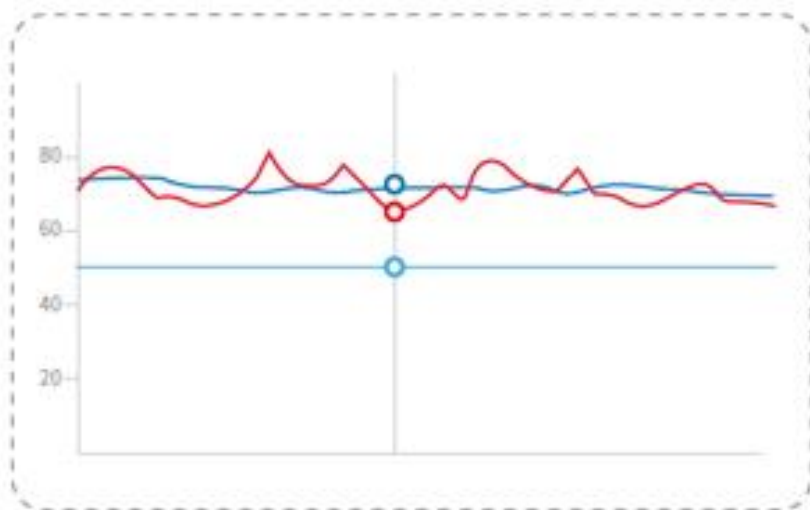
Event Snapshot



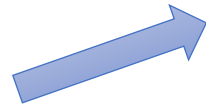
3 Advanced AI feature—Abnormal Sound Detection

When the sound intensity in the environment **increases or decreases suddenly, and lasts for a period of time**, an abnormal sound event will be triggered.

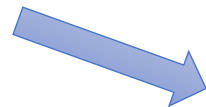
This new feature gives our IPC the ability to perceive ambient sounds.



- Sound intensity: **65**
- Background Sound intensity: **71**
- Sound Intensity Threshold: **50**



Sound Intensity Sudden Increase



Sound Intensity Sudden Decrease



3 Advanced AI feature—Abnormal Sound Detection



Event Configuration

Config Home ▶ Alarm ▶ Audio Exception

Detection Config Schedule

Enable

Sudden Increase of Sound Intensity Detection

Sensitivity 60

Sound Intensity Threshold 50

Sudden Decrease of Sound Intensity Detection

Sensitivity 60

Alarm Holding Time ▾

Trigger Alarm Out

Trigger SD Card Snapshot

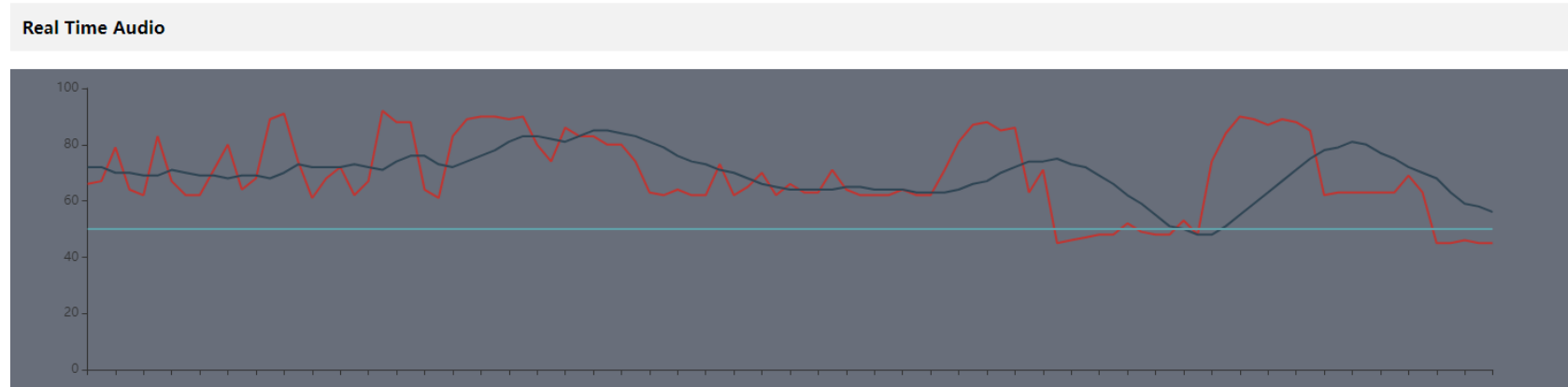
Trigger SD Card Recording

Trigger Email

Trigger FTP

3 Advanced AI feature—Abnormal Sound Detection

Event Snapshot



Sub stream | Third stream

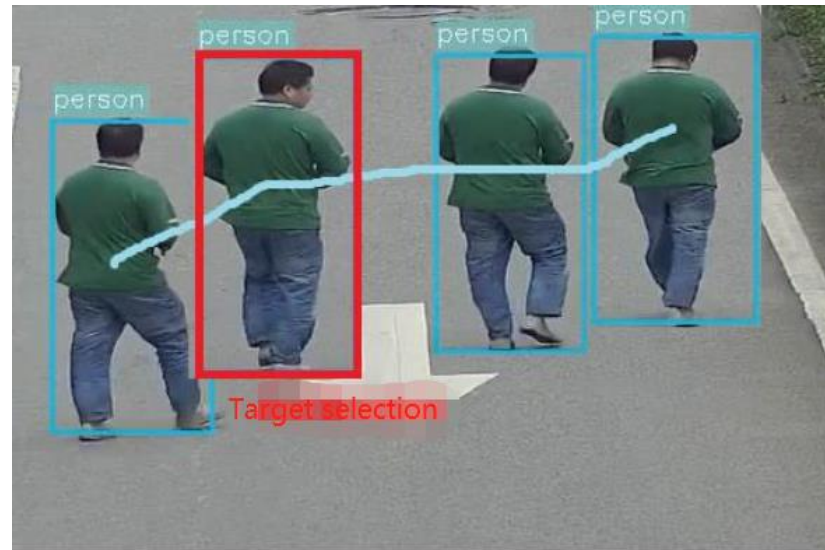
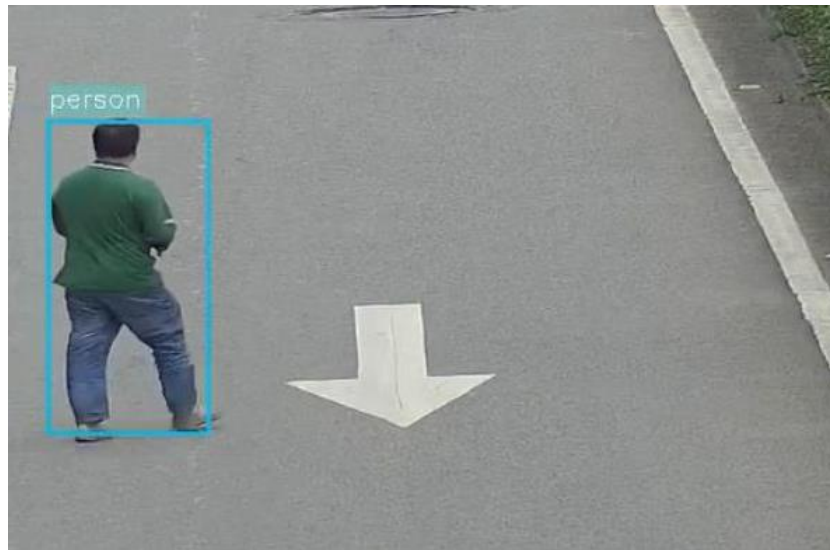
E3B 4MP **2023/04/28 02:37:07**

The video stream interface shows a dark, mostly black screen. In the top right corner, there is a notification icon consisting of a person silhouette, a red exclamation mark, and a red walking figure. A red arrow points from the bottom right towards this icon. The text 'E3B 4MP' is visible on the left side, and the timestamp '2023/04/28 02:37:07' is on the right. The bottom right corner shows '156Kbps'.

3 Advanced AI feature—video metadata

Video metadata is a feature designed to extract the structured information from the targets of the video image. For the structured information, normally there are two levels:

- (1) Extract the target's coordinate and classification, eg. $(x=22, y=34, w=10, y=20)$, it is a person
- (2) Extract the attributes of the target, ex. Gender, age, cloth of person or brand, color of car.



Extracted
Attributes:
Male;
Middle age;
Back
Long sleeve;
Long trouser;

3 Advanced AI feature—video metadata



No.	Metadata	Values
1	Gender	Male, Female
2	Age	Infant(<7), Teenage(7-18), Youth(18-40), Middle-aged(41-60), Senior(>60)
3	Direction	Face, Back
4	Hat	Yes, No
5	Glasses	Yes, No
6	Backpack	Yes, No
7	Upper clothing	Short sleeves, Long sleeves,
8	Upper color	Red, Orange, Yellow, Green, Blue, Cyan, Purple, Black, White, Silver, Gray, Golden, Brown
9	Lower clothing	Shorts, Trousers,
10	Lower color	Red, Orange, Yellow, Green, Blue, Cyan, Purple, Black, White, Silver, Gray, Golden, Brown
11	Skirt/Dress	Yes, No
12	Mask	Yes, No
13	Shoulder bag	Yes, No



Human Metadata



No.	Meta data	Values
1	Color	Red, Orange, Yellow, Green, Blue, Cyan, Purple, Black, White, Silver, Gray, Golden, Brown
2	Year	2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021,
3	Type	Sedan, SUV, Minivan, Sports coupe, Minivan, Coach, School bus, Bus, Big van, Pickup, Semi truck, Special vehicle
4	Brand	128 Brands
5	Model	12 thousands

Vehicle Metadata

No.	Metadata	Values
1	Type	Bike, Electric motorcycle, Non-motor Vehicle, Tricycle,

Non-motorized Vehicles Metadata

3 Advanced AI feature—video metadata



No.	Metadata	Values
1	Gender	Male, Female
2	Age	Infant(<7), Teenage(7-18), Youth(18-40), Middle-aged(41-60), Senior(>60)
3	Direction	Face, Back
4	Hat	Yes, No
5	Glasses	Yes, No
6	Backpack	Yes, No
7	Upper clothing	Short sleeves, Long sleeves,
8	Upper color	Red, Orange, Yellow, Green, Blue, Cyan, Purple, Black, White, Silver, Gray, Golden, Brown
9	Lower clothing	Shorts, Trousers,
10	Lower color	Red, Orange, Yellow, Green, Blue, Cyan, Purple, Black, White, Silver, Gray, Golden, Brown
11	Skirt/Dress	Yes, No
12	Mask	Yes, No
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Human Metadata



No.	Meta data	Values
1	Color	Red, Orange, Yellow, Green, Blue, Cyan, Purple, Black, White, Silver, Gray, Golden, Brown
2	Year	2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021,
3	Type	Sedan, SUV, Minivan, Sports coupe, Minivan, Coach, School bus, Bus, Big van, Pickup, Semi truck, Special vehicle
4	Brand	128 Brands
5	Model	12 thousands

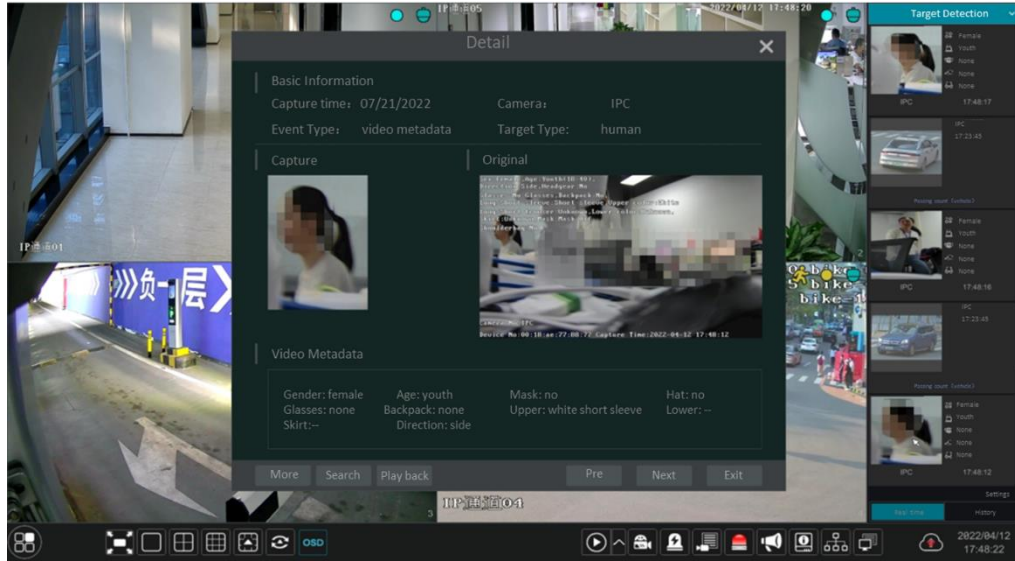
Vehicle Metadata

No.	Metadata	Values
1	Type	Bike, Electric motorcycle, Non-motor Vehicle, Tricycle,

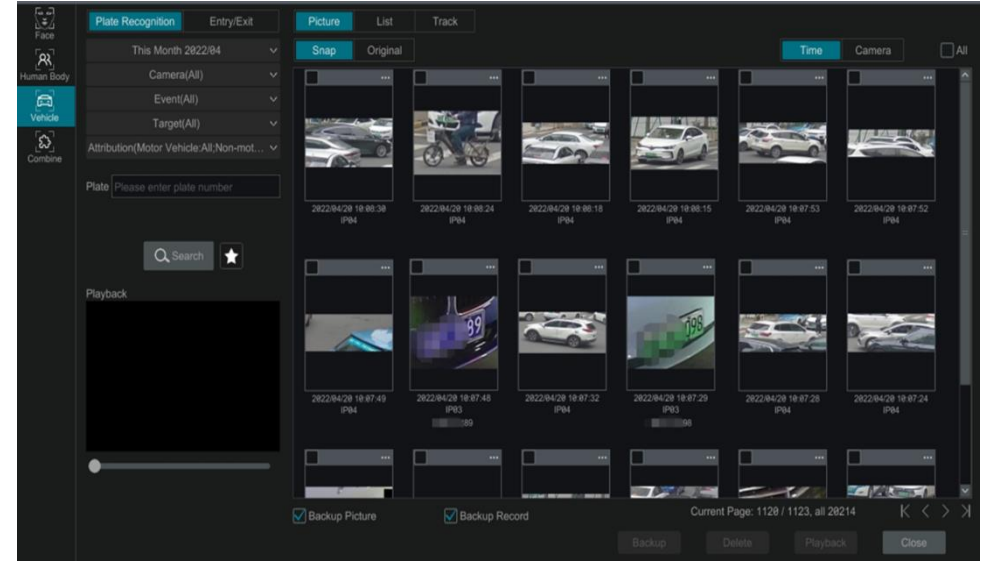



Non-motorized Vehicles Metadata

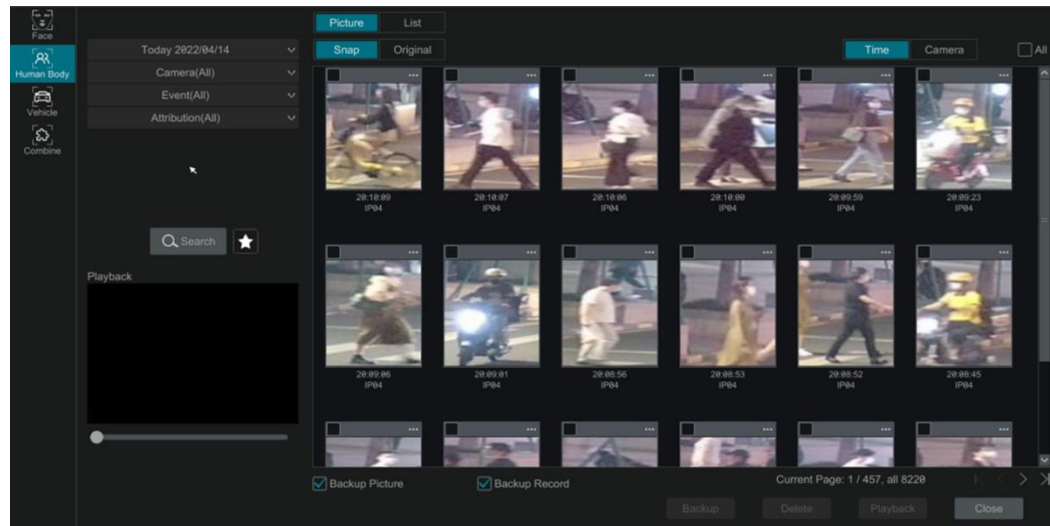
3 Advanced AI feature—video metadata



Preview



Vehicle Search



Human Search



1

Smart Motion Detection

2

Basic AI features

3

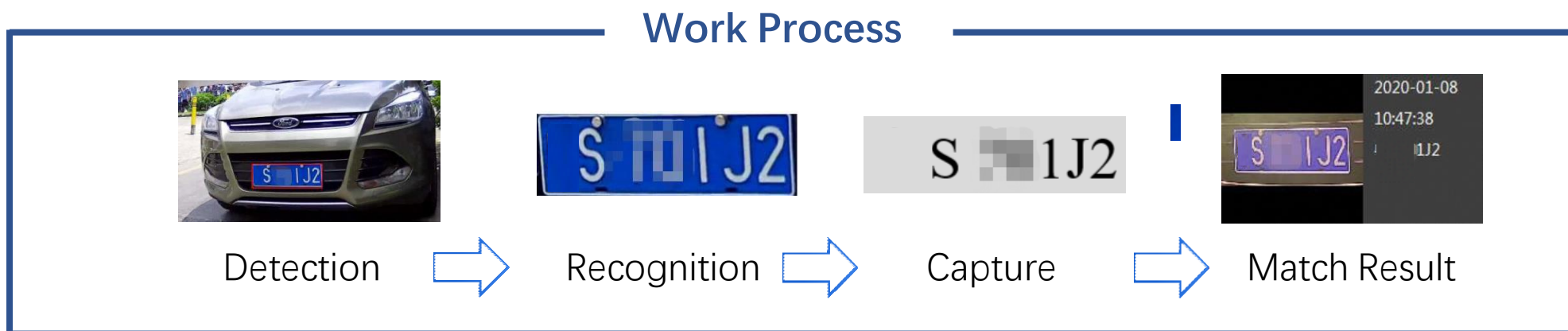
Advanced AI feature

4

Special AI features

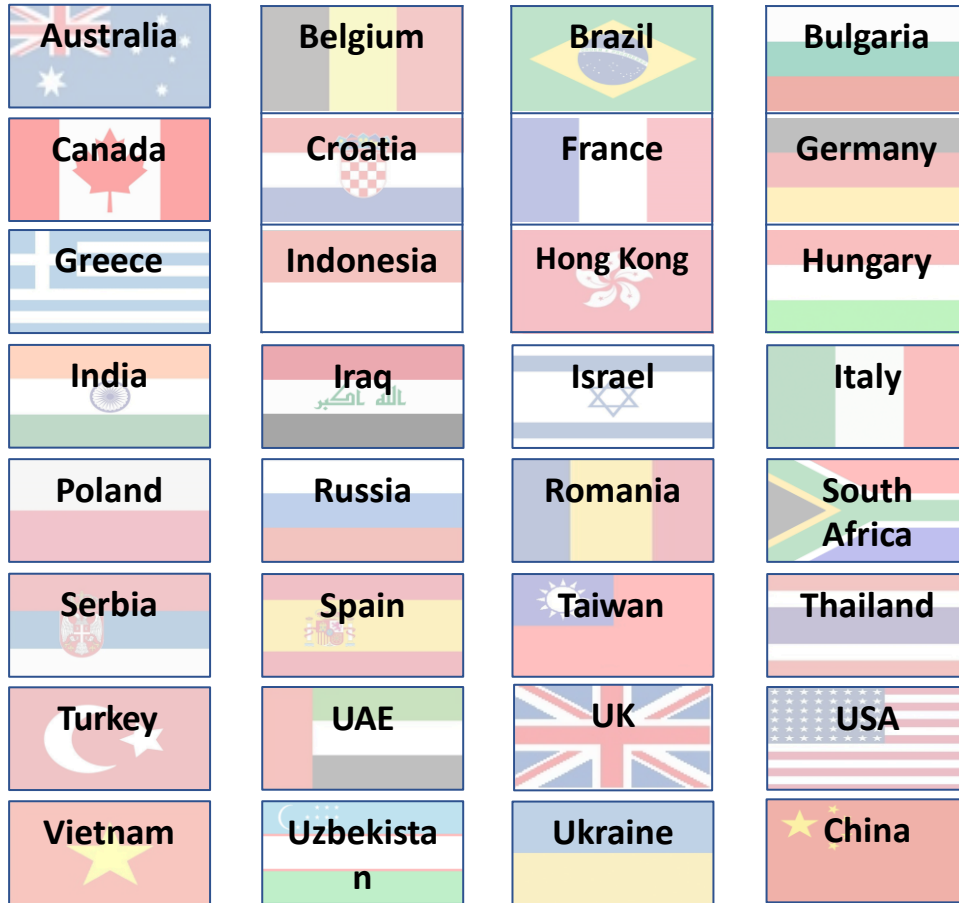
4 Special AI feature—plate number recognition

ANPR technology can extract license plates from complex backgrounds, directly identify each character on the license plate, and format and output license plate number information. The technology includes license plate detection and license plate character recognition, all of which are based on deep learning algorithms.



4 Special AI feature—plate number recognition

☐ Areas already supported



☐ Areas to be supported soon



Appendix

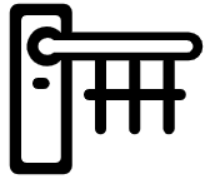
The areas supported in USA —

California, Colorado, Florida, Georgia, Iowa, Illinois, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, North Carolina, New Jersey, New Mexico, Nevada, New York, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington, Wisconsin, Arizona, Connecticut, Indiana, Maryland, Tennessee, Mississippi, Montana

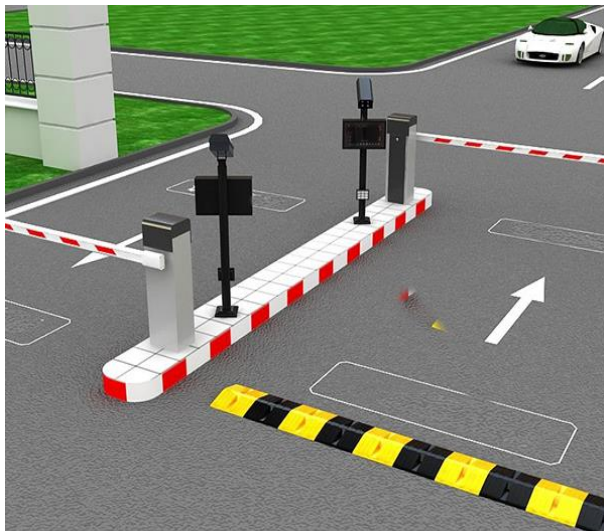


4 Special AI feature—plate number recognition

□ Main Application Scenarios



Gate Control



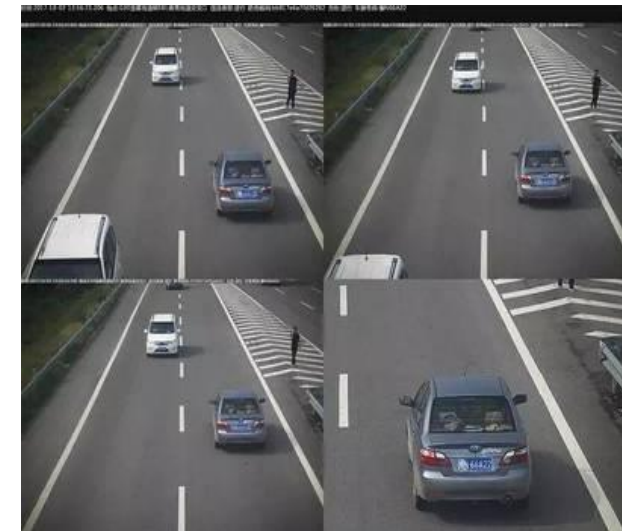
Vehicle Monitoring



Not Supported

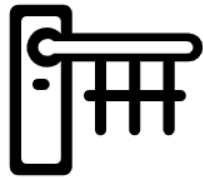


Highways

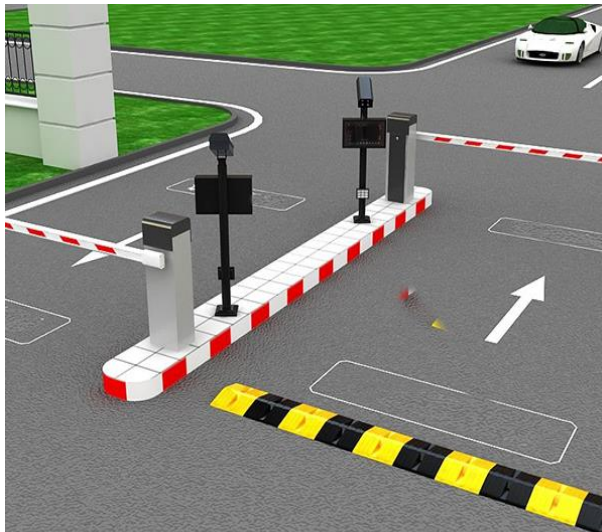


4 Special AI feature—plate number recognition

□ Main Application Scenarios



Gate Control



Access Control of Private Residence



Access Control of Comunity & Factory



Access Control of Paring Lot

4 Special AI feature—plate number recognition

❑ Main Application Scenarios



Vehicle Monitoring



Vehicle Monitoring in Public Areas



Vehicle Monitoring in Special Areas

4 Special AI feature—plate number recognition



Available models

TD-9423A3-LR



70Km/h



Built-in SDcard

2.8-12MM
(Gate Control)

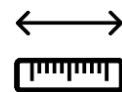


10,000



Artificial Intelligence and
Deep Learning Algorithms

7-22MM
(Vehicle Monitoring)



2.8-12:6m

7-22:25m

5-50:120m

5-50MM
(Vehicle Monitoring)



30+International Plates



TD-9443A3BH-LR

2.8-12MM
(Gate Control)



2.8-12:70Km/h

8-32:120Km/h



Built-in SDcard

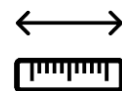


10,000



Artificial Intelligence and
Deep Learning Algorithms

8-32MM
(Vehicle Monitoring)



2.8-12:8m

8-32:30m



Support wiegand
input and output

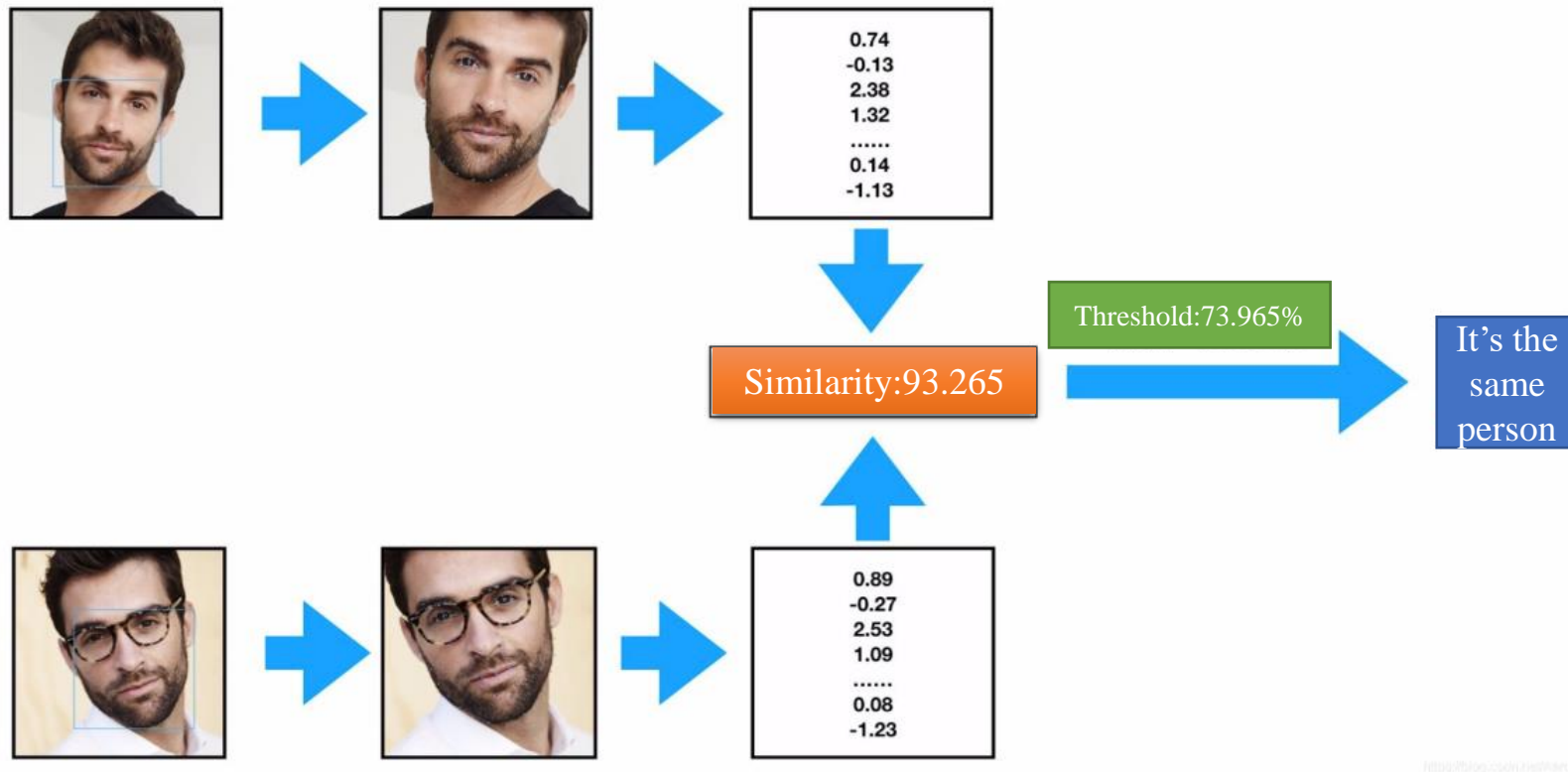


TD-9843A3BH-LR



30+International
Plates

4 Special AI feature—face recognition

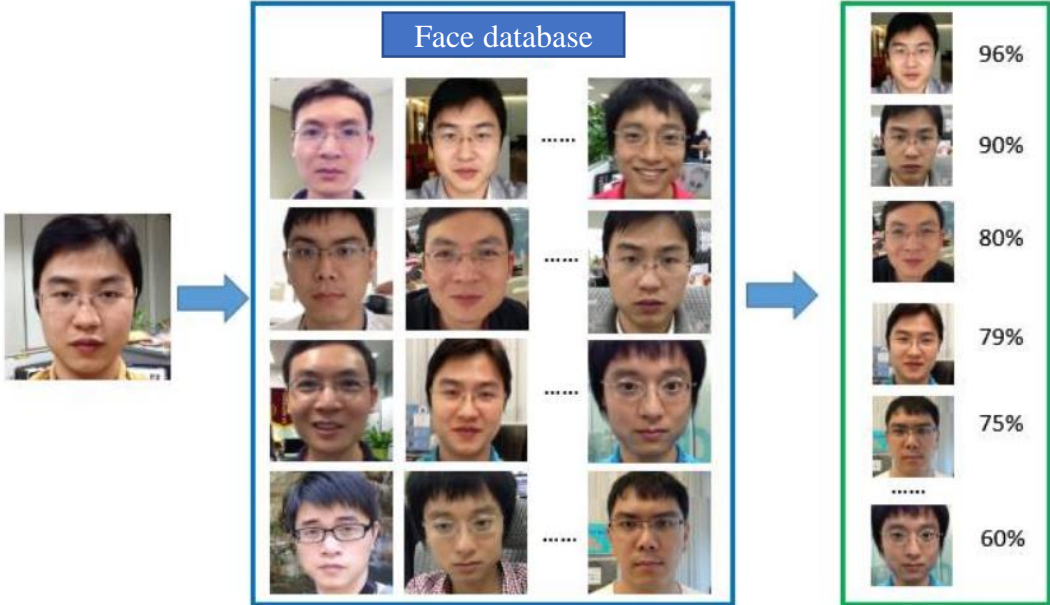
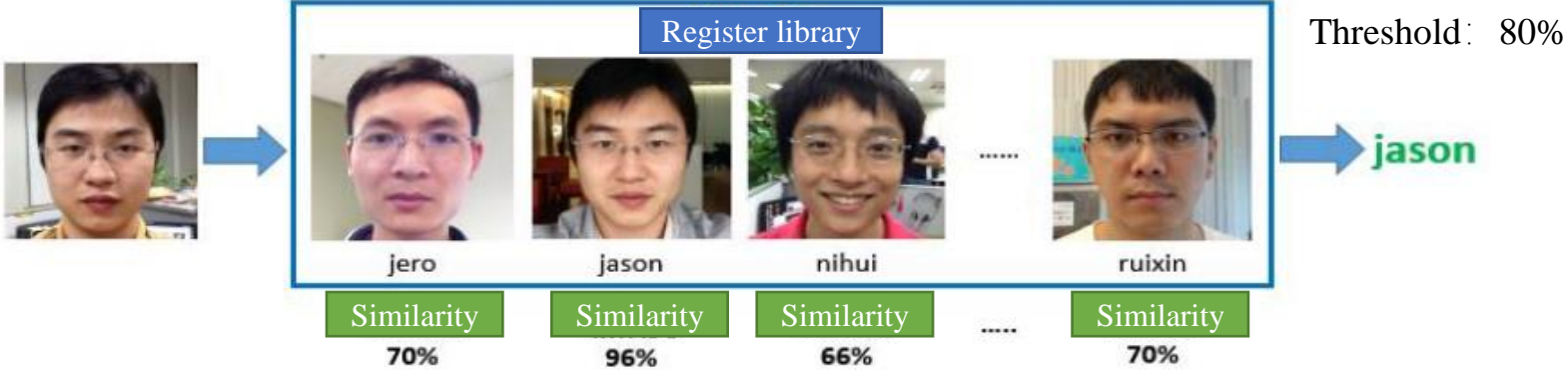


https://blog.csdn.net/qq_35714557

- Face Detection {
- Face capture: from the image to find out the position of face;
 - Face alignment: from the face to find out the positions of eye, nose, mouse, and other facial organs;
 - Face attribute & feature: Extract facial image information into string information through facial feature extraction;

Face Recognition: face match, compare the target facial image with the existing face to calculate similarity and confirm the corresponding identity of the face.

4 Special AI feature—face recognition



4 Special AI feature—face recognition

Config Home ▶ Event ▶ Face Comparison


Detection Config Comparison and Linkage Area Advanced Schedule **Face Database Management**

Block and Allow Lists

Name

Index	

Add User

 (Format:jpg, Size limit: 70KB)

List Type: **Allow list**

Name:

Gender: Male Female

Age:

Tel:

Card NO.:

Remark:

Entry

Search **Delete** **Batch Delete**

Card NO.	Operate
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For TVT, **A3-FR<10,000 database>**, **M3 series, face panel(E2128<10,000 database>, E2123<3,000 database>, E2223<10,000 database>, E2127<10,000 database>, E2228<40,000 database>)** can support face recognition feature.

4 Special AI feature—face recognition



Entrance & Exit based on face recognition



Face attendance

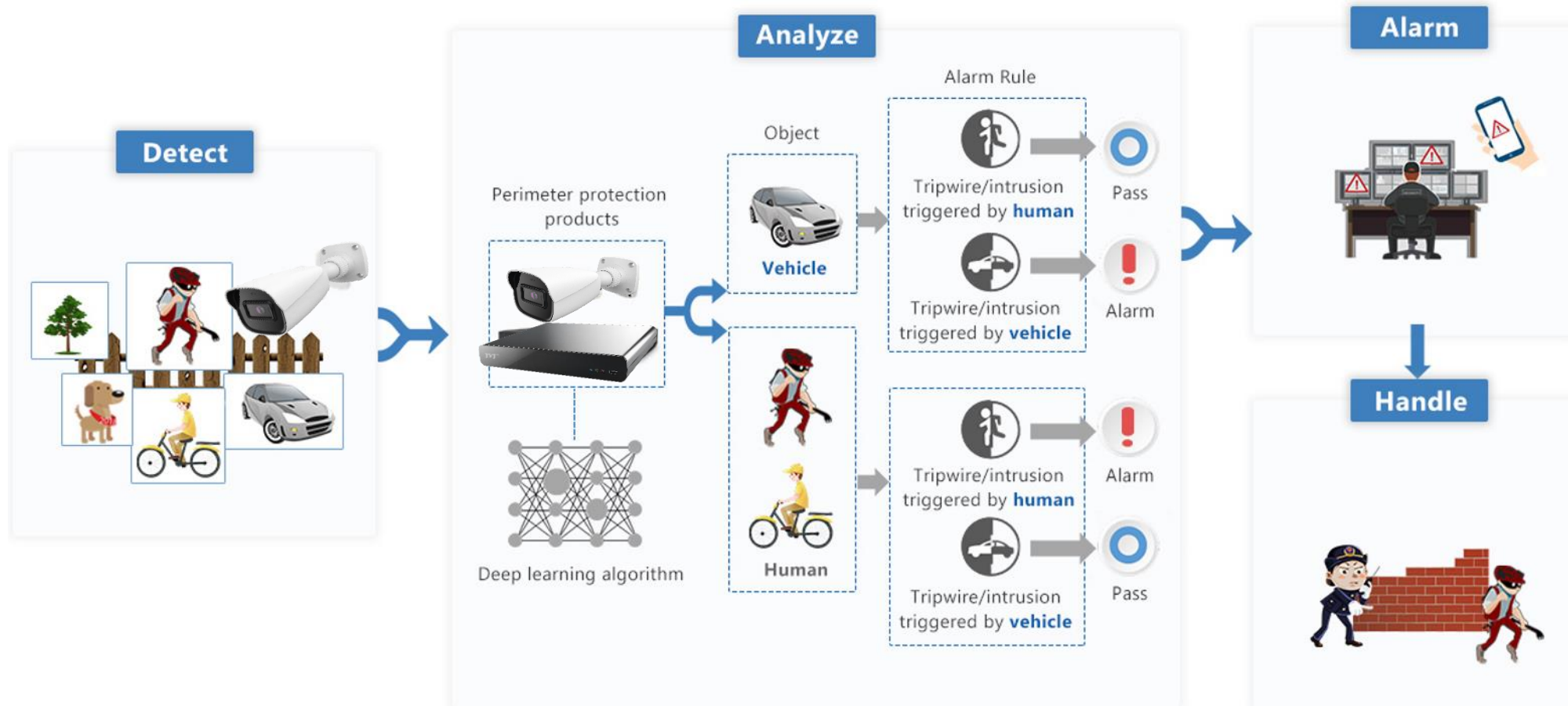


Access control based on face recognition

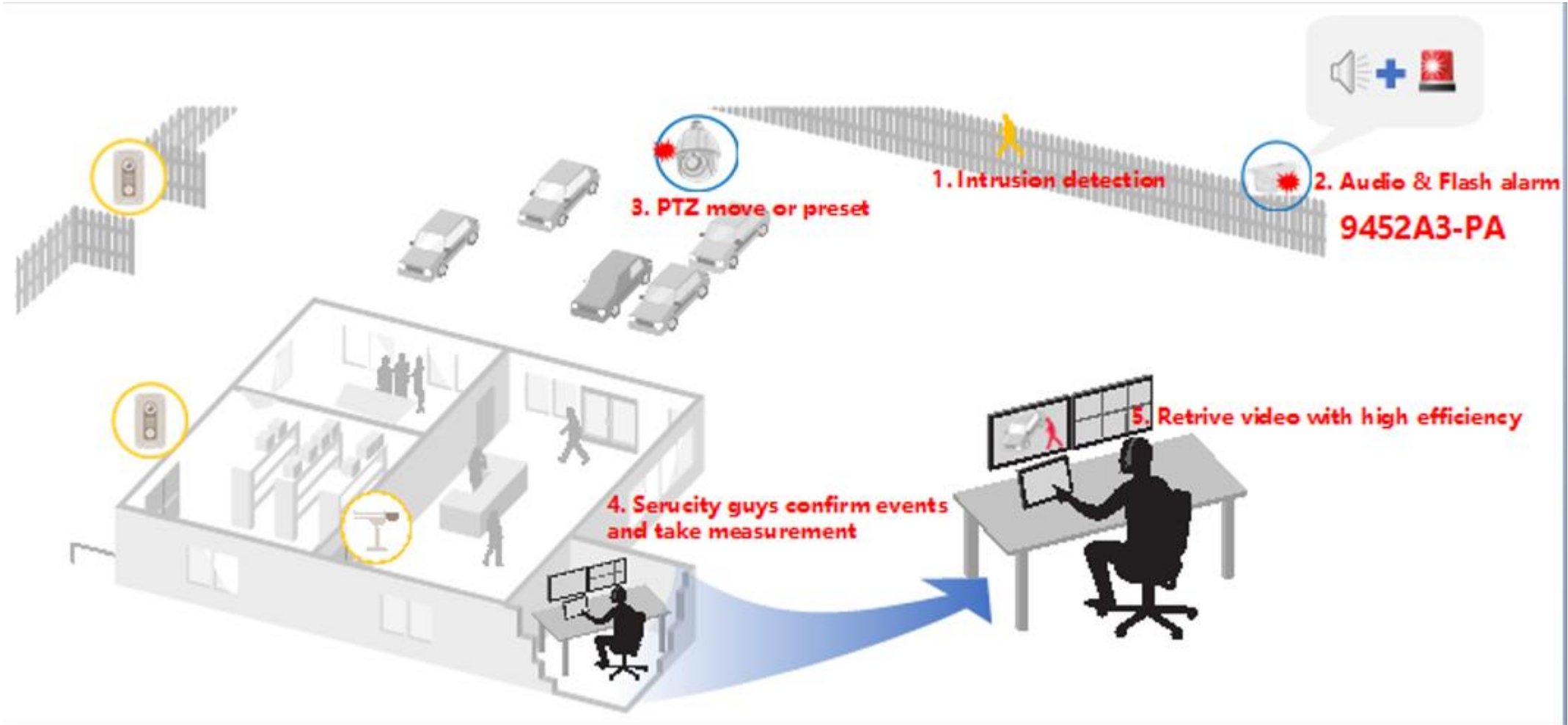


Search for specific person based on blacklist

4 Special AI feature—perimeter protection alarm



4 Special AI feature—perimeter protection alarm



For TVT, **A3-5MP-PA**, **C2-4MP-PA**, **C2H-8MP-PA** can support perimeter protection alarm.

4 Special AI feature—perimeter protection alarm



Thanks

