AcuSense False Alarm Reduction Application Guidance

1 Demand analysis

In the traditional CCTV system, all the moving objects in the picture will trigger perimeter alarm, which may generate a lot of false alarms. Users have to waste a lot of time dealing with false alarms and the alarm is unreliable. In addition, when the target needs to be found in the video, it needs to be manually searched by video playback, which is time-consuming and laborious, and it is easy to lost key targets, which is very inconvenient to use.

After solving the basic monitoring and video problems, users need receive more accurate alarm and more convenient target search function to better use the monitoring system.

2 Solution

Some false alarms can be reduced by using thermal camera, vibration optical fiber, radar and other equipment. The cost of the whole system is too high, and it cannot meet the requirement that find the target quickly afterwards.

With the development of artificial intelligence, target classification can be realized directly based on video screen, and then the function of false alarm reduction and target retrieval can be provided, which can provide users with very cost-effective schemes.

3 System architecture

This scheme consists of AcuSense network camera, NVR and Client, and it can realize the function of target classification and false alarm reduction without additional products.

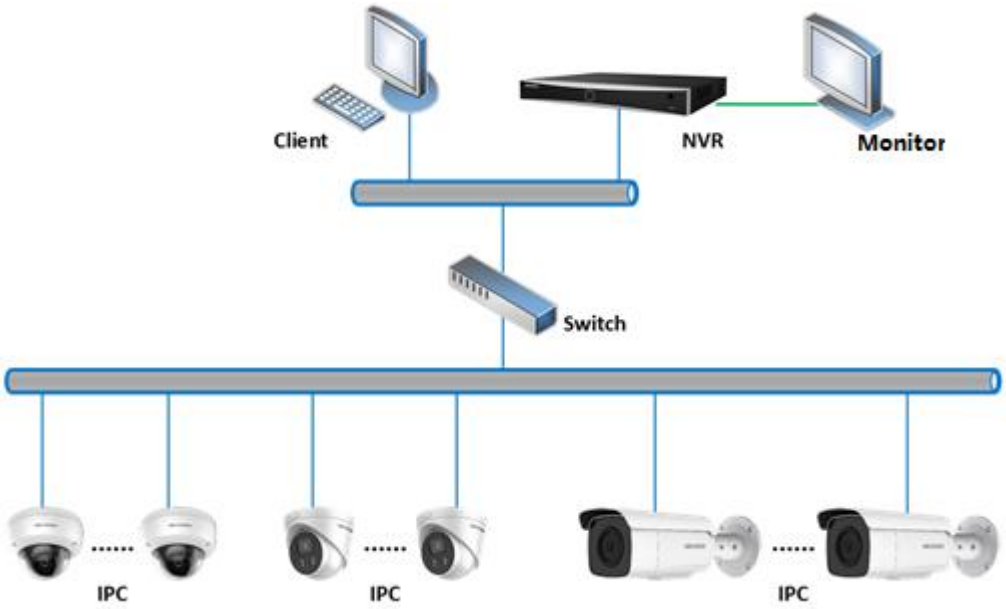


Figure 1 System architecture diagram

4 Function description

4.1 Target classification

By upgrading the hardware of conventional products, Hikvision has loaded the artificial intelligence technology into the chip of the equipment. The equipment can classify and identify the objects appearing in the picture, such as human, vehicles, rainwater, light, leaves, animals and so on. The function of object classification is the basis of realizing false alarm reduction and key target alarm.

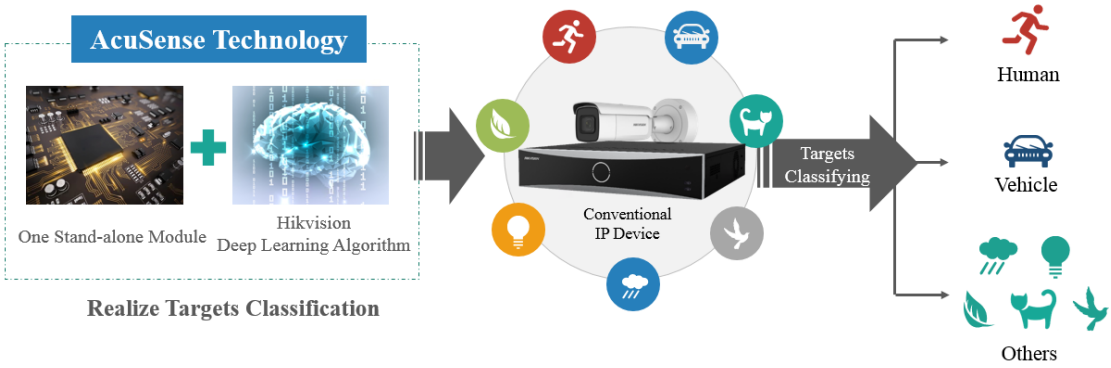


Figure 2 Target classification

4.2 False alarm reduction and quick target search

Through target classification, the alarm caused by animals, light, rain, leaves or other objects can be highly reduced, and only the alarm triggered by human body and vehicle can be received, which realize the function of false alarm reduction.

In addition, the quick target search function could efficiently locate the specific target like human or vehicle when there are tons of video record data which highly reduce the searching time.

Figure 3 False alarms

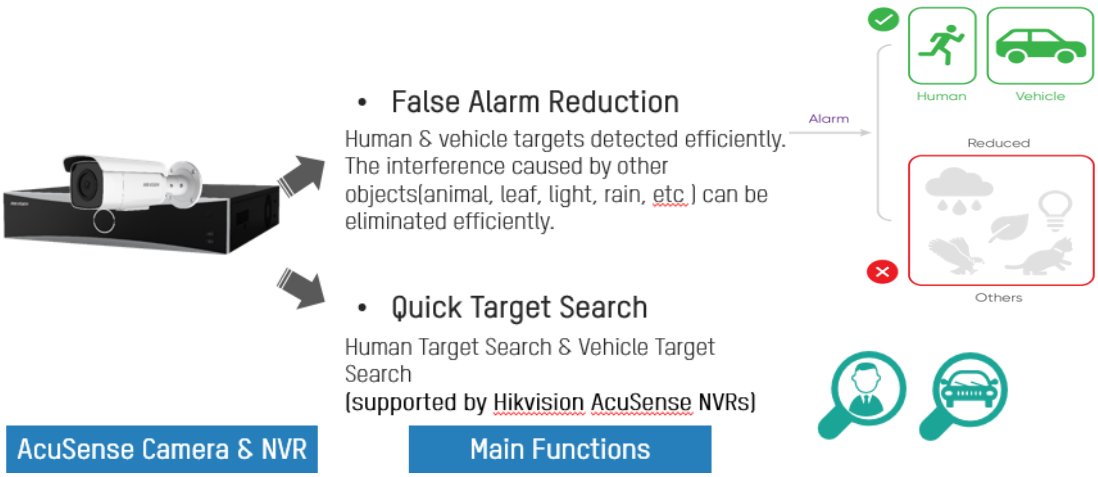


Figure 4 False alarm reduction and quick target search

5 Product introduction

5.1 AcuSense network camera

5.1.1 Parameter configuration

[Take the Line Crossing Detection configuration for example]

Step1: Enable Line Crossing Detection, draw line crossing detection lines and configure the maximum and minimum size of the target, select detection targets, configure line crossing direction and sensitivity, then click Save.

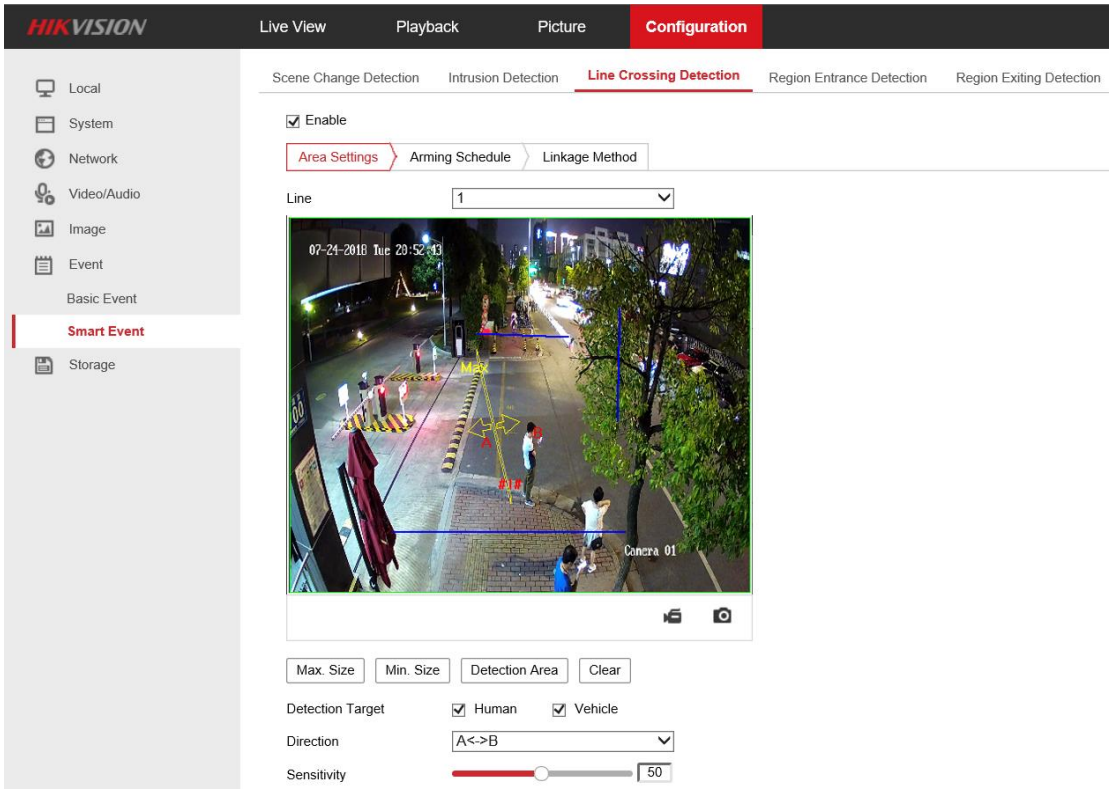


Figure 5 Configure Line Crossing Detection

- Detection line: click Detection Area, preview interface will appear a line, left click to select the detection line, moving or dragging the line can change location and length.

* Note: Up to 4 detection lines can be drawn, and the target classification can be set separately for each detection line.

- Maximum and minimum size: click Max. Size or Min. Size, select a point in the preview screen as the starting point, left click and drag to draw a quadrangular

maximum size filter box or minimum size filter box. If you need to redraw the filter box, click Max. Size and Min. Size again, then it can be redrew. By drawing the maximum size and minimum size, while an object enters the alert area and its size is within the range of the maximum and minimum size, it can be recognized as a target, otherwise, it is not a target. The detection accuracy can be improved.

- Detection Target: human body and vehicle can be selected for different types of target detection.
- Direction: indicates the direction of the target crossing the detection line, and the direction can be set from area A to area B, from area B to area A or both.
- Sensitivity: indicates the degree of target crossing the line, the sensitivity value = 100 - S1 / ST * 100, S1 is the area of target has crossed the line and ST is the actual area of the target. The higher the sensitivity, the easier it is to trigger the alarm.

Step 2: Set Arming Schedule (it is depending on demand of user), click Save.

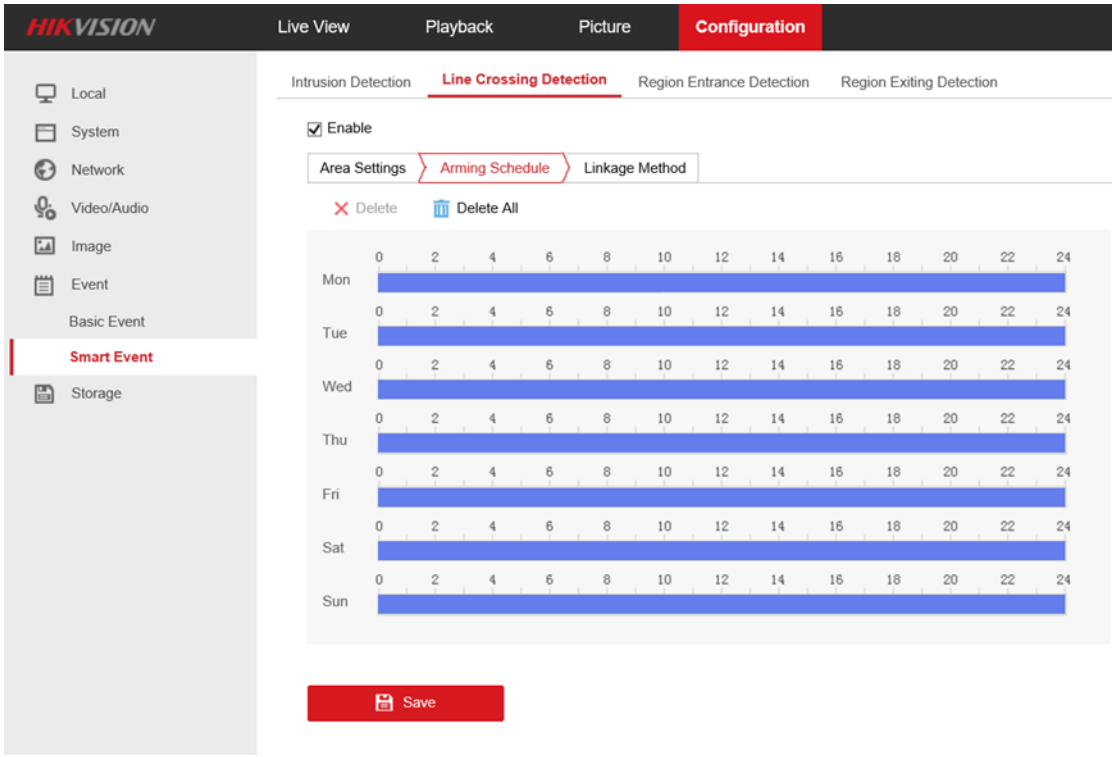


Figure 6 Arming Schedule of line crossing detection

Step 3: Set Linkage Method, it allows to select Trigger Recording, Notify Surveillance Center, Upload to FTP/Memory Card/NAS, White Light Flashing，Audible Warning (**White Light Flashing, Audible Warning are available for**

Sound-Light Alarm /SL models only).

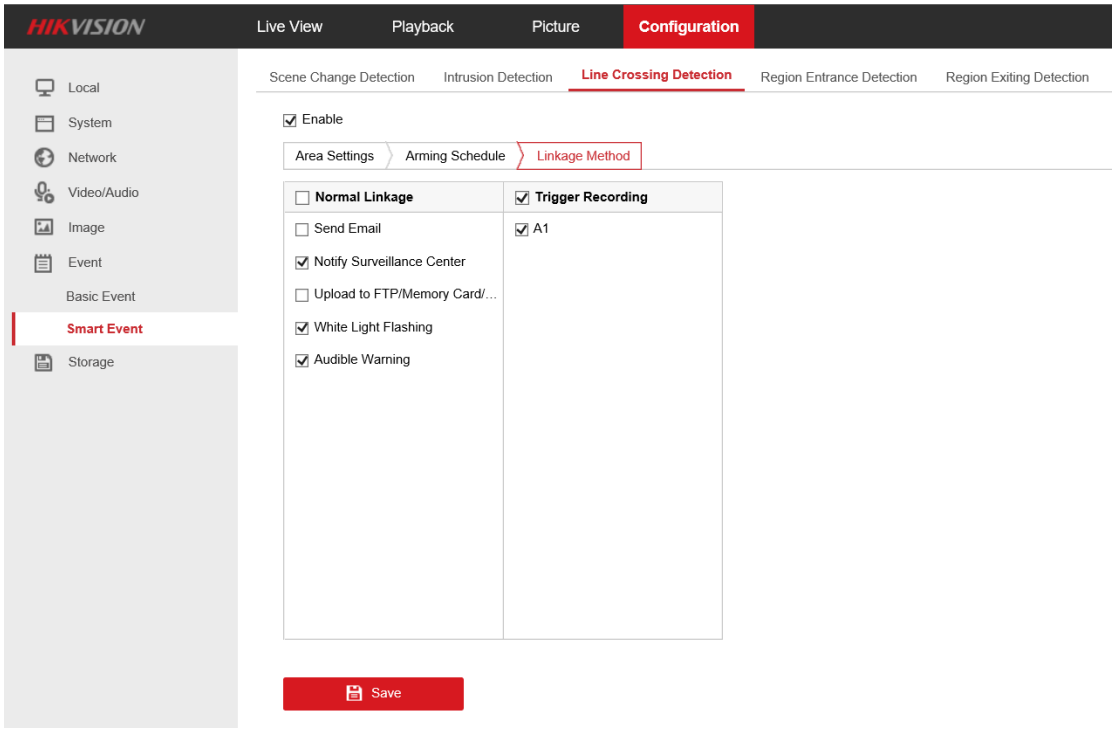


Figure 7 Linkage Method

Step 4: Set White Light Alarm Output (**available for Sound-Light Alarm /SL models only**), go to [Event]-[Basic Event]-[Flashing Alarm Light Output], it allows to set Flashing Duration and Flashing Frequency, Flashing Duration can be set from 1 to 60 seconds, Flashing Frequency can be set to High (interval 0.6 seconds), Medium (interval 1 second) or Low (interval 1.5 seconds).

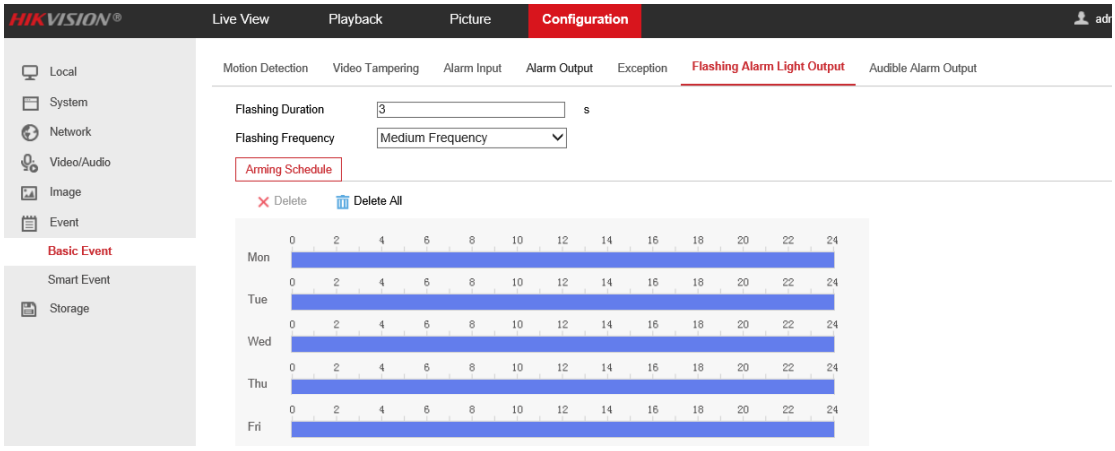


Figure 8 Flashing Alarm Light Output

Step 5: Set Audible Alarm Output (**available for Sound-Light Alarm /SL models only**), go to [Event]-[Basic Event]-[Audible Alarm Output], it allows to set Alarm

Sound Type, Alarm Times and Sound Volume. For Alarm Sound Type, 10 types of built-in alarm sounds are available, local audio file import, click the drop-down list box, it will show the details about all Alarm Sound Type. Alarm Times can be set from 1 to 50 times, Sound Volume can be set from 1 to 100.

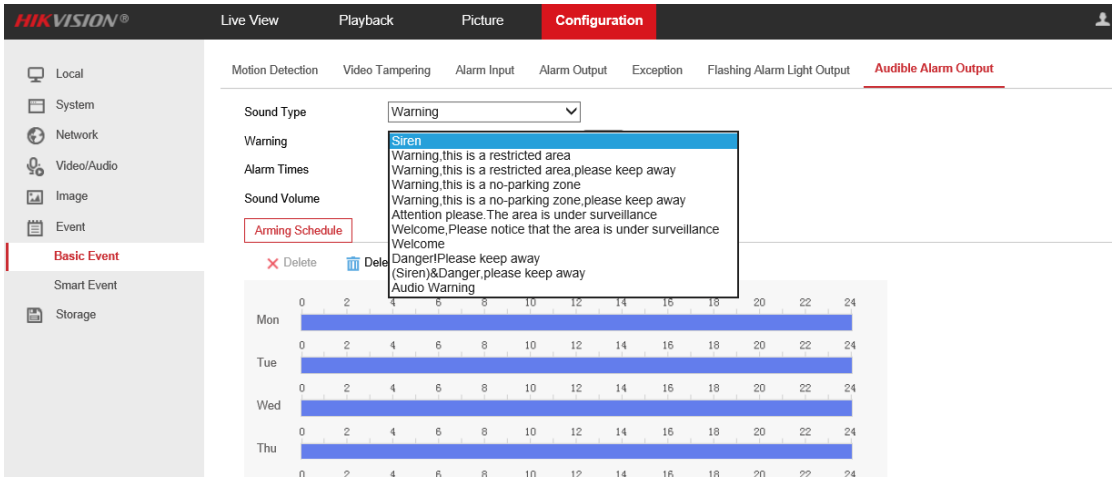


Figure 9 Audible Alarm Output

Details of 10 types built-in alarm sounds

Number	Details of alarm sounds
1	Siren
2	Warning, this is a restricted area
3	Warning, this is a restricted area, please keep away
4	Warning, this is no-parking zone
5	Warning, this is no-parking zone, please keep away
6	Attention please, the area is under surveillance
7	Welcome, please notice that the area is under surveillance
8	Welcome
9	Danger! Please keep away
10	(Siren) & Danger! Please keep away

5.1.2 Web preview interface check alarm

Step 1: Complete parameters configuration. (Take the Vehicle as target for instance)

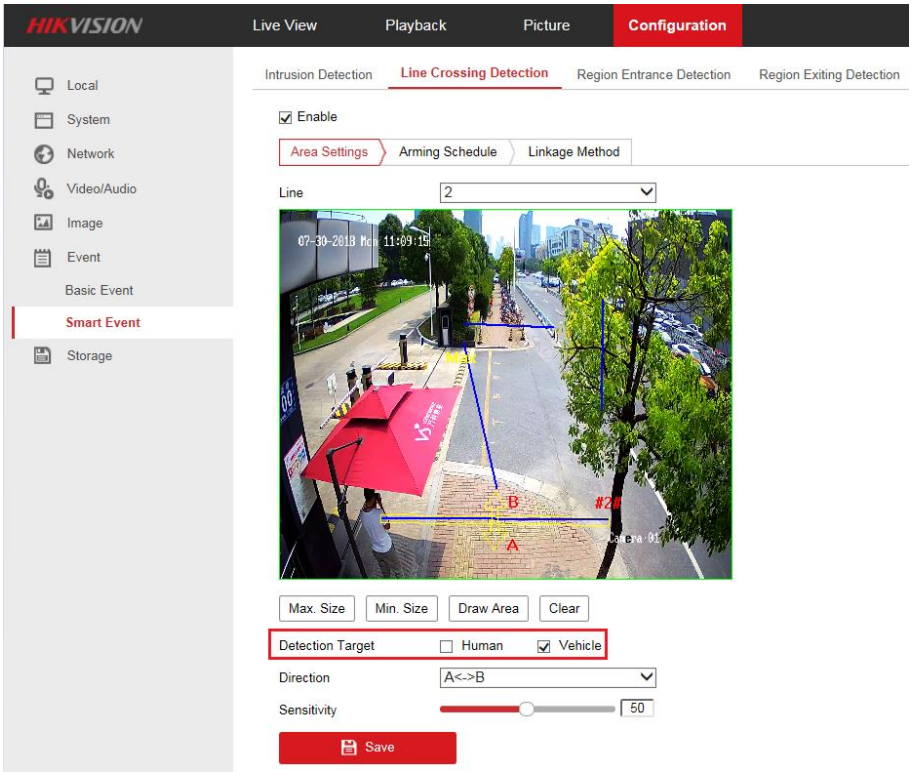


Figure 10 Line Crossing Detection (Target: Vehicle)

Step 2: Enable target rule box display.

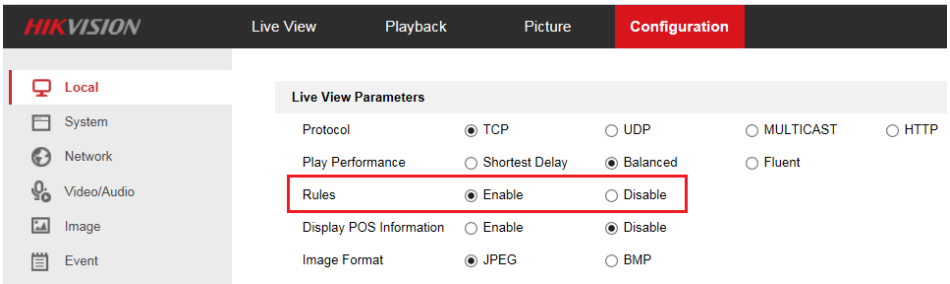


Figure 11 Enable target rule box

Step 3: Check the alarm on network camera web preview interface. When someone crosses the line, the rule box on the web interface turns red, but at this time, the iVMS-4200 client does not show the human alarm.

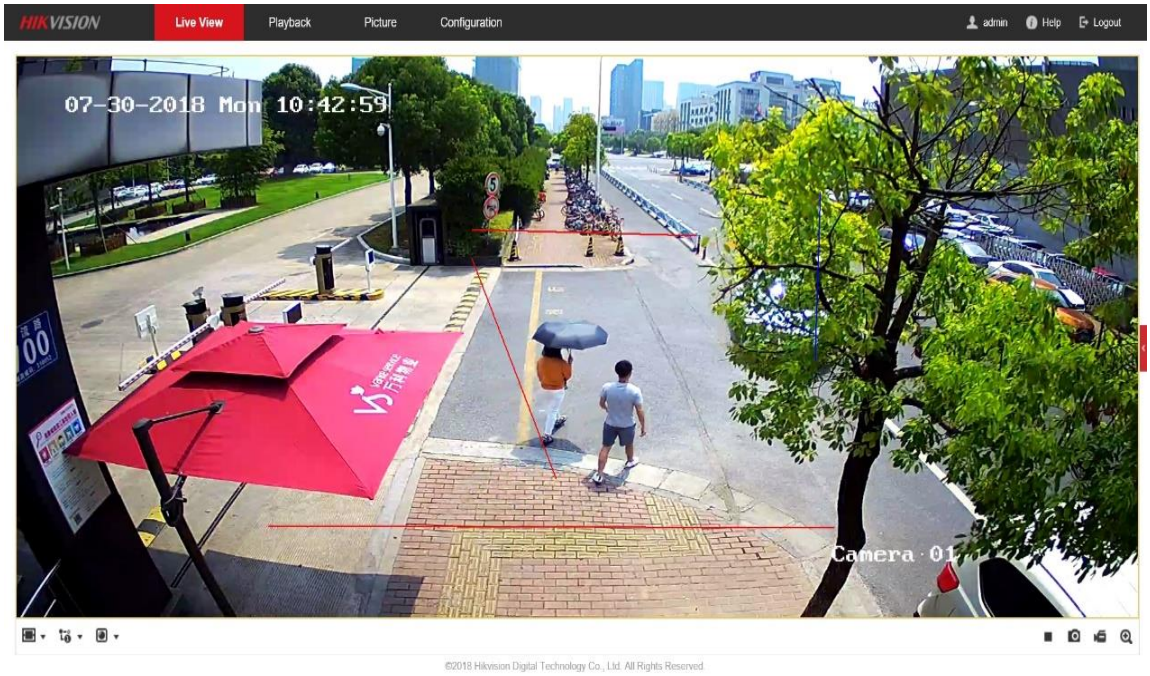


Figure 12 Human triggers line crossing detection alarm

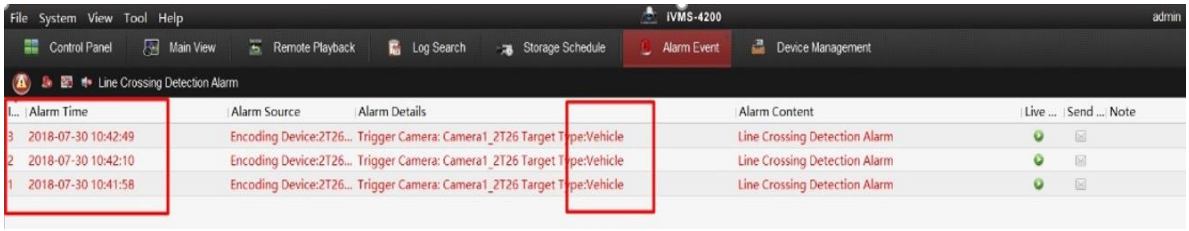


Figure 13 iVMS-4200 filter Human alarm

* Note:

The rule box displayed in the web preview interface of network camera does not make target classification judgment, the alarm information is subject to the search result received from the alarm receiver and NVR. A comparison of the web interface with the alarm receiver (such as iVMS-4200 client), can be used to distinguish whether the false alarm reduction has been performed.

5.2 iVMS-4200 client

[Precondition] Check “Notify Surveillance Center” in event linkage method.

Step 1: Add camera on Device Management of iVMS-4200.

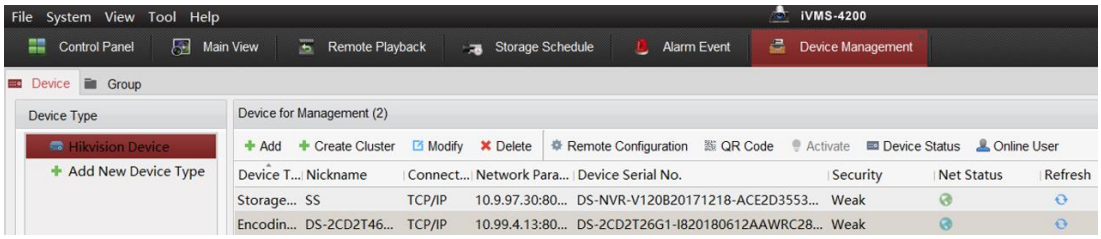


Figure 14 Add network camera

Step 2: View the triggered alarm at the iVMS-4200 Alarm Event interface. Alarm detail information will be labeled Human or Vehicle, as shown in the figure below.

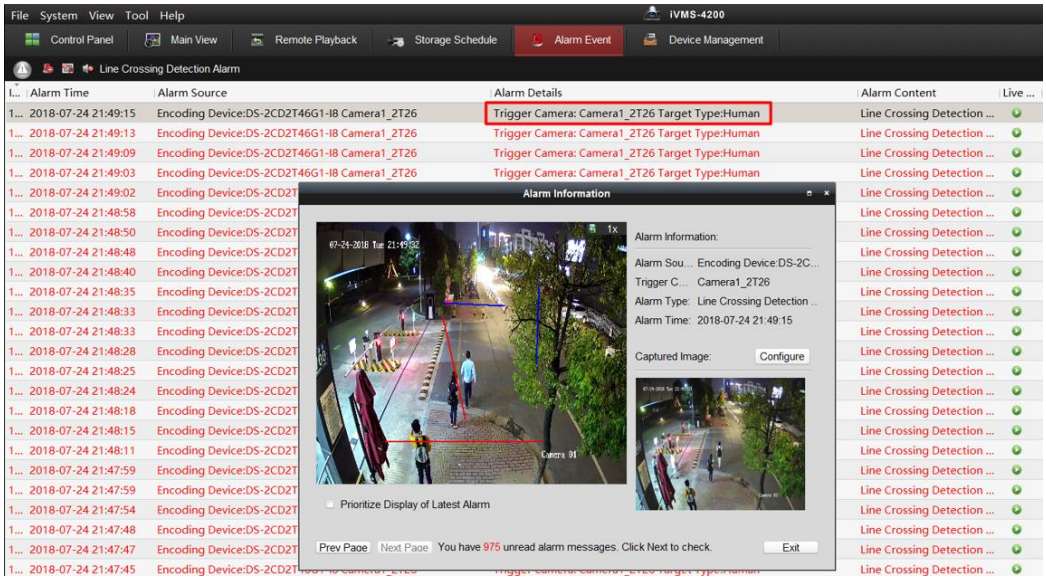


Figure 15 iVMS-4200 view alarm information (Human)

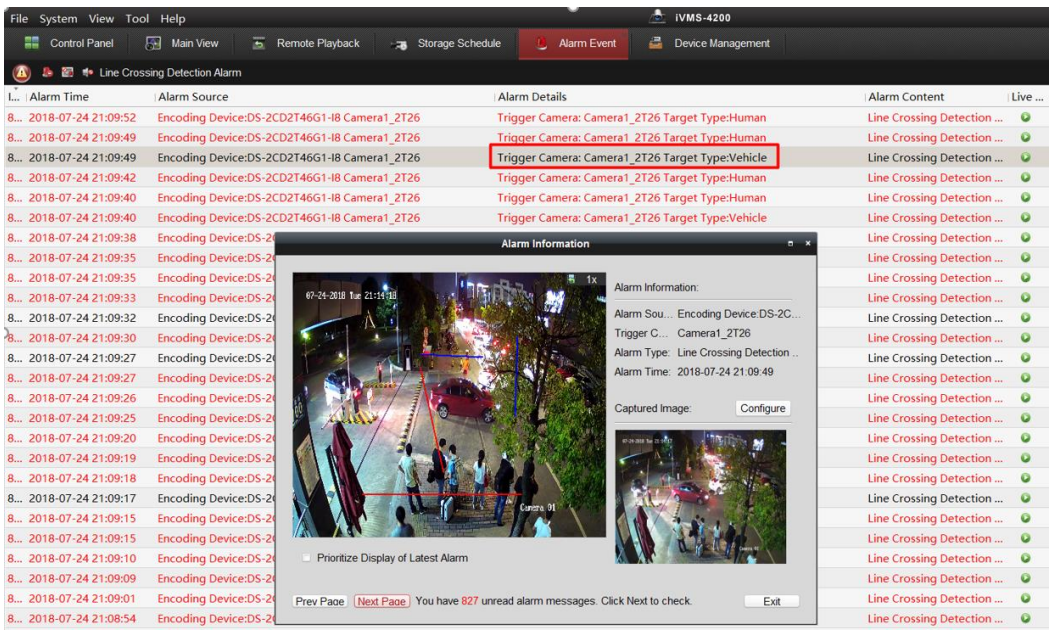


Figure 16 iVMS-4200 view alarm information (Vehicle)

*** Note:**

The Target Type shown on iVMS-4200 is the same as the Detection Type set in the configuration interface, alarm information triggered by the unchecked category will be reduced and will not be displayed on iVMS-4200.

1） Check Human on Detection Type, then iVMS-4200 client will only display the alarm information of Target Type as Human.

2） Check Vehicle on Detection Type, then iVMS-4200 client will only display the alarm information of Target Type as Vehicle

5.3 NVR

Step 1: Add network camera in camera management interface.

Step 2: Configure Smart Event on the system configuration interface.

➢ Configuration method similar to the Web interface, draw crossing detection line and the min-max size. Check the detection targets, choose crossing line direction and sensitivity, click save.

Notice: Smart AcuSense NVR now support 4-ch @2MP false alarm reduction and 1-ch facial reorganization up to 4MP(mutually exclusive with false alarm reduction).

If NVR does not check Enable Smart Analysis, event will be analyzed by camera, NVR acquires smart event configuration and alarm information from camera.

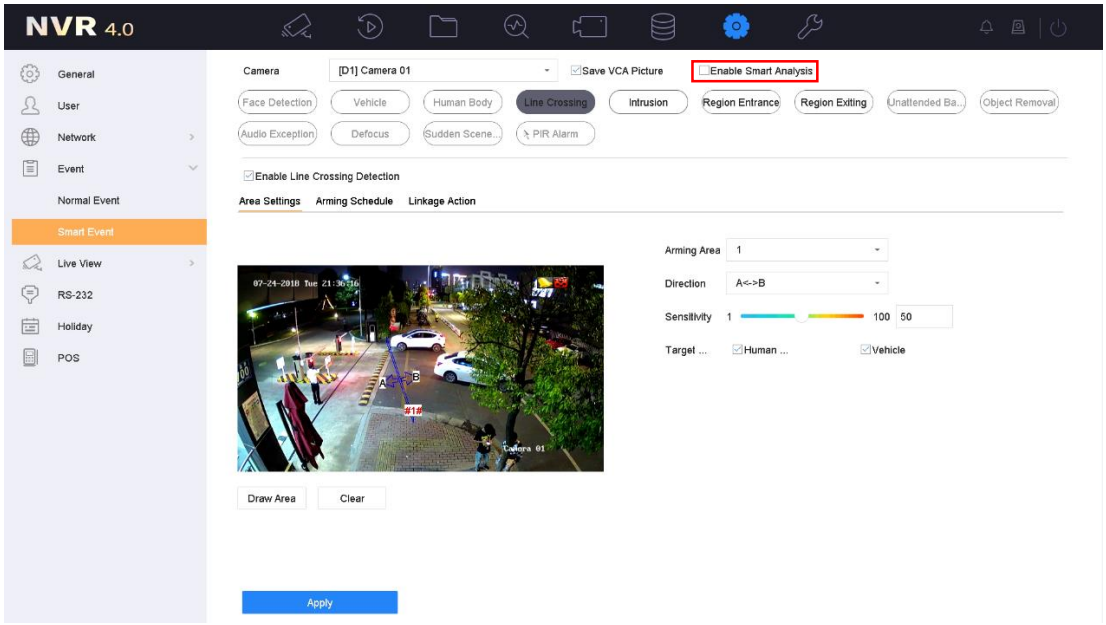


Figure 17 Configure Smart Event

➢ Configure Arming Schedule

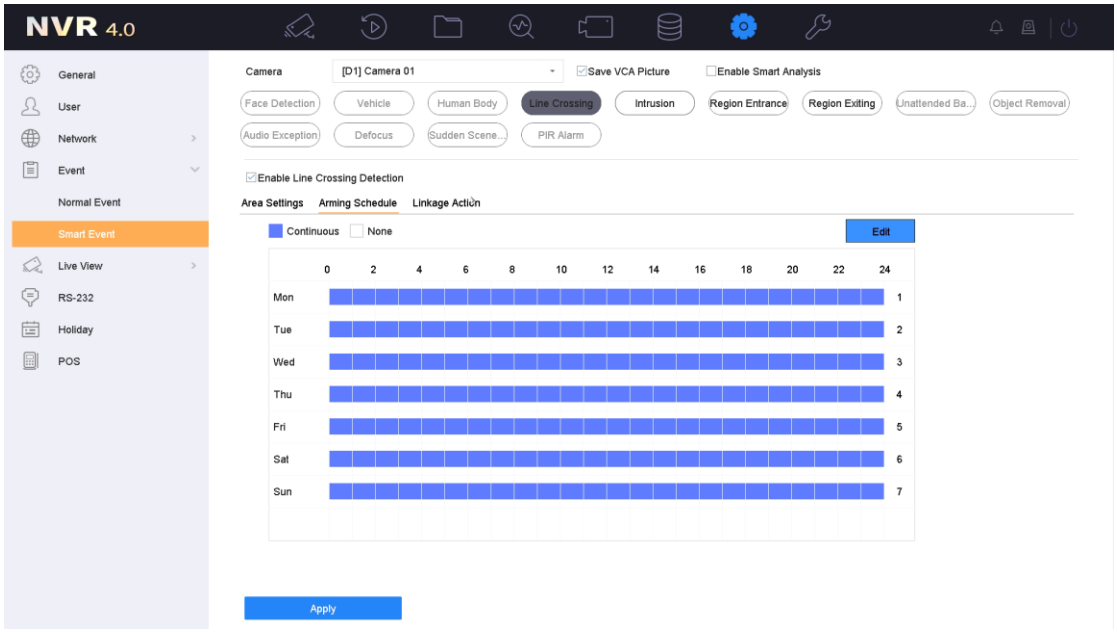


Figure 18 Configure Arming Schedule

➢ Set Linkage Action

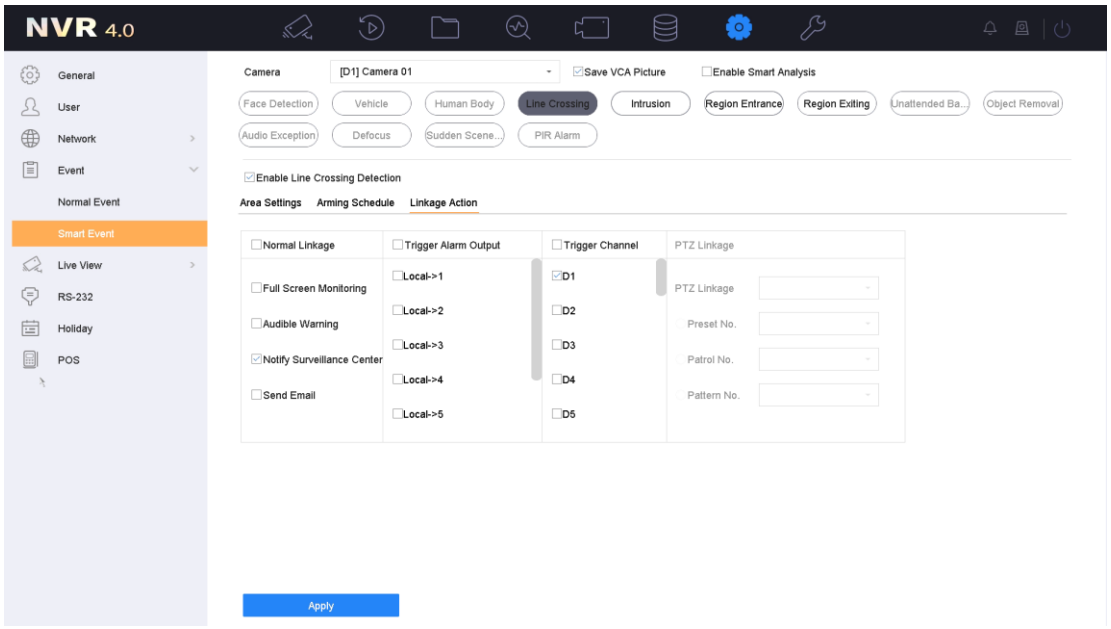


Figure 19 Set Linkage Action

5.3.1 GUI interface view alarm picture

NVR local GUI interface cannot classify Human and Vehicle at this version.

The current mechanism: after checking Smart Detection, GUI interface will display all alarm picture, without classification between Human and Vehicle (This feature will be

optimized by the end of the year).

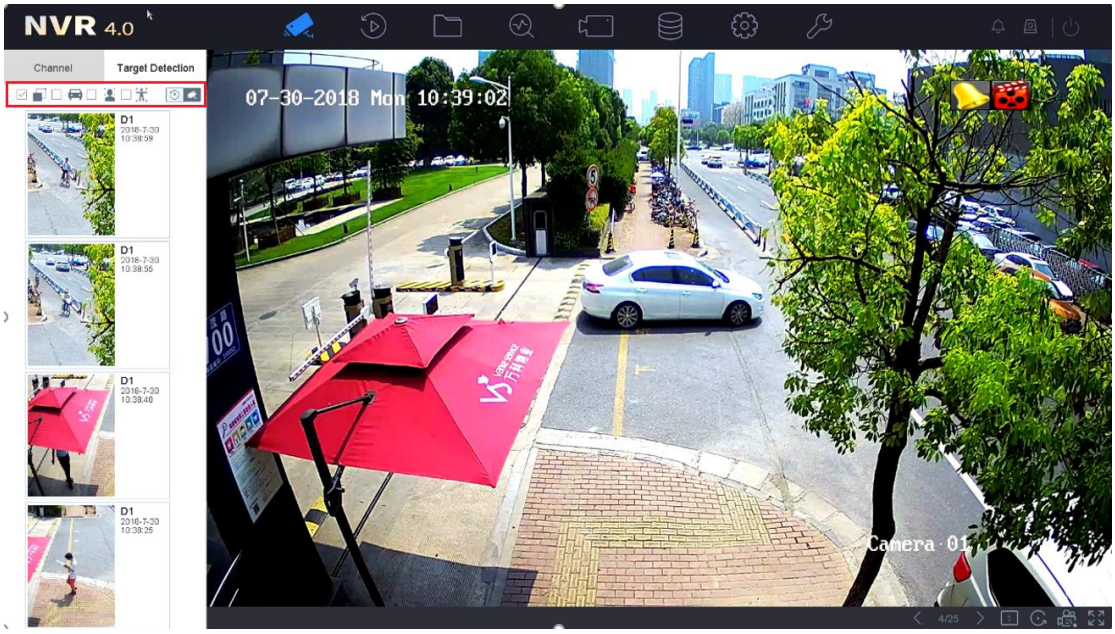


Figure 21 NVR local GUI interface

5.3.2 File management retrieves human or vehicle events

Step 1: Go to File Management, select the type of file (Human or Vehicle), Camera, Time period to retrieve.

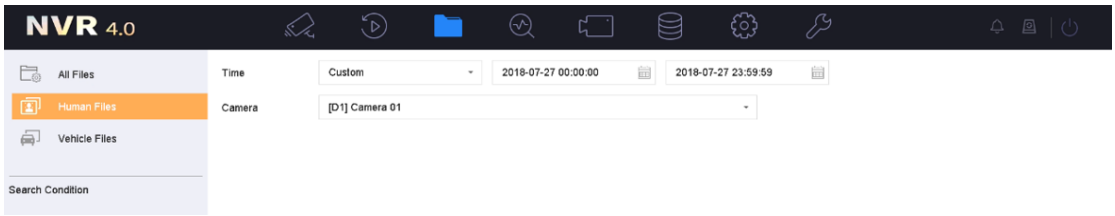


Figure 22 File Management searching interface

Step 2: Click Search to get the relevant event file, double-click the event file, you can replay the event video or view the capture.

* Note:

A. Select the target image in the red box area on the upper left corner, the listed picture is close-up view of target;

B. Select the source image in the red box area on the upper left corner, the listed picture is original picture;

C. Select video in the red box on the upper right corner, the listed files are all video files;

D. Select picture in the red box on the upper right corner, the listed files are all picture files;

E. Select all, the image and video will be displayed together.

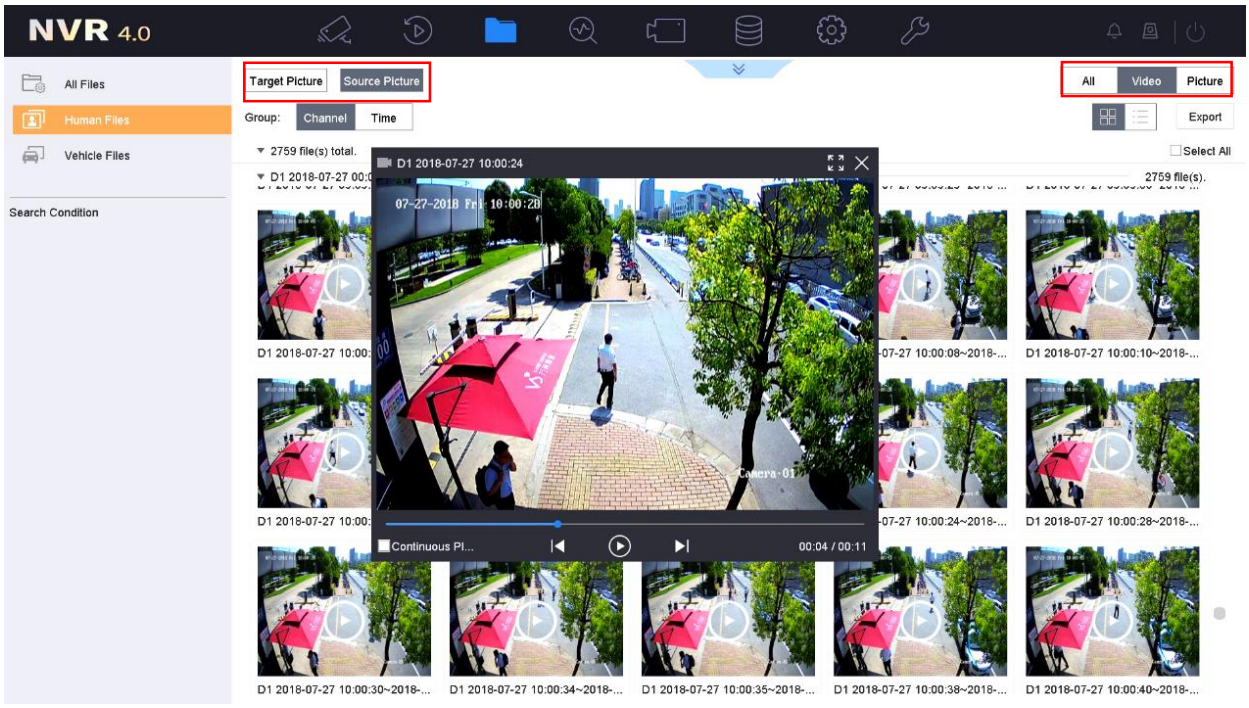


Figure 23 Human videos

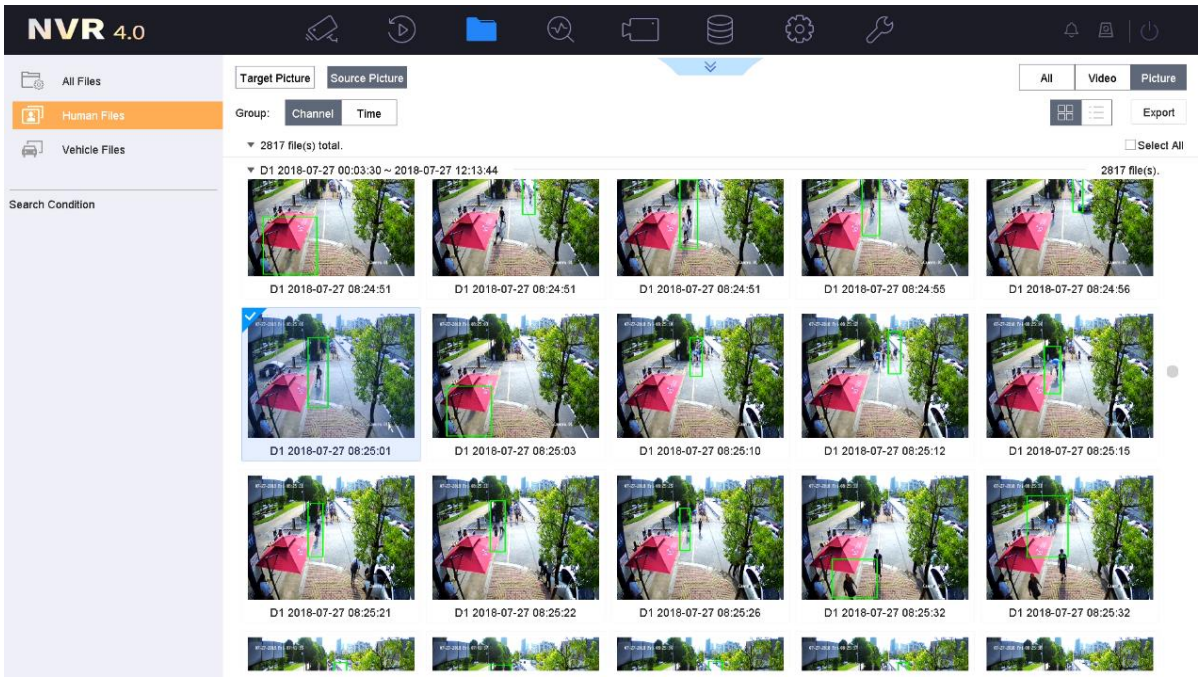


Figure 24 Human captures

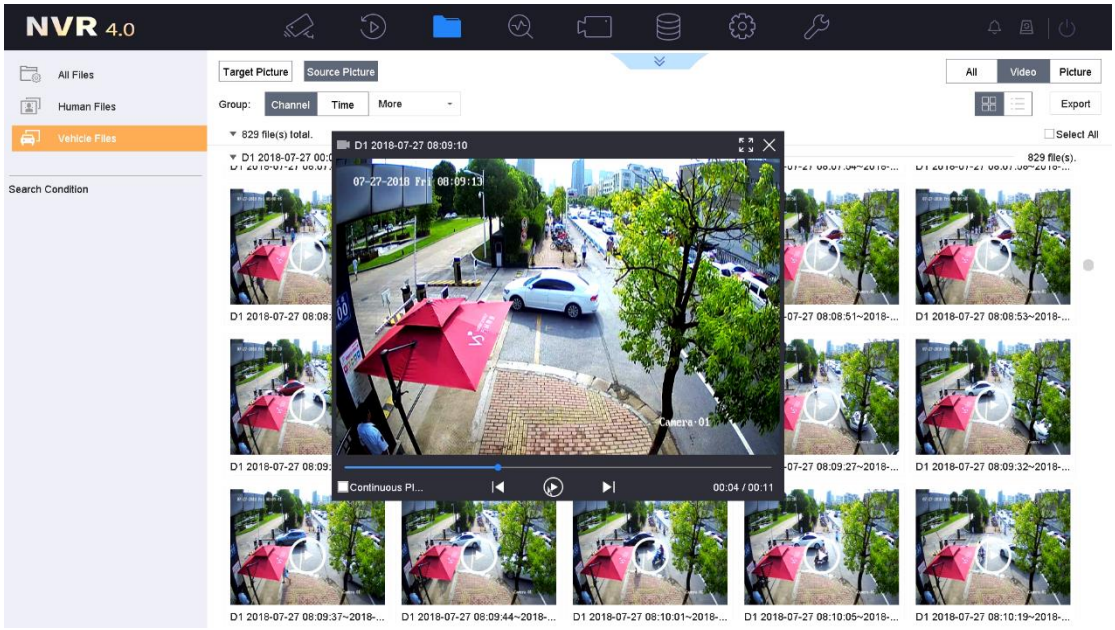


Figure 25 Vehicle videos

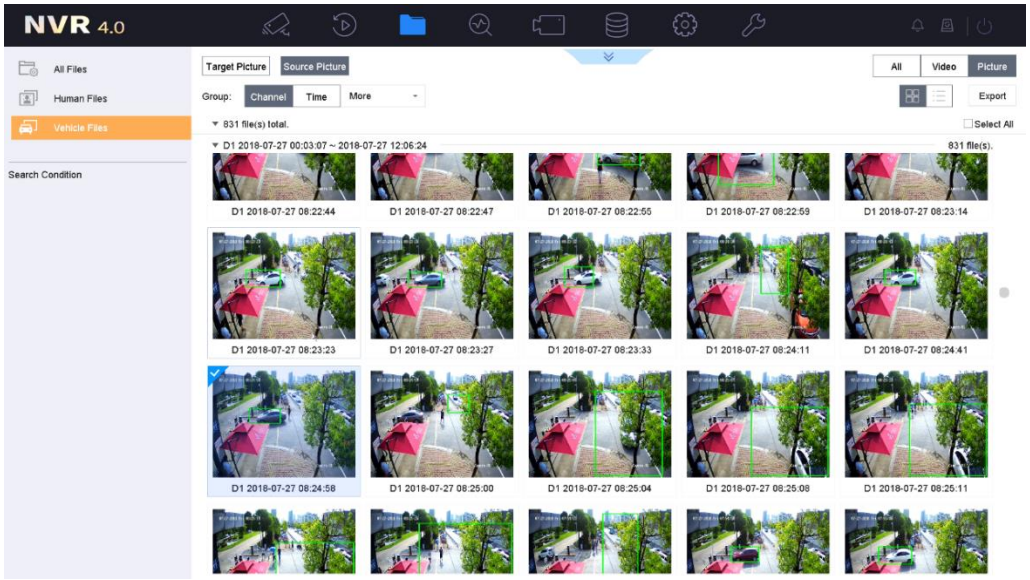


Figure 26 Vehicle captures

5.3.3 iVMS-4200 view alarm

Step 1: Add NVR on iVMS-4200 Device Management interface.

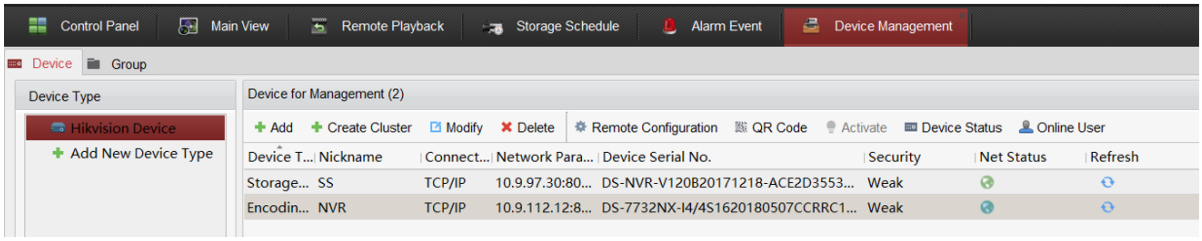


Figure 27 add NVR on iVMS-4200

Step 2: View the triggered alarm on iVMS-4200 alarm event interface. Alarm detail information will label target category as Human or Vehicle, as shown in the figure below.

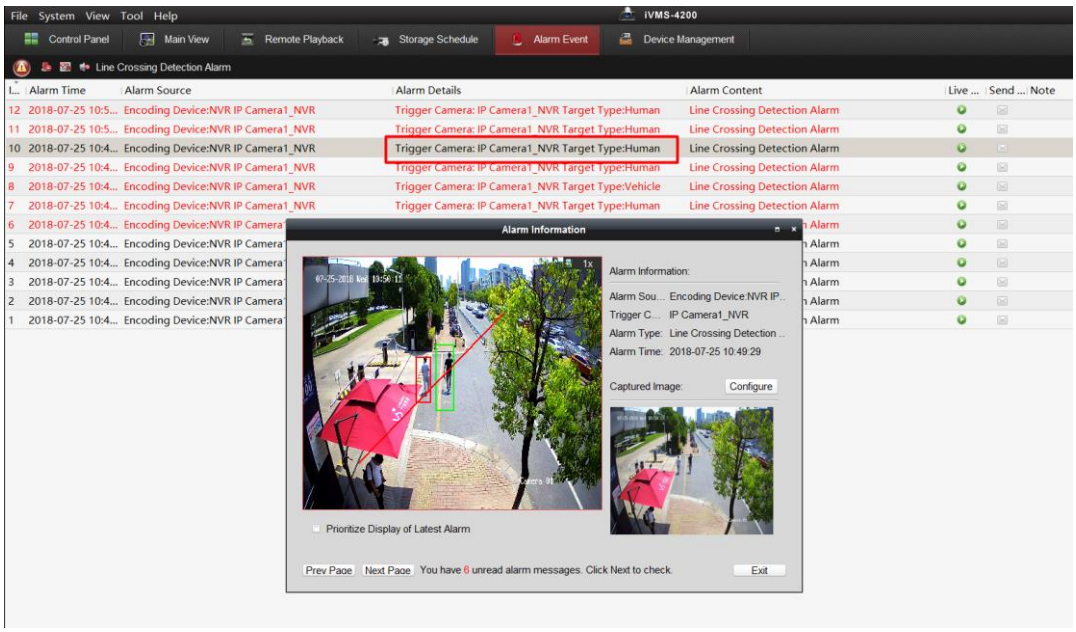


Figure 28 View alarm information on iVMS-4200 (Human)

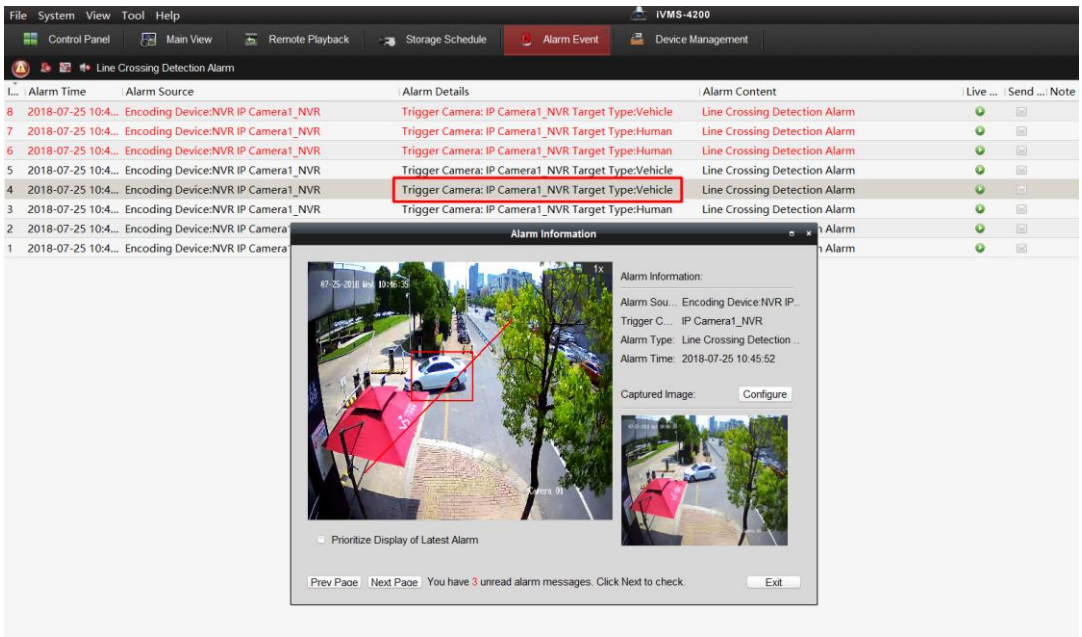


Figure 29 View alarm information on iVMS-4200 (Vehicle)

The alarm upload to iVMS-4200 mechanism of NVR is same with network camera. The Target Type shown on iVMS-4200 is consistent with the Detection Type set on the configuration interface. The unchecked categories will be redduced and will not be

displayed on iVMS-4200.

5.3.4 Known issue

When adding network camera to NVR, the NVR will issue a 24 - hour arming schedule to the camera by default. After the camera is connected, configure arming schedule on NVR will only effect whether alarm reported and displayed on This NVR, but the setting time of the camera will not be changed. If other terminals access the camera, the alarm will still be received.

5.4 Product list

	AcuSense Camera	**AcuSense NVR**
Model name	DS-2CD2XX6	DS-76/77XXNXI

6 Installation requirements

1. The proposal altitude of Installation distance is 3 to 5 meters, equipment bow Angle is 10° or so, specific adjustments according to the environment.
2. According to the number of millimeters of the lens, the maximum monitoring distance is different. The table of the maximum monitoring distance for the specific number of millimeters is as follows

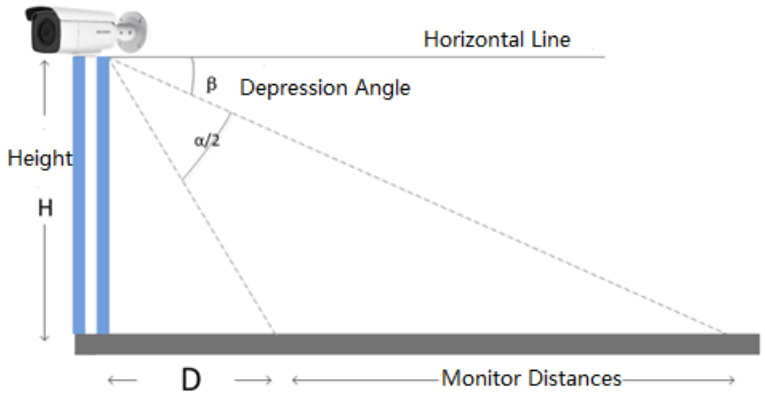
Lens(mm)	Recommended max monitoring distance
2.8 mm	10 m
4 mm	15 m
6 mm	22 m

3. The monitoring area cannot be covered by nearby objects. Do not shoot backlight at the installation position, which will affect the image effect. The following

picture is an installation sketch of the perimeter environment:

Figure 30 Installation of the perimeter environment.

4. The equipment installation needs to pay attention to certain blind area. The calculation method of blind area distance is as follows:



$$D = H \cdot \tan(90° - \alpha/2 - \beta)$$

D: Camera monitoring blind area

H: Mounting height

α: Vertical field Angle

β: Angle of depression

Lens(mm)	Horizontal field Angle (γ)	Vertical field Angle (α)	Blind area D (Height 3.3 m, Depression Angle10 °)
2.8 mm	109 °	62 °	3.7 m
4 mm	90 °	48 °	4.5 m
6 mm	53 °	39 °	5.6 m

4、Recommended Scenario:

1）Try to avoid getting too close. It recommends that the target be more than 3 meters away from the camera. For example, avoid the scene with lots of trees nearby;

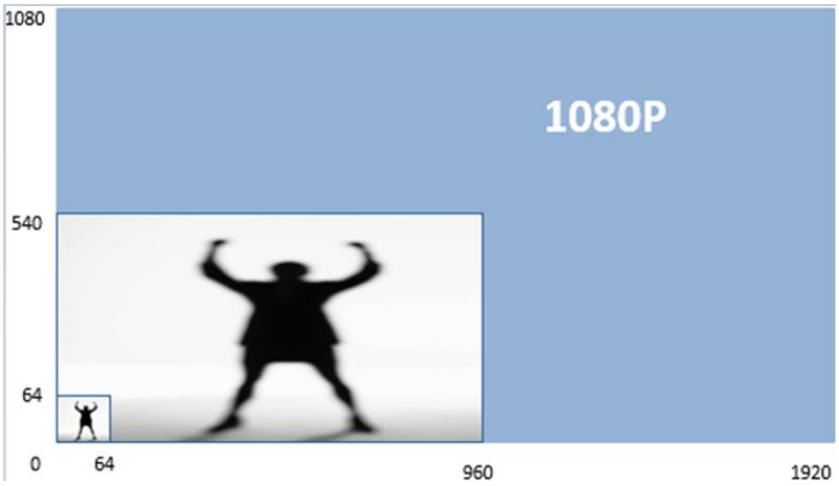
2）If there is a mirror in the environment, the mirror image or shadow can easily lead to false alarm trigger;

3）Adjust the camera angle during installation to avoid interference from high brightness lights or headlights;

4）Dome are not recommended for outdoor scenes, IR reflect can seriously affect the accuracy of the alarm, as shown below:

5）The scene of heavy traffic will bring a lot of perimeter alarm, such as station, airport, theater, etc., so it is suggested to avoid this kind of scene;

6）Avoid situations where personnel targets are too large. AcuSense NVR can analyze the target size between 1/16 and 1/2 of the image's vertical size. For example, the camera's resolution is 1080p, and the vertical size of the target should be between 64 to 540 pixels.



In the following scene, the target takes up almost the whole picture. It is suggested to adjust the camera angle so that the camera can detect from a far distance, and the target size is in a suited size.

7）It is recommended to use the Region Entrance/Exiting Detection instead of Intrusion/Line Crossing Detection for region intrusion of fixed scenarios.