Dual-lens Stereo Analysis Network Camera

Installation and Commissioning Manual

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V1.0.0

Foreword

This manual mainly introduces the installation and commissioning of the Dual-lens Stereo Analysis Network Camera (hereinafter referred to as "the camera"), to guide you in using AI functions such as IVS and stereo analysis.

Revision History

Version	Revision Content	Release Time
V1.0.0	First release.	November, 2023

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1 Overview

1.1 Introduction

This manual mainly introduces the installation and commissioning of the Dual-lens Stereo Analysis Network Camera. The camera can meet the intelligent scene requirements of the financial industry, which needs to configure behavior analysis devices. It can detect abnormal stereo behaviors in the self-service banks and output alarm signals in real time, so as to intelligently identify various events in the banking scenes.

1.2 AI Analysis

For the scenes outside the ATM cabins of the self-service banks, we recommend using inclined mount. For the scenes inside the cabins, use ceiling mount. The following are the AI functions supported by the camera.

Function	Description
Crossing Warning Line	Detects the behavior of crossing the warning line and triggers an alarm.
Warning Area Intrusion	Detects the behavior of crossing the warning area and triggers an alarm.
Running Detection	Detects people running in the area and triggers an alarm (only supported by inclined mount).
People Approach Detection	Detects the situation in which the distance between one person and other people in the area is too close when the person is walking or standing and triggers an alarm.
Fall Detection	Detects the situation in which a person suddenly falls down when walking or standing in the scene and triggers an alarm.
Abnormal Number of People Detection	Detects the situation in which the number of people in the area is abnormal and triggers an alarm.
Violence Detection	Detects violent movements or fights between people in the area and triggers an alarm.
People Stay Detection	Detects the situation in which a person stays in the area for too long and triggers an alarm.

1.3 Model Selection

The following table is for reference only. For information on the latest product models, see market promotion material.

Model	Appearance	Name	Features
DH-IPC-HDW8441XP-BV-3D-0200B DH-IPC-HDW8441XP-BV-3D-0280B IPC-HDW8441XP-BV-3D-0200B IPC-HDW8441XP-BV-3D-0280B		4 MP Dual-Lens Behavior Analysis IR Fixed-Focal Eyeball Network Camera	1. Height self-adaptation: Automatically adjusts the image size to improve the algorithm detection effect according to the installation height and angle, and supports privacy protection and height filtering. 2. Upgraded intelligence: Add crossing warning line, warning area intrusion and running detection based on 3D stereo vision projection technology. 3. Upgraded peripherals: With built-in SPK and microphone, and Dahua Sound Management, the camera can provide high-quality two-way talk.

2 Site Survey and Installation

2.1 IVS and Stereo Analysis

This chapter introduces the site and installation requirements when stereo analysis and IVS of the camera are used.

2.1.1 Site Requirements

The following requirements must be met before using AI functions.

Table 2-1 Site requirements

No.	Type	Requirements	Remarks
1	Illumination	The lighting on the site must be sufficient and the image cannot be overexposed or too dark. The human faces and bodies must be clear. When the light is insufficient, such as at night or in cloudy days, illuminators need to be used to provide more light.	When the illumination is poor, the intelligent detection performance will be affected.
2	Scene	Avoid environments with complex and frequently changing light, backlight, and direct light exposure. To ensure the calibration effect, the following ground scenes need to be avoided. 1) Overexposed or too dark images. 2) Large area of objects in solid color such as white walls. 3) Long and thin objects that are completely transverse. 4) Highly duplicated objects. 5) Transparent objects, such as glass. 6) Reflective objects such as water surface and mirror surface. 7) Surface of fast moving objects.	—

No.	Type	Requirements	Remarks
3	Installation Height	Recommended height: 2.5–4 m.	Adjust the installation height according to the actual scenario, and the pixel requirements of the algorithm must be met. We recommend using 2.0 mm focal length for low-altitude scenes below 3 m.
4	Installation Angle	Inclined mount: The angle between the optical axis of the lens and the horizontal plane is 25°–35°. Ceiling mount: The angle between the optical axis of the lens and the horizontal plane must be greater than 70°.	—
5	Monitoring Range	The arming range of the camera is strictly determined by the on-site environment and camera focal length.	Adjust the installation height according to the actual scenario, and the pixel requirements of the algorithm must be met.

2.1.2 Scene Requirements

2.1.2.1 Recommended Scenes

The following figures display the actual financial scenes. They are typical examples of ceiling mount and inclined mount of the camera in self-service banks.

Figure 2-1 Typical ceiling mount in financial scenes

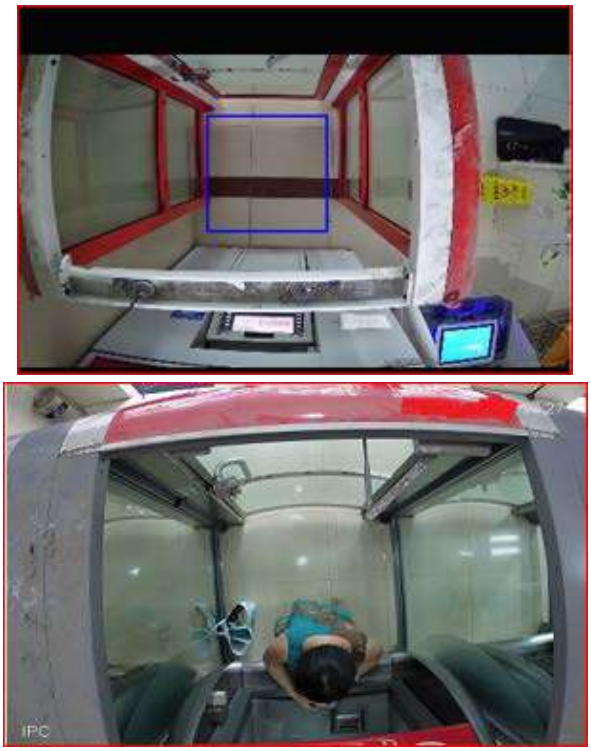


Figure 2-2 Typical inclined mount in financial scenes

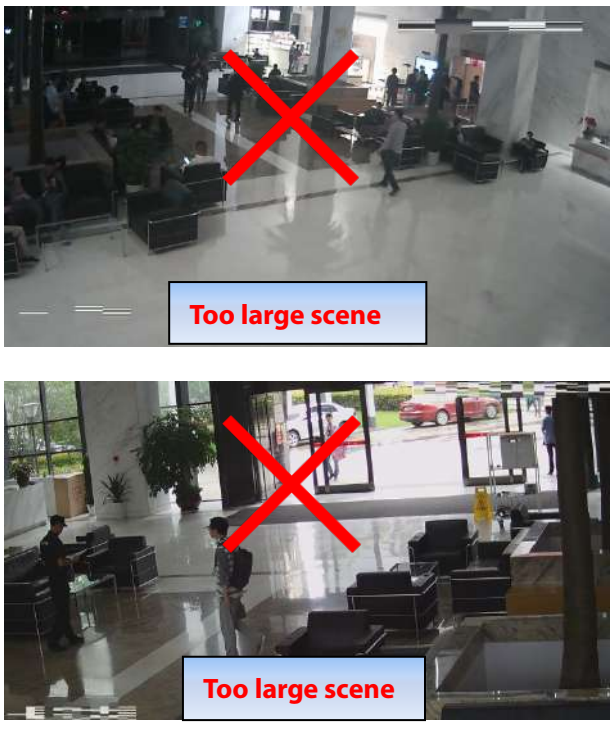
Other application scenarios: As shown in the following figures, some alarm detection items can be selected for abnormal events arming in some display areas, internal bank office areas, office building entrances, and other places.

Figure 2-3 Other application scenes

2.1.2.2 Non-Recommended Scenes

Avoid these scenes: Too large scenes exceeding 7 × 7 m and installation height exceeding 4 m; too many obstacles in the scene with persons being blocked; persons sitting and lying in the scene and close to each other. See the figures below.

Figure 2-4 Non-recommended scenes



2.1.3 Installation Methods

Inclined Mount

Select the **corner** positions where most scenes can be monitored, avoid obstructions such as cross walls and columns, and keep the depression angle between the camera sight and the horizontal plane **around 35°**, to ensure that the main arming position is in the **center** of the image.

Figure 2-5 Recommended arming positions

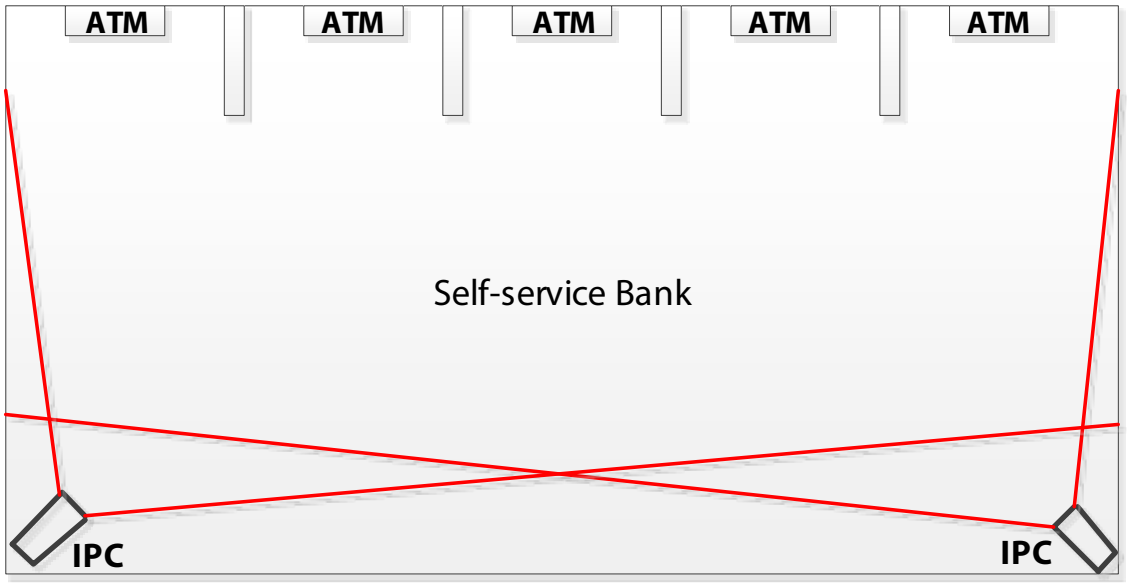


Figure 2-6 Ceiling mount arming

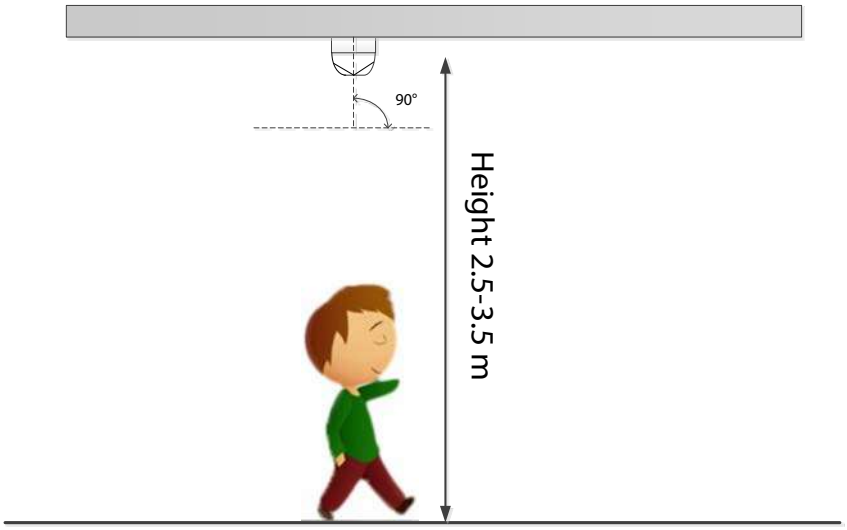
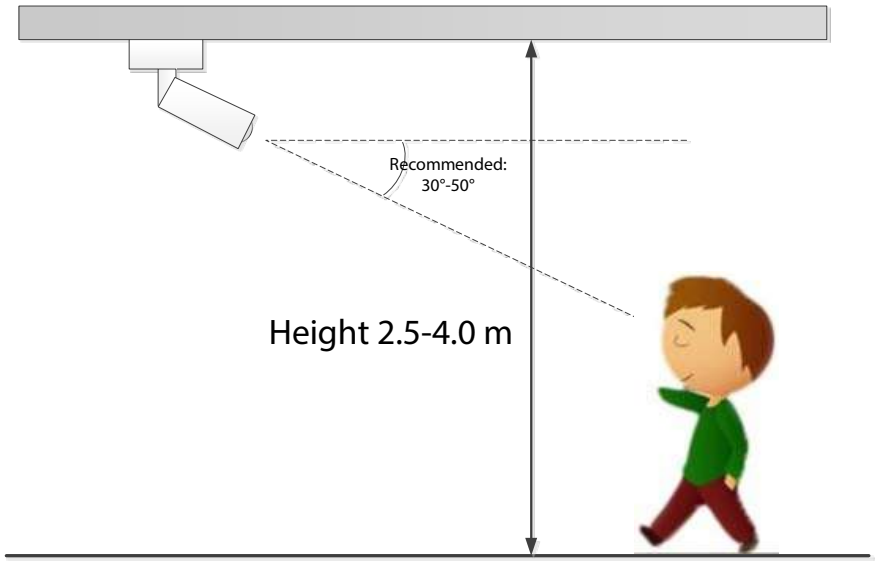


Figure 2-7 Inclined mount arming



2.1.3.1 Installation Methods

Figure 2-8 Installation methods

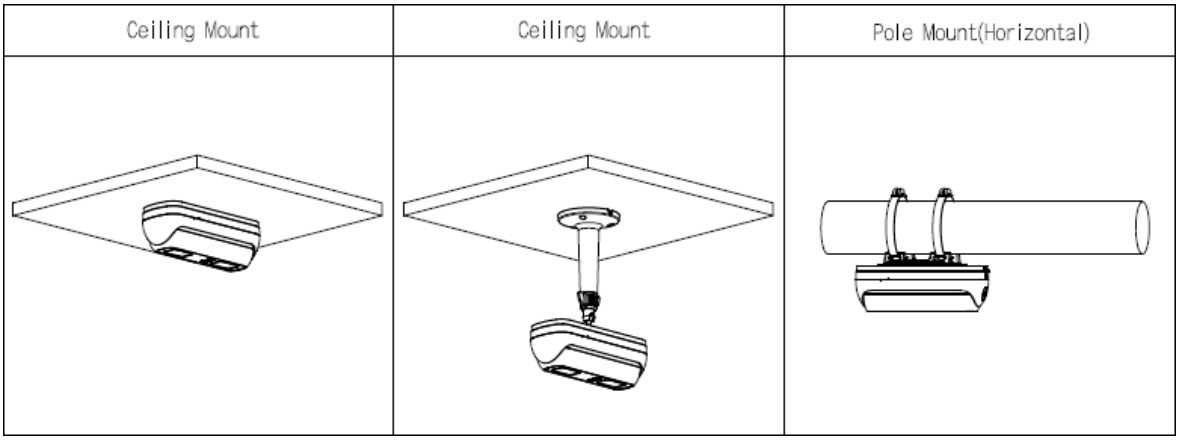
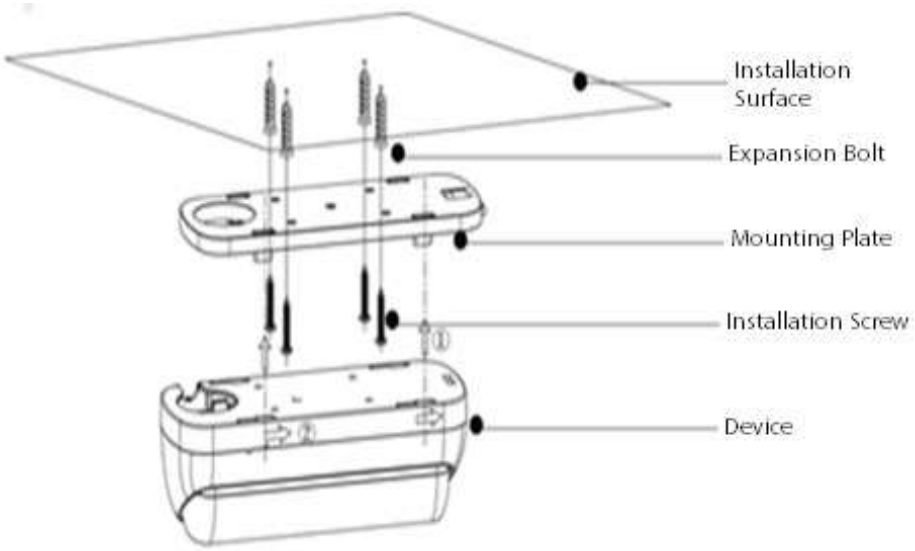


Figure 2-9 Illustration of installation structure



2.1.4 Installation Height

The recommended installation height is 2.5–4 m for the camera when IVS and stereo analysis are used.

2.1.5 Installation Angle

The recommended vertical depression angle between the optical axis of the lens and the monitoring object is 25–40° when the camera is used for IVS and stereo analysis. Keep the installation direction parallel to the ground, otherwise some areas cannot be correctly detected. Ensure that the image is horizontal.

2.1.6 Arming Data

2.1.6.1 Arming Scenes

- Because vertically downward ceiling mount scenes are simple, this section focuses on inclined mount scenes.
- The scene armed by the inclined-mounted camera forms a sector on the plane.
- In inclined mount scenes, the arming distance requires that feet can be seen in near places and heads can be seen in far places. The arming width requires that a complete body can be seen in the image and detection requirements are met.

Figure 2-10 Top view of arming scene

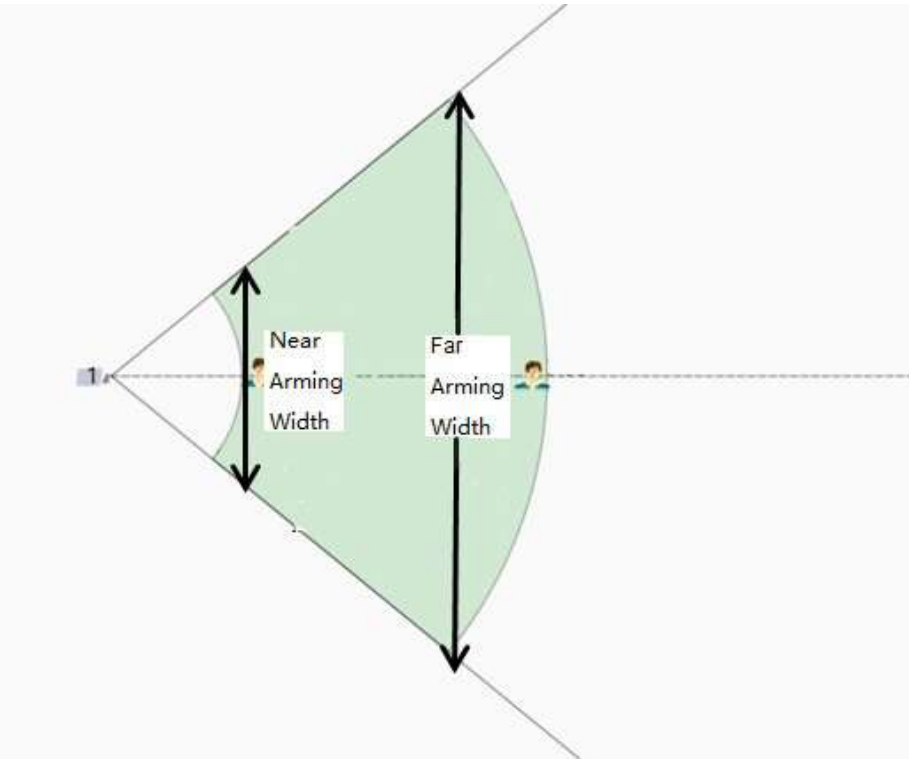
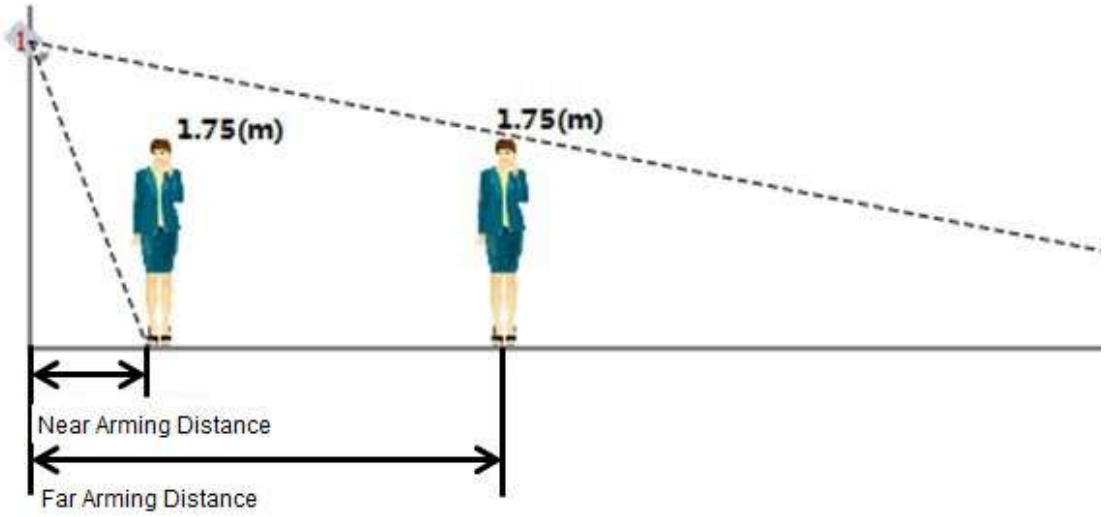


Figure 2-11 Side view of arming scene



2.1.6.2 Arming Illustration Data

You can use the engineering design tool to calculate the arming data in real time according to the camera model, or send emails to the R&D team for the arming data.

The arming data is provided based on vertically downward ceiling mount and inclined mount scenes. See Figure 2-2 and 2-3 respectively. If the actual scenes are significantly different, or the height or angle is not covered, refer to the following data to roughly estimate the positive and negative deviations.

- The ceiling mount arming data is based on the premise that the camera is installed vertically downward at 90°. A vertical angle within 80°–90° is recommended.
- The inclined mount arming data is based on the premise that the angle between the camera sight and the horizontal plane is 35°. A depression angle within 30°–50° is recommended.
- The following arming data is based on a 1.75 m tall person: The data is too small when the height is higher than the reference value, and too large when the height is lower than the reference value.
- The tool calculates the data as if there is a sufficient amount of light by default. If the lighting on the site is poor, the data from the on-site test will not reach the value calculated by the tool. So the test results from the on-site test must be chosen over the results from the tool.
- Intelligent detection data is closely related to the installation scenario, light, and other factors. If these conditions are poor, you can adjust the scene or add more light to improve the intelligent detection rate. However, the result still might not be as accurate as it is for scenes that naturally have the ideal amount of light. So the test results from the on-site test must be chosen over the results from the tool.

- The data in the following table is for reference only. If the actual scenario is different, please use the actual data.

Table 2-2 Detection and arming data for stereo analysis (ceiling mount angle 90°)

Model	Focal Length	Installation Height (m)	Angle (°)	Horizontal (m)	Vertical (m)	Effective Surveillance Area (m^2)
DH-IPC-HDW8441XP-BV-3D-0200B	2.0 mm	2.1	90	0.60	1.10	0.66
		2.3	90	0.90	1.65	1.49
		2.5	90	1.21	2.20	2.66
		2.7	90	1.51	2.75	4.15
		2.9	90	1.81	3.30	5.97
		3.2	90	2.26	4.13	9.33
		3.5	90	2.71	4.95	13.44
DH-IPC-HDW8441XP-BV-3D-0280B	2.8 mm	2.7	90	1.04	1.90	1.98
		2.9	90	1.25	2.28	2.85
		3.1	90	1.46	2.66	3.87
		3.3	90	1.67	3.04	5.06
		3.5	90	1.87	3.42	6.40
		3.8	90	2.19	3.99	8.71
		4.3	90	2.71	4.93	13.36
		5	90	3.44	6.26	21.52

Table 2-3 Detection and arming data for stereo analysis (inclined mount angle 35° and 50°)

Model	Focal Length	Height (m)	Angle (°)	Near Arming Distance (m)	Near Arming Width (m)	Far Arming Distance (m)	Far Arming Width (m)
DH-IPC-HDW8441XP-BV-3D-0200B	2.0 mm	2.3	35	0.19	1.39	7.27	15.12
		2.5	35	0.26	1.85	7.13	15.12
		2.7	35	0.32	2.31	6.99	15.12
		2.9	35	0.39	2.77	6.85	15.12
		3.2	35	0.49	3.47	6.64	15.12
		3.5	35	0.58	4.16	6.43	15.12
		3.8	35	0.68	4.85	6.22	15.12
DH-IPC-HDW8441XP-BV-3D-0280B	2.8 mm	2.6	35	0.47	1.71	6.84	11.61
		2.9	35	0.62	2.28	9.11	15.12
		3.2	35	0.78	2.85	9.87	15.12
		3.5	35	0.94	3.42	9.66	15.12
		3.8	35	1.09	3.99	9.45	15.12
		4.3	35	1.35	4.93	9.10	15.12
		5	35	1.72	6.26	8.61	15.12
	2.0 mm	2.3	50	0.03	1.32	2.60	5.86

DH-IPC-HDW8441XP-BV-3D-0200B		2.5	50	0.04	1.76	3.47	7.82
		2.7	50	0.05	2.20	4.33	9.77
		2.9	50	0.06	2.64	5.20	11.73
		3.2	50	0.08	3.30	6.50	14.66
		3.5	50	0.09	3.96	7.66	15.12
		3.8	50	0.11	4.62	7.30	15.12
DH-IPC-HDW8441XP-BV-3D-0280B	2.8 mm	2.6	50	0.20	1.55	2.17	3.96
		2.9	50	0.27	2.07	2.90	5.28
		3.2	50	0.33	2.59	3.62	6.60
		3.5	50	0.40	3.10	4.35	7.92
		3.8	50	0.47	3.62	5.07	9.24
		4.3	50	0.58	4.48	6.28	11.44
		5	50	0.73	5.69	7.97	14.52

3 Commissioning and Configuration

3.1 Preparation

This chapter describes how to clean up the plug-ins, view the browser version, and configure the network after the initialization.

Before the commissioning and configuration, ensure that the following operations are complete. For details, see the user's manual.

- Make sure the camera is connected to the power supply and starts normally.
- Make sure the camera is initialized and the basic configuration is complete.
- Clear the plug-ins of your browser, including clearing the browser's cache and deleting the camera's controls.
  Delete the webrec folder under C:\Program Files\webrec or C:\Program Files (x86)\webrec.
- Use a browser of the compatible version to log in to the camera webpage.

3.2 Configuring Stereo Analysis

Dual-lens stereo analysis is used to detect people falling, approaching and staying, abnormal number of people, fight, smash and other violent movements, and behaviors such as crossing the warning line, intruding the warning area and running. It can help you effectively manage anomaly information and upload the information to the device management platform.

3.2.1 Enabling AI Function

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **Stereo Analysis**, and then click **Next**.

Stereo analysis is enabled by default.

Step 3 Click **Add Rule**, and click under **On** to enable the corresponding rule.

3.2.2 Configuring Rule

This section describes how to configure the AI rules.

Stereo analysis includes 8 AI rules: Fall detection, people approach detection, people stay detection, abnormal number of people detection, violence detection, crossing warning line, warning area intrusion, and running detection.

3.2.2.1 Crossing Warning Line

When the target passes the configured warning line, an alarm is triggered, and the warning line and bounding box flash red.

Operations

Step 1 Click on the right of the image to clear the default detection area.

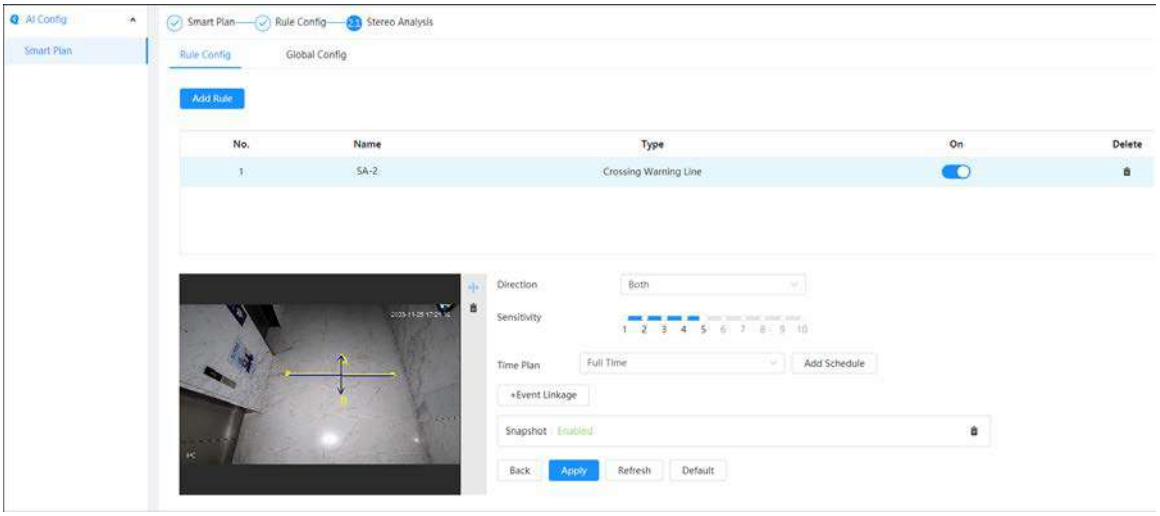
Step 2 Click on the right of the image to configure the detection area.

The default detection area is the maximum detection area. You can drag the rectangular frame corners within the range.

Step 3 Left-click to drag on the live video and draw a warning line, and then right-click to complete the drawing.

- Draw 1 polyline with a maximum of 20 vertices.
- Draw the warning line on the ground.
- Click on the right of the monitoring image to redraw the warning line.

Figure 3-1 Crossing warning line



Step 4 Select the direction.

- Both: An alarm can be triggered from A to B or from B to A.
- A to B: An alarm can be triggered only from A to B.
- B to A: An alarm can be triggered only from B to A.

Step 5 Select the sensitivity.

It is 5 by default. The higher the sensitivity, the easier the alarm is likely to be triggered.

3.2.2.2 Warning Area Intrusion

When the target enters or leaves the configured warning area, an alarm is triggered, and the warning area and bounding box flash red.

Operations

Step 1 Click on the right of the monitoring image to clear the default detection area.

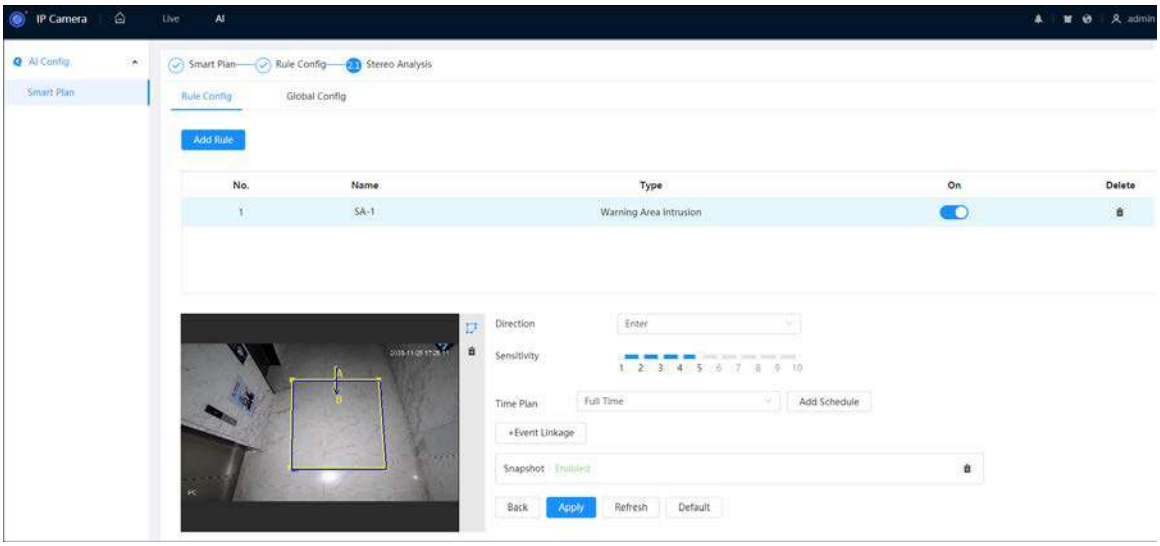
Step 2 Click on the right of the image to configure the detection area.

The default detection area is the maximum detection area. You can drag the rectangular frame corners within the range.

Step 3 Left-click and drag on the live video, left-click again to turn on the polyline and draw a warning area, and then right-click to finish the drawing.

- Draw 1 area (polygons are supported) with a maximum of 20 vertices.
- Draw the warning area on the ground.
- Click on the right of the monitoring image to redraw the warning area.

Figure 3-2 Warning area intrusion



Step 4 Select the direction.

- Enter: When the target enters the warning area, an alarm is triggered.
- Exit: When the target exits the warning area, an alarm is triggered.
- Both: When the target enters or exits the warning area, an alarm is triggered.

Step 5 Select the sensitivity.

It is 5 by default. The higher the sensitivity, the easier the alarm is likely to be triggered.

3.2.2.3 Running Detection

When the moving speed of the target reaches the configured sensitivity in the drawn detection area, an alarm is triggered, and the detection area and the bounding box flash red. Running detection is supported only when inclined mount is used. The angle between the optical axis of the lens and the horizontal plane is at least 70°.

Operations

Step 1 Click on the right of the monitoring image to clear the default detection area.

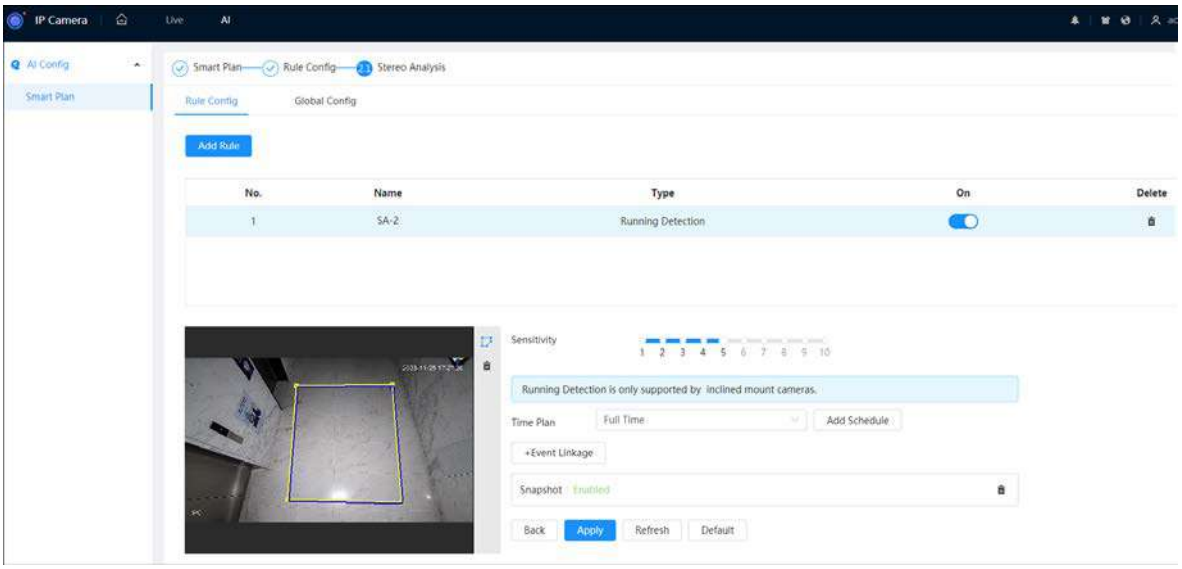
Step 2 Click on the right of the image to configure the detection area.

The default detection area is the maximum detection area. You can drag the rectangular frame corners within the range.

Step 3 Left-click and drag on the live video, left-click again to turn on the polyline and draw a warning area, and then right-click to finish the drawing.

- Draw 1 area (polygons are supported) with a maximum of 20 vertices.
- The detection target must be included in the detection box.
- Click on the right of the monitoring image to redraw the detection area.

Figure 3-3 Running detection



Step 4 Select the sensitivity.

It is 5 by default. The higher the sensitivity, the easier the alarm is likely to be triggered. When the sensitivity is 1, 5 and 10, an alarm is triggered when the running speed reaches 4.5 m/s, 2.5 m/s and 2 m/s respectively.

3.2.2.4 People Approach Detection

When the spacing between people reaches the spacing threshold of the selected type and reaches the shortest duration in the drawn detection area, an alarm is triggered, and the detection area flashes red.

Operations

Step 1 Click on the right of the monitoring image to clear the default detection area.

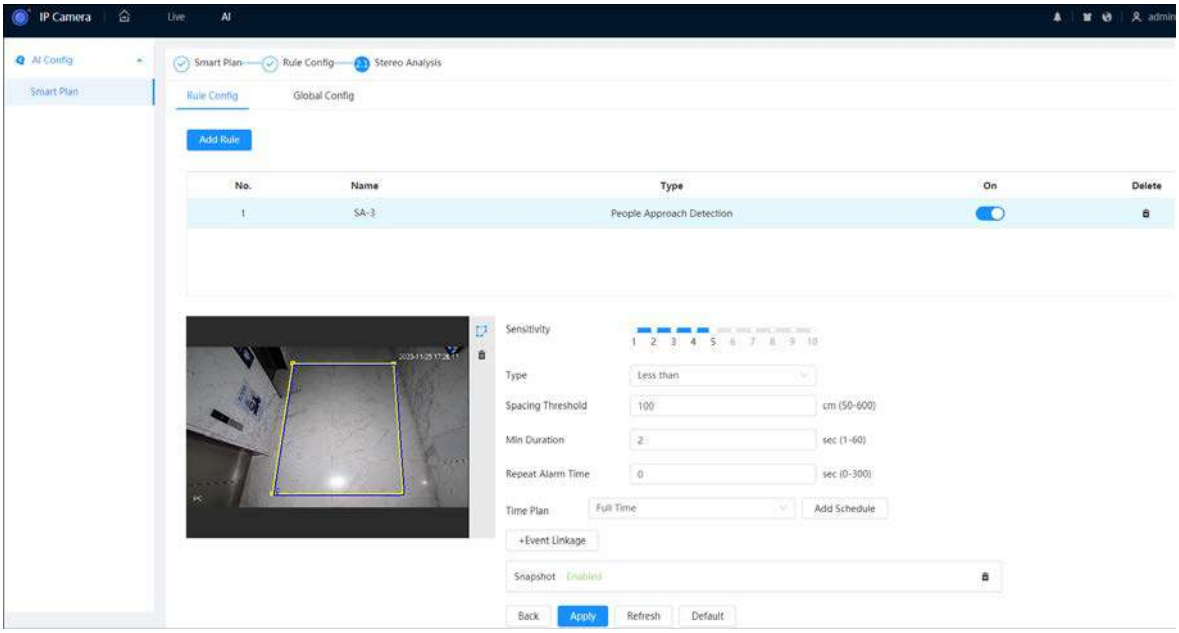
Step 2 Click on the right of the monitoring image to configure the detection area.

The default detection area is the maximum detection area. You can drag the rectangular frame corners within the area.

Step 3 Left-click and drag on the live video, left-click again to turn on the polyline and draw a warning area, and then right-click to finish the drawing.

- Draw 1 area (polygons are supported) with a maximum of 20 vertices.
- Click on the right of the monitoring image to redraw the detection area.

Figure 3-4 People approach detection



Step 4 Select the sensitivity.

It is 5 by default. The higher the sensitivity, the easier the alarm is likely to be triggered.

Step 5 Configure the parameters for people approach detection.

Table 3-1 Description of people approach detection parameters

Parameter	Description
Type	• Less than: The distance between people in the detection area is less than the spacing threshold. • Greater than: The distance between people in the detection area is greater than the spacing threshold.
Spacing Threshold	The spacing detection threshold. An alarm is triggered when the distance between people in the detection area is greater than or less than the spacing threshold. The default spacing threshold is 100 cm.
Min Duration	The minimum duration for determining that the distance between people exceeds the spacing threshold.
Repeat Alarm Time	After the first alarm is triggered, another alarm is triggered at the configured interval to maintain the alarm status. 0 means that the function is turned off. Alarm repeat time is 0 by default.

3.2.2.5 People Stay Detection

When the people stay time reaches the shortest duration in the drawn detection area, an alarm is triggered, and the detection area and bounding box flash red.

Operations

Step 1 Click on the right of the monitoring image to clear the default detection area.

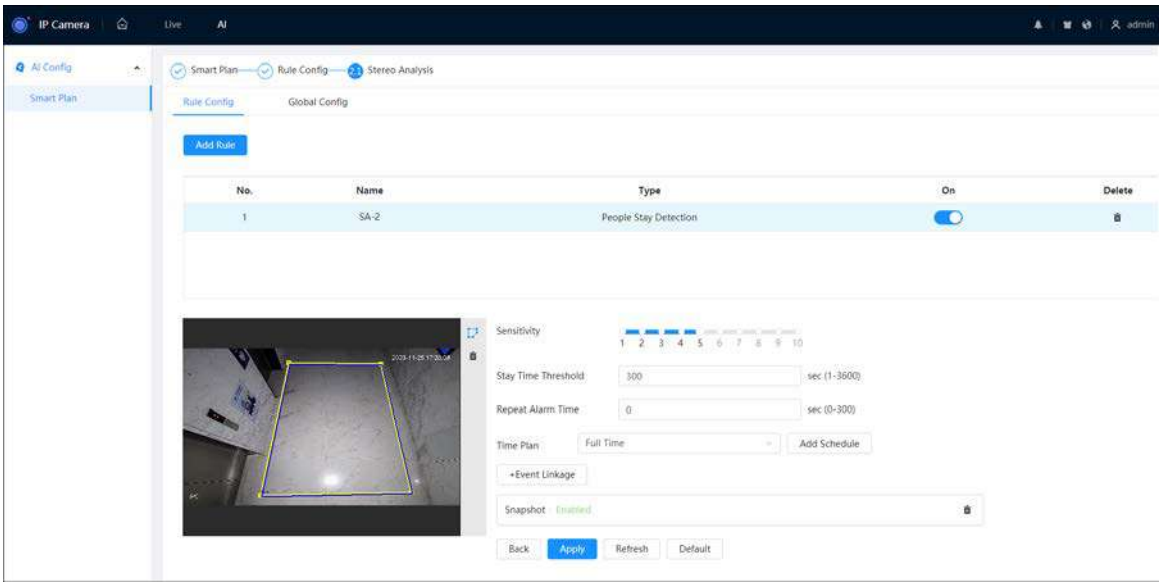
Step 2 Click on the right of the monitoring image to configure the detection area.

The default detection area is the maximum detection area. You can drag the rectangular frame corners within the area.

Step 3 Left-click and drag on the live video, left-click again to turn on the polyline and draw a warning area, and then right-click to finish the drawing.

- Draw 1 area (polygons are supported) with a maximum of 20 vertices.
- Click on the right of the monitoring image to redraw the detection area.

Figure 3-5 People stay detection



Step 4 Configure the parameters.

- Sensitivity: It is 5 by default. The higher the sensitivity, the easier the alarm is likely to be triggered.
- Stay Time Threshold: It is 300 s by default. When a target remains in the detection area for longer than the specified time, an alarm is triggered.
- Repeat Alarm Time: After the first alarm is triggered, another alarm is triggered at the configured interval to maintain the alarm status. It is 0 by default, which means the function is turned off.

3.2.2.6 Fall Detection

When the detection target falls from a certain height in the drawn detection area, and the height difference reaches the configured minimum duration, an alarm is triggered, and the detection area and bounding box flash red.

Operations

Step 1 Click on the right of the monitoring image to clear the default detection area.

Step 2 Click on the right of the monitoring image to configure the detection area.

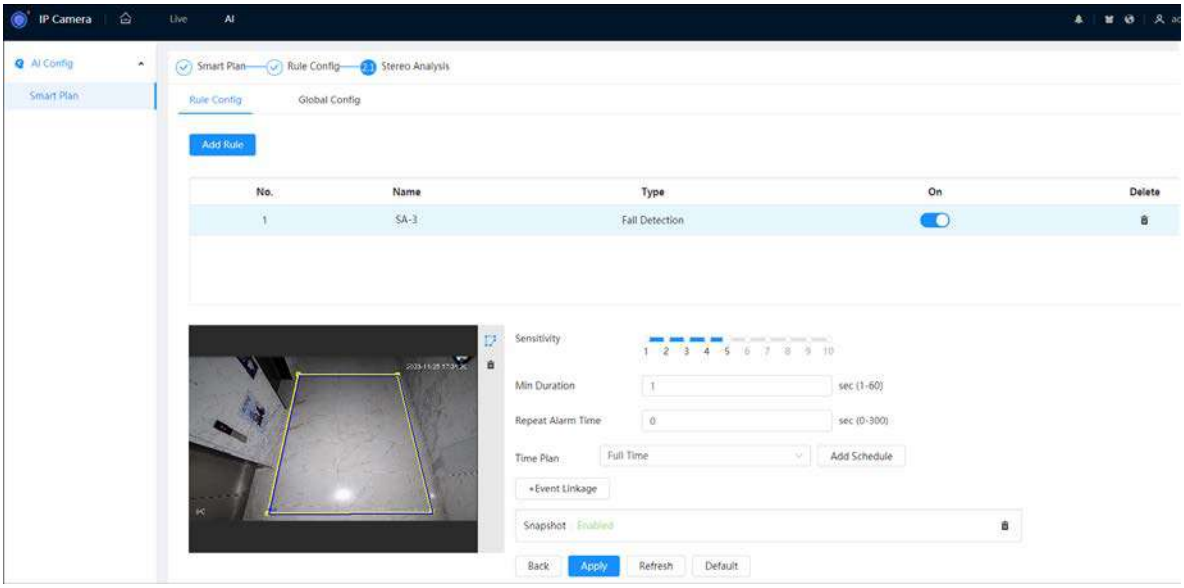
The default detection area is the maximum detection area. You can drag the rectangular frame corners within the area.

Step 3 Left-click and drag on the live video, left-click again to turn on the polyline and draw a warning area, and then right-click to finish the drawing.

- Draw 1 area (polygons are supported) with a maximum of 20 vertices.

- Click on the right of the monitoring image to redraw the detection area.

Figure 3-6 Fall detection



Step 4 Configure the fall detection parameters.

- Sensitivity: It is 5 by default. The higher the sensitivity, the easier the alarm is likely to be triggered.

When the sensitivity is set to 1, 5 and 10, and the height difference of the human body reaches 80 cm, 50 cm and 30 cm respectively, an alarm is triggered.

- Min Duration: It is 1 s by default. An alarm is triggered when the fall action remains for longer than the configured minimum duration.
- Repeat Alarm Time: After the first alarm is triggered, another alarm is triggered at the configured interval to maintain the alarm status. It is 0 by default, which means the function is turned off.

3.2.2.7 Violence Detection

When fights between two or more people or smashes by one or more people are detected in the drawn detection are, an alarm is triggered.

Operations

Step 1 Click on the right of the monitoring image to clear the default detection area.

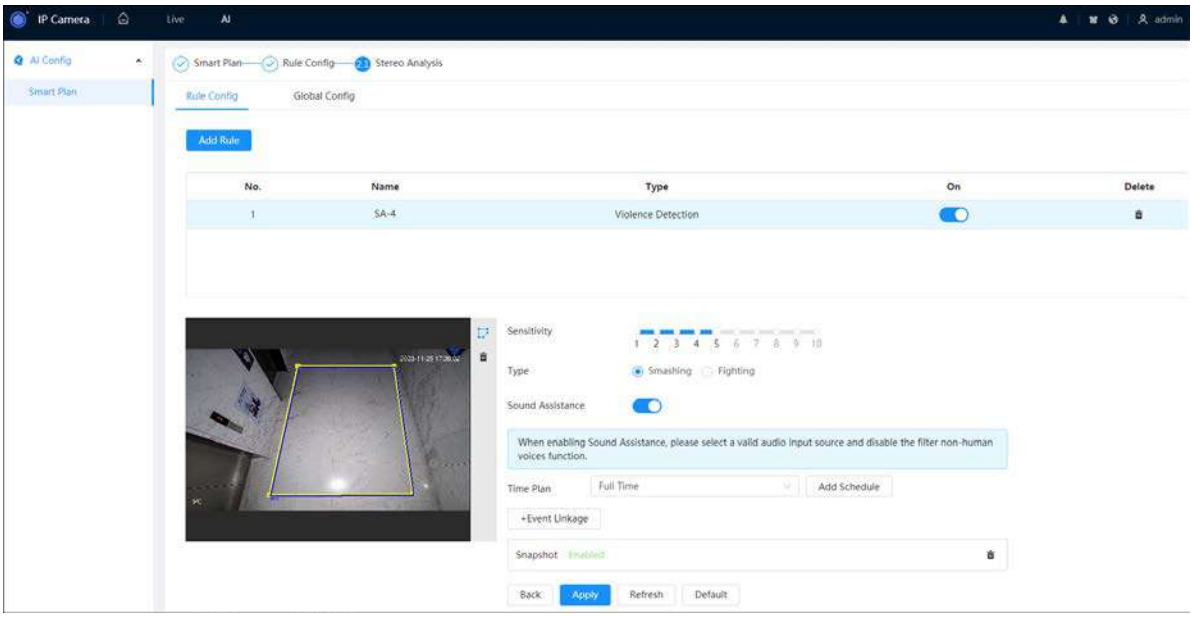
Step 2 Click on the right of the monitoring image to configure the detection area.

The default detection area is the maximum detection area. You can drag the rectangular frame corners within the area.

Step 3 Left-click and drag on the live video, left-click again to turn on the polyline and draw a warning area, and then right-click to finish the drawing.

- Draw 1 area (polygons are supported) with a maximum of 20 vertices.
- Click on the right of the monitoring image to redraw the detection area.
- A single rule can be added 3 times at most.
- After a single rule has been added 3 times, when you click **Add Rule**, this rule does not appear in the rule list any more.

Figure 3-7 Violence detection



Step 4 Select the sensitivity.

It is 5 by default. The higher the sensitivity, the easier the alarm is likely to be triggered.

Step 5 Configure the violence detection parameters.

Table 3-2 Violence detection parameter description

Parameter	Description
Type	• Fighting: When an alarm is triggered, the detection area flashes red. • Smashing: When an alarm is triggered, the detection area and bounding box flash red. • Fighting or smashing must be selected. • The smashing detection box must be drawn in the specific detection area. Do not use full-screen detection.

Parameter	Description
Sound Assistance	Click to enable sound assistance. The system can analyze external sounds to improve detection accuracy. You can configure sound assistance only when the type is smashing. Sound assistance is turned of by default.
Sensitivity	Configure the sensitivity for detecting smashing sound. The higher the sensitivity, the easier the alarm is likely to be triggered. Even light sounds can be recognized. It is 5 by default. You can configure the sound sensitivity only when the type is smashing.
Intensity Change Threshold	Detects the sudden change of the target sound, that is, detects the threshold at which the sound of the current frame is greater than that of the previous frame. When the threshold reaches the configured value, it is identified as smashing. It is 25 by default. You can configure intensity change threshold only when the type is Smashing.
Intensity Change Duration	The value ranges from 1 to 60 s. The default value is 5 s. You can configure sound changing duration only when the type is Smashing.

3.2.2.8 Abnormal Number of People Detection

When the number of target people in the drawn detection area is abnormal, an alarm is triggered, and the detection area flashes red.

Operations

Step 1 Click on the right of the monitoring image to clear the default detection area.

Step 2 Click on the right of the monitoring image to configure the detection area.

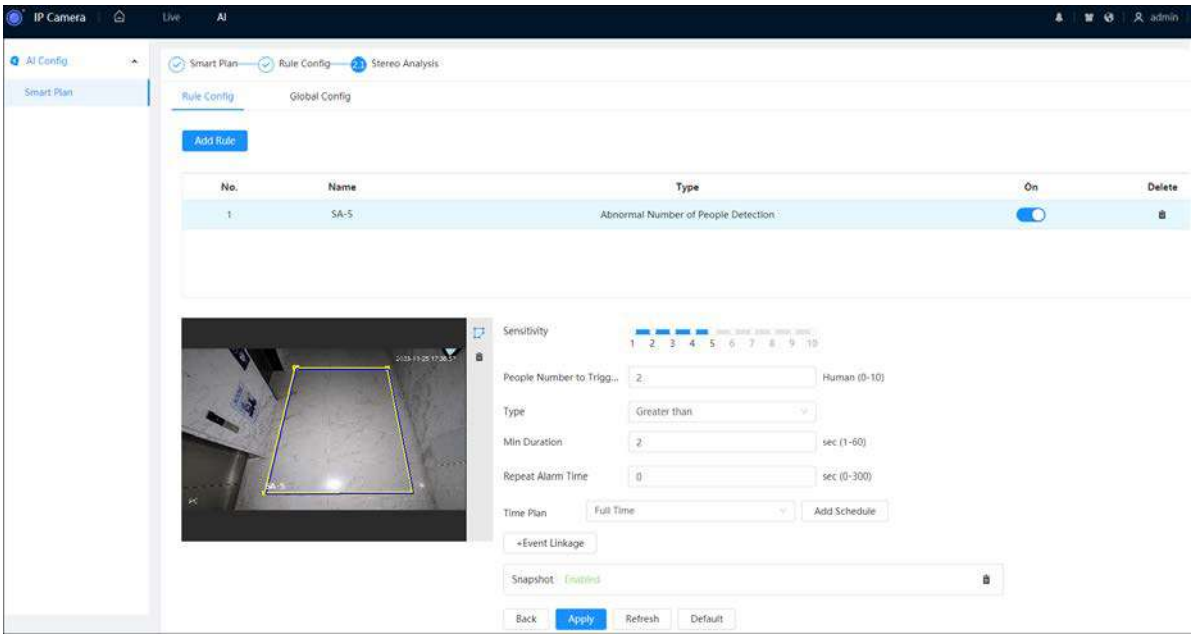
The default detection area is the maximum detection area. You can drag the rectangular frame corners within the area.

Step 3 Left-click and drag on the live video, left-click again to turn on the polyline and draw a warning area, and then right-click to finish the drawing.

- ◇Draw 1 area (polygons are supported) with a maximum of 20 vertices.

- Click on the right of the monitoring image to redraw the detection area.

Figure 3-8 Abnormal number of people detection



Step 4 Configure the parameters of abnormal number of people detection.

Table 3-3 Description of abnormal number of people detection parameters

Parameter	Description
Sensitivity	The higher the sensitivity, the easier the alarm is likely to be triggered. It is 5 by default.
People Number to Trigger Alarm	Configure the number of people in the area that triggers alarms. It is 2 by default.
Type	• Greater than: An alarm is triggered when the number of people is greater than the configured threshold. • Equal to: An alarm is triggered when the number of people is equal to the configured threshold. • Less than: An alarm is triggered when the number of people is less than the configured threshold. • Unequal to: An alarm is triggered when the number of people is not equal to the configured threshold.
Min Duration	An alarm is triggered when the status of abnormal number of people remains for the minimum duration. It is 2 s by default.
Repeat Alarm Time	After the first alarm occurs, the subsequent alarms are triggered at the configured interval to maintain the alarm status. It is 0 by default, which means the function is turned off.

Up to 10 rules in total can be added. When the number of rules reaches the limit, the Add Rule button is grayed out.

Step 5 Configure the time plan and event linkage.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add the linkage action and configure the linkage parameters.

Step 6 Click **Apply**.

For more information on other parameters, see the corresponding user's manual.

3.2.3 Ground Calibration

This section introduces how to perform the ground calibration. You need to complete the ground calibration after the stereo behavior rules are configured.

3.2.3.1 Rectangle Calibration

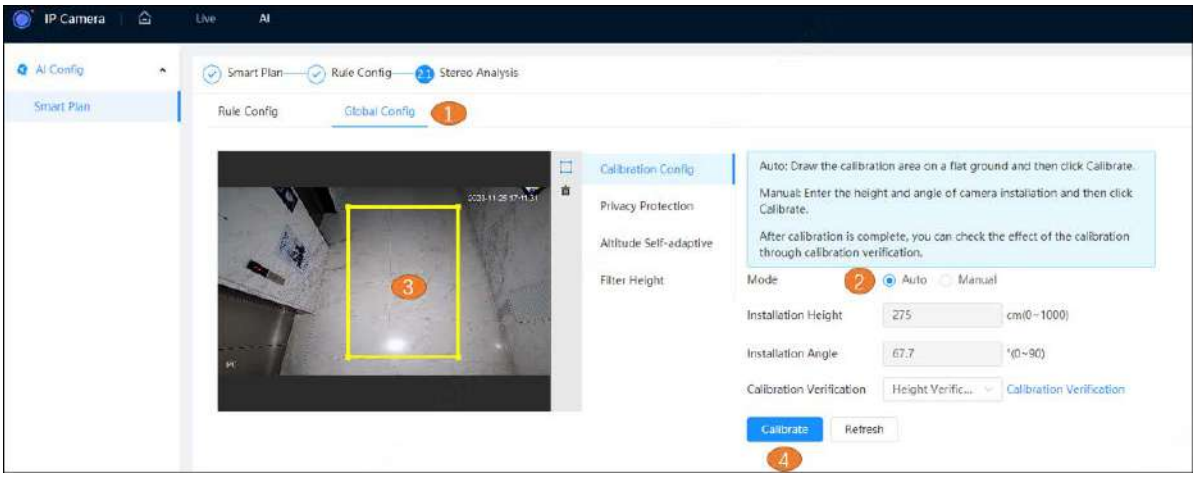
Step 1 Click **Global Config**, and then configure on the **Calibration Config** page.

Step 2 Select **Auto** or **Manual** mode.

It is **Auto** by default. See the following figure.

The rectangular rule box should cover as large a ground area as possible. Draw it in the center of the image. The mapping effect at some edges is not good. Do not let the rule box touch the edges.

Figure 3-9 Ground calibration



Step 3 After the rectangular ground calibration is applied, the calculated installation height and installation angle are displayed on the webpage. The two values are close to the actual installation height and angle value of the camera. When

the difference between the calculated installation height and angle and the actual values is ± 10 cm and ± 10°, it means that the calibration effect is good. If the difference between the calculated camera installation height and angle and the actual values is large due to the scene conditions, you can use the manual mode.

Enter the actual installation height and angle, and then click **Calibrate** for the configuration to take effect.

3.2.3.2 Calibration Verification

After you perform the rectangular ground calibration, there are two verification: Height verification and floor verification.

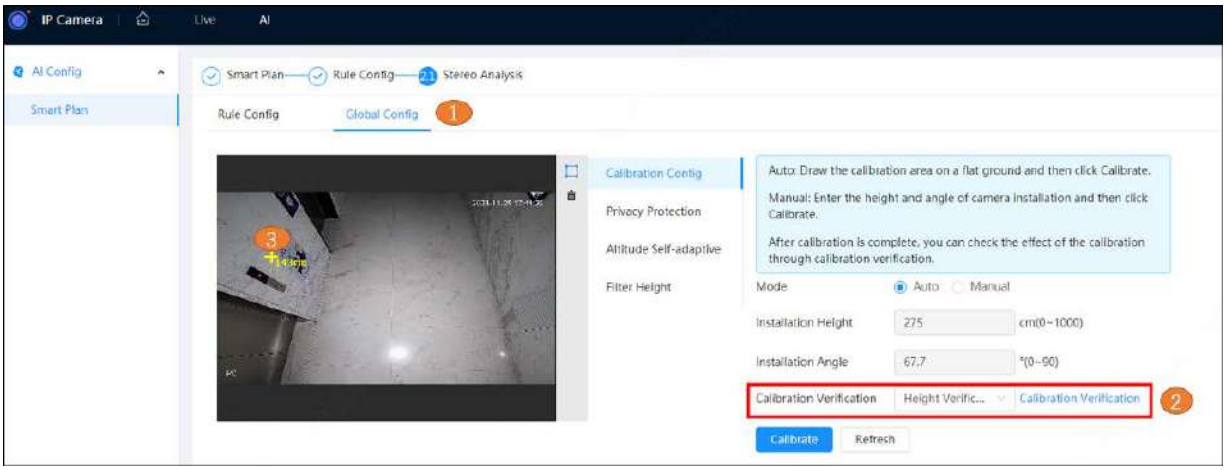
Verification method 1: Height verification.

Step 1 After you select **Height Verification** and click **Calibration Verification**, a yellow cross point is displayed in the image. You can drag the point to view the corresponding height.

Step 2 Randomly select the points on the ground and wall to verify the height information.

For example, click the ground with the actual value 0, if the displayed value is within the range of ± 10cm, it means the calibration is normal.

Figure 3-10 Height verification



Verification method 2: Floor verification.

Step 1 After you select **Floor** and click **Calibration Verification**, a green ground effect picture is displayed in the image, as shown in the following figure.

Step 2 When the green area covers most of the ground, it means that the calibration effect is good. When there are spacings in the image, and many fault blocks cover the ground, it means that the calibration is not successful. See the following figure.

Figure 3-11 Floor verification

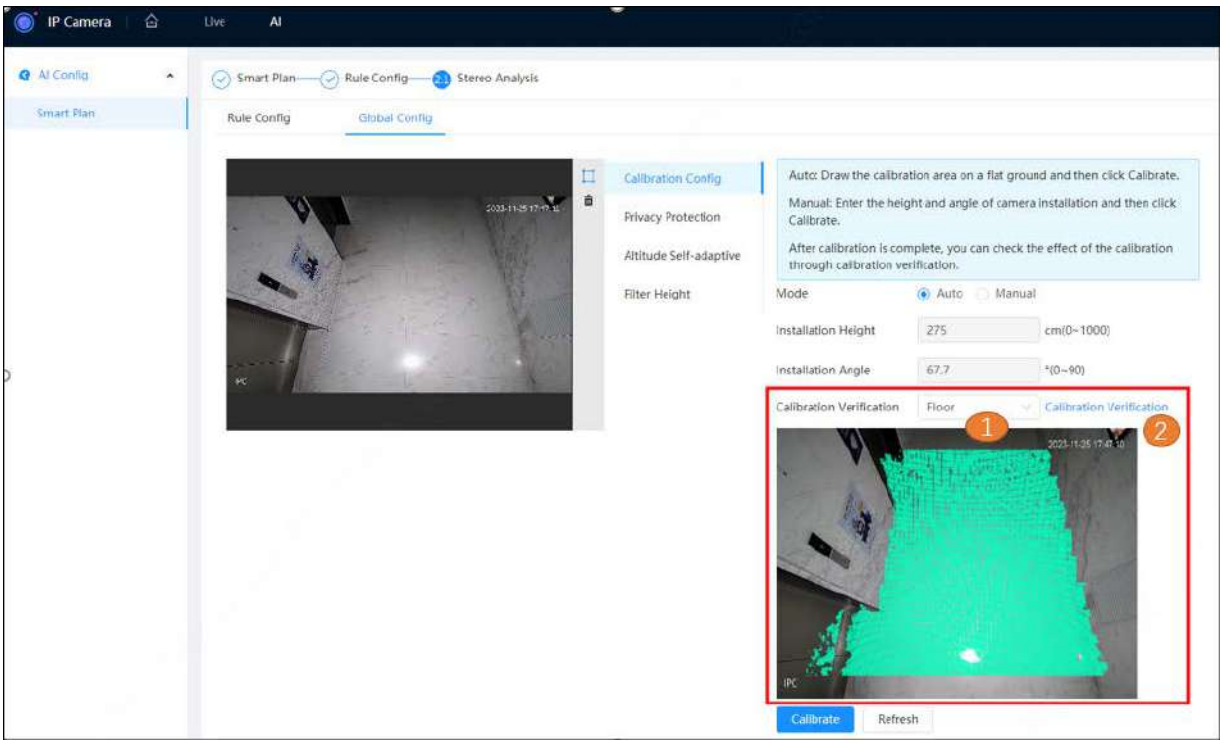
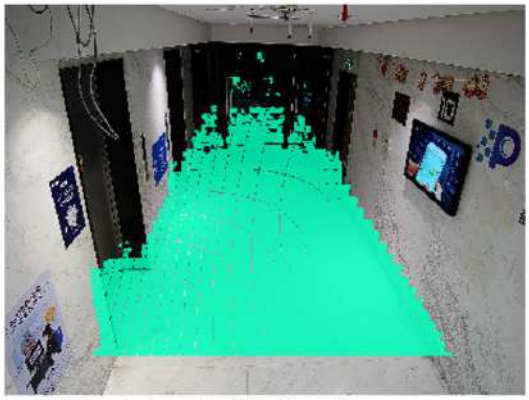
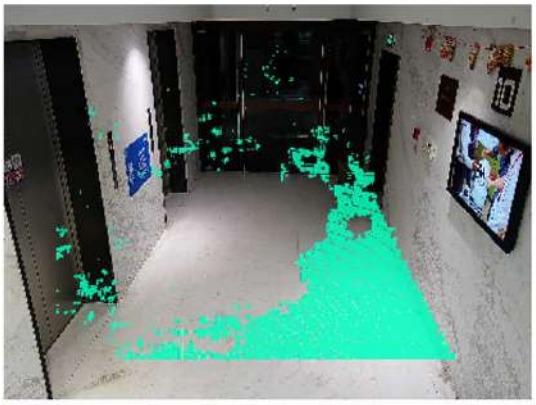


Figure 3-12 Correct and incorrect floor verification effect



Correct Floor Verification Effect

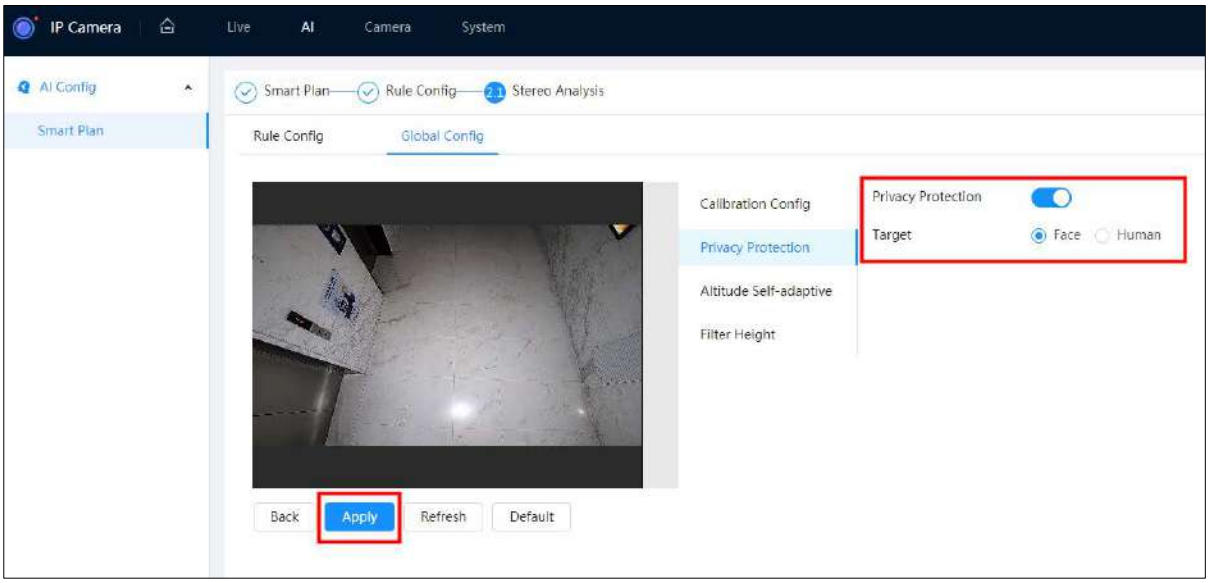


Incorrect Floor Verification Effect

3.2.4 Privacy Protection

The camera allows the real-time masking of faces or human bodies detected on the monitoring image to protect the privacy of certain groups. Select **Smart Plan > Stereo Analysis > Global Config > Privacy Protection**, enable **Privacy Protection**, select **Face** or **Human**, and then click **Apply** for the configuration to take effect. This function is turned off by default.

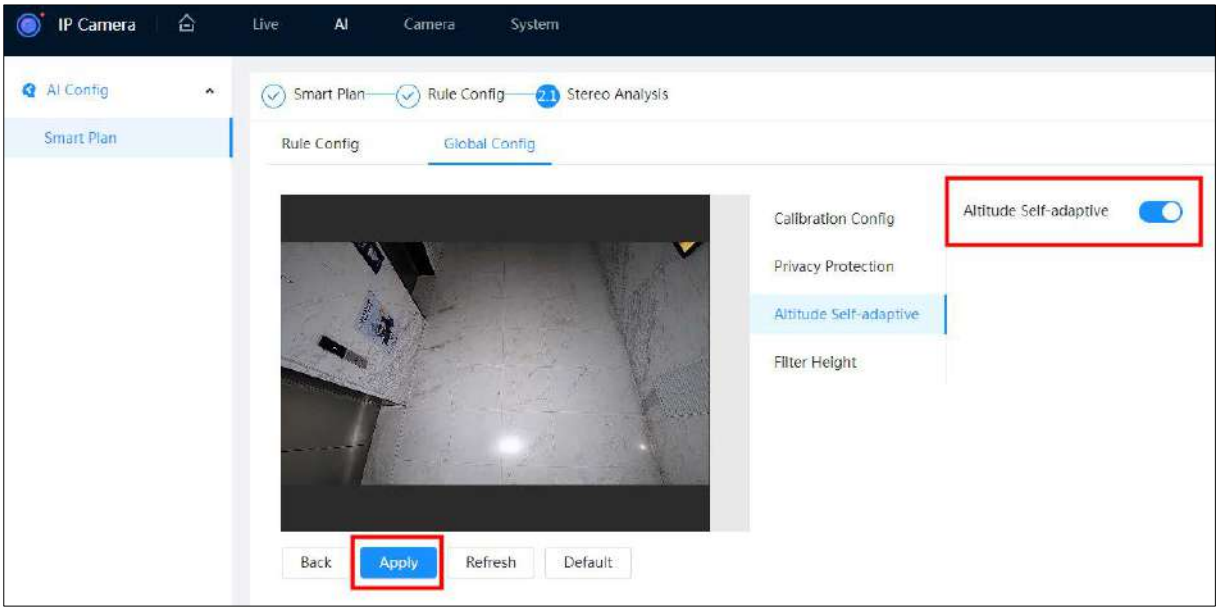
Figure 3-13 Privacy protection



3.2.5 Altitude Self-adaptive

The Altitude Self-adaptive technology adjusts the field of view according to the camera installation height and angle. By increasing the effective pixel proportion of the detection target in the image, the detection effect of the algorithm can be improved. Select **Smart Plan > Stereo Analysis > Global Config > Altitude Self-adaptive** to enable the function, and then click **Apply** for the configuration to take effect. This function is turned off by default.

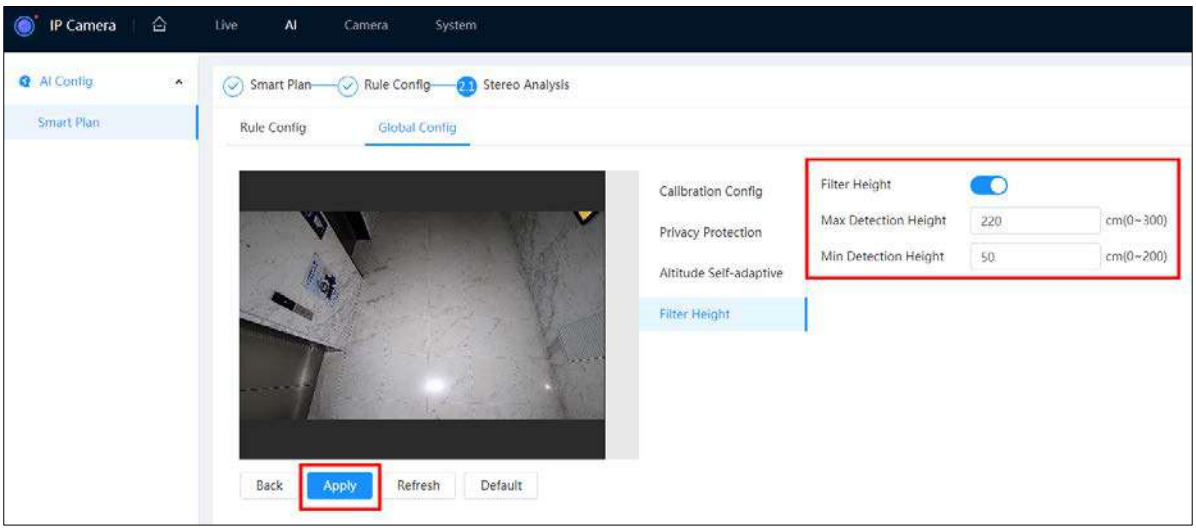
Figure 3-14 Altitude self-adaptive settings



3.2.6 Filter Height

The system can filter the height of the detection targets. Currently, the minimum detection height is 50 cm and the maximum detection height is 220 cm by default. If you have filtering requirements on the height of the detection targets, select **Smart Plan > Stereo Analysis > Global Config > Filter Height**, and then click **Apply** for the configuration to take effect. This function is enabled by default. See the following figure.

Figure 3-15 Filter height



3.3 Configuring IVS

8 rules are included in IVS: Tripwire, intrusion, abandoned object, fast moving, parking detection, crowd gathering, missing object and loitering detection. These rules can be enabled at the same time and each of them has its own configuration page.

3.3.1 Configuring AI Functions

3.3.1.1 Tripwire

When a target crosses the line toward the defined direction, an alarm is triggered. It is applicable to scenes with sparse targets and few occlusion among targets, such as the perimeter protection of unattended area.

Prerequisites

The global configuration for IVS are complete. For details, see "3.3.2 Global Configuration".

Operations

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS** under the video channel, and then click **Next**.

Step 3 Click the **Rule Config** tab.

Step 4 Click **Add Rule**, and then select **Tripwire** from the drop-down list.

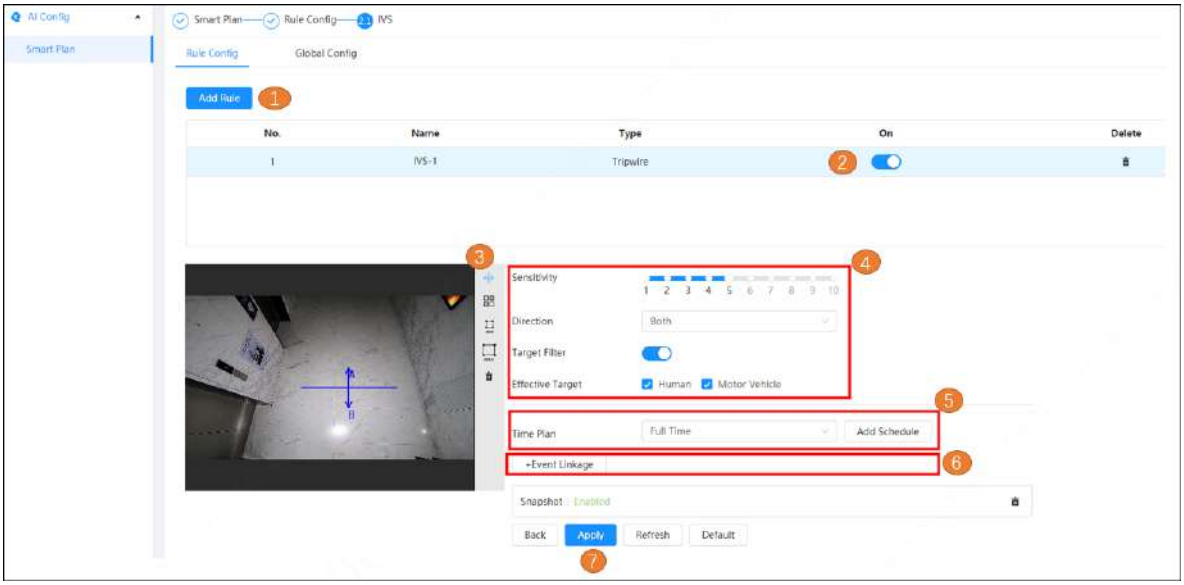
Step 5 The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name.

The rule is enabled by default.

Step 6 Click on the right of the image, and then draw 1 detection line on the monitoring image. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-16 Configure tripwire



Step 7 Configure IVS parameters.

Table 3-4 Description of IVS (tripwire) parameters

Parameter	Description
Direction	Configure the direction of rule detection. ● When configuring tripwire, select **A to B**, **B to A** or **Both**. ● When configuring intrusion, select **Enter**, **Exit** or **Both**.
Target Filter	After **Target Filter** is enabled, effective targets are not detected and alarms will not be triggered. This function is currently supported by tripwire, intrusion and fast moving.
Effective Target	Effective targets include human and motor vehicle. Among them, non-motor vehicle belongs to the category of human.
Action	When configuring the intrusion action, select **Appear**, **Cross** or **Inside**.

Parameter	Description
Sensitivity	• For fast moving, the sensitivity is related to the triggering speed. Lower sensitivity requires faster moving speed to trigger the alarm. • For crowd gathering, the sensitivity is related to the alarm triggering time. It is easier to trigger the alarm with higher sensitivity.

Step 8 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add linkage actions and configure linkage parameters.

Step 9 Click **Apply**.

3.3.1.2 Intrusion

When the target enters, leaves, or appears in the detection area, an alarm is triggered, and the system performs configured alarm linkages. It is applicable to scenes with sparse targets and few occlusion among targets, such as the perimeter protection of unattended area.

Prerequisites

The global configuration for IVS are completed. For details, see "3.3.2 Global Configuration".

Operations

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS**, and then click **Next**.

Step 3 Click **Rule Config** tab.

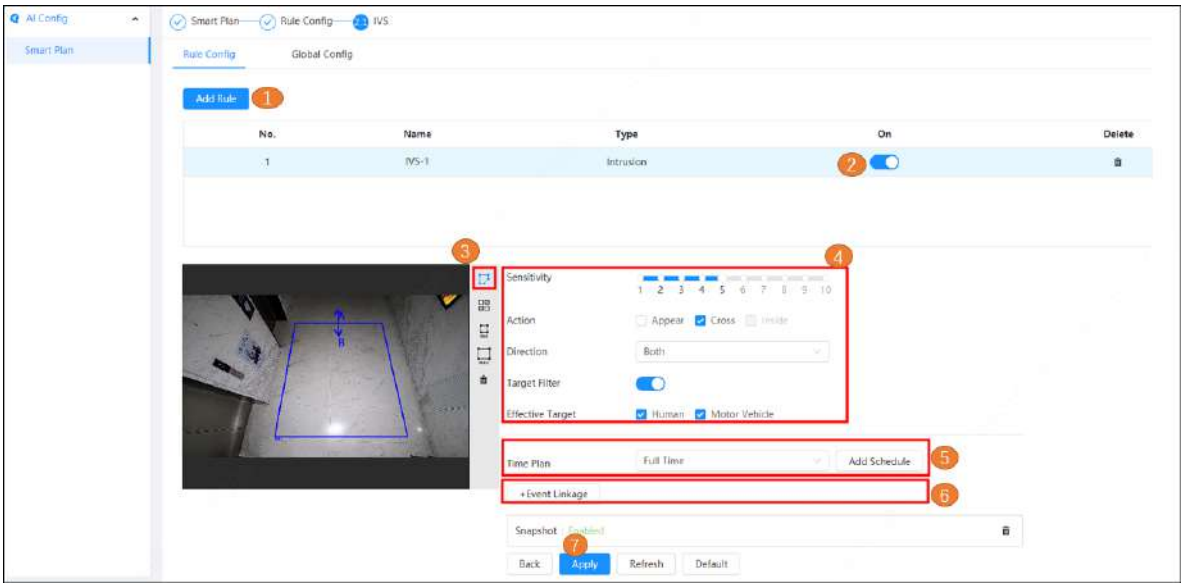
Step 4 Click **Add Rule**, and then select **Intrusion** from the drop-down list.

Step 5 The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name. The rule is enabled by default.

Step 6 Click  on the right of the image, and then draw 1 detection area. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-17 Configure intrusion parameters



Step 7 Configure IVS parameters.

Table 3-5 Description of IVS (intrusion) parameters

Parameter	Description
Direction	Configure the direction of rule detection. ● When configuring tripwire, select **A to B**, **B to A** or **Both**. ● When configuring intrusion, select **Enter**, **Exit** or **Both**.
Target Filter	After enabling **Target Filter**, effective targets are not detected and alarms will not be triggered. This function is currently supported by tripwire, intrusion and fast moving.
Effective Target	Effective targets include human and motor vehicle. Among them, non-motor vehicle belongs to the category of human.
Action	When configuring intrusion action, select **Appear**, **Cross** or **Inside**.
Sensitivity	● For fast moving, the sensitivity is related to the triggering speed. Lower sensitivity requires faster moving speed to trigger the alarm. ● For crowd gathering, the sensitivity is related to the alarm triggering time. It is easier to trigger the alarm with higher sensitivity.

Step 8 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add linkage actions and configure linkage parameters.

Step 9 Click **Apply**.

3.3.1.3 Abandoned Object

When an object is abandoned in the detection area for longer than the configured time, an alarm is triggered, and then the system performs configured alarm linkages. It is suitable for scenes with sparse targets and without obvious and frequent light change. Detection areas with simple texture are recommended.

- Missed alarms might increase in scenes with dense targets, frequent occlusion, and long people stay.
- False alarms might be triggered for abandoned or missing object in scenes with complex foreground and background.

Prerequisites

The global configuration for IVS are complete. For details, see "3.3.2 Global Configuration".

Operations

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS**, and then click **Next**.

Step 3 Click **Rule Config** tab.

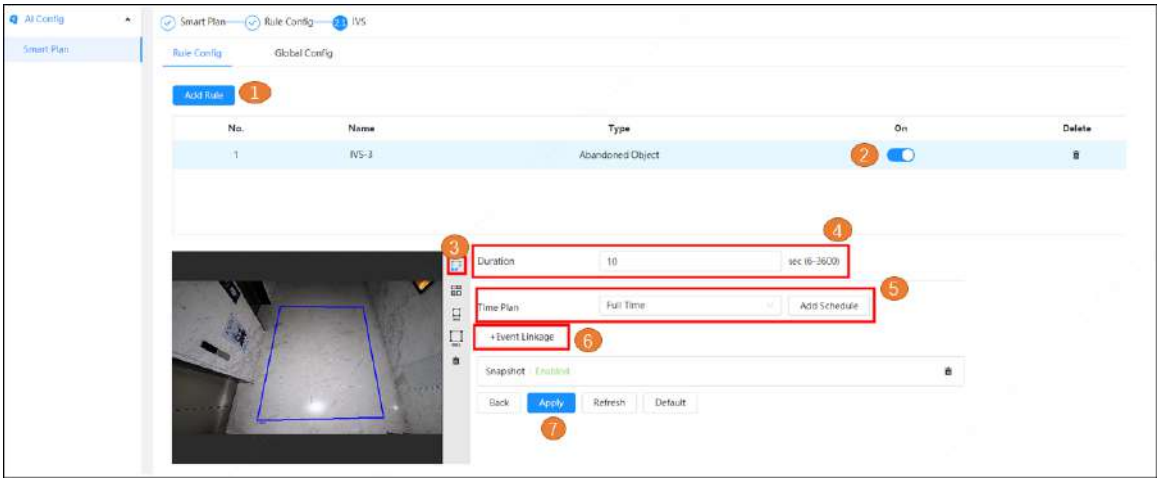
Step 4 Step 4 Click **Add Rule** and then select **Abandoned Object** from the drop-down list.

The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name. The rule is enabled by default.

Step 5 Click on the right of the image, and then draw 1 detection area. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-18 Configure abandoned object



Step 6 For abandoned object, the duration is the shortest time for triggering an alarm after an abandoned object is detected.

Step 7 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add linkage actions and configure linkage parameters.

Step 8 Click **Apply**.

3.3.1.4 Fast Moving

When the motion speed is higher than the configured speed, an alarm is triggered, and then the system performs configured alarm linkages. It is suitable for scenes with sparse targets and less occlusion. The camera should be installed right above the monitoring area. The light direction should be vertical to the motion direction.

Prerequisites

The global configuration for IVS are complete. For details, see "3.3.2 Global Configuration".

Operations

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS**, and then click **Next**.

Step 3 Click the **Rule Config** tab.

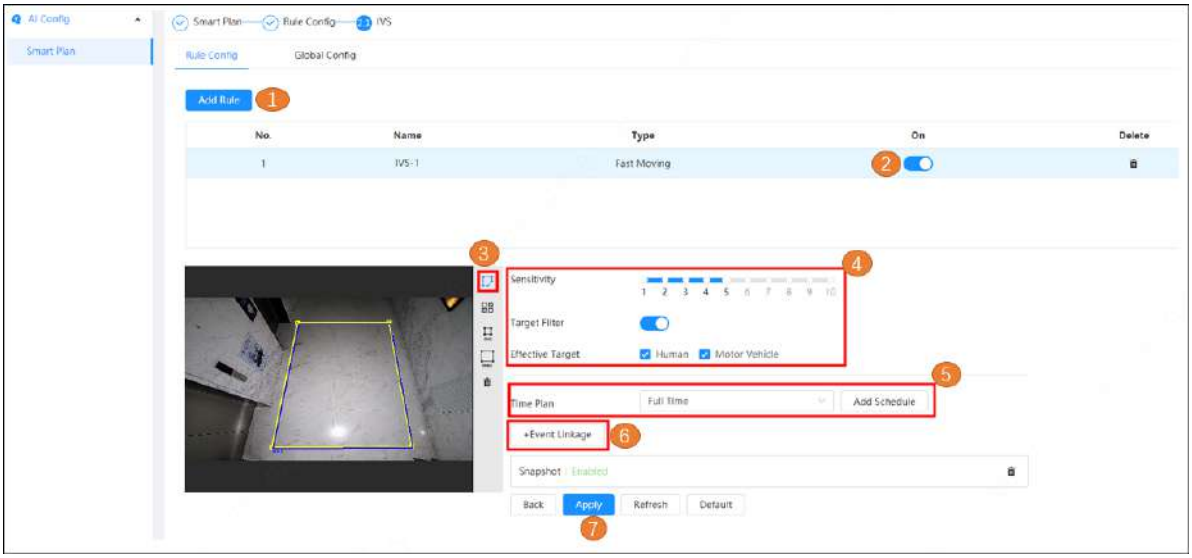
Step 4 Click **Add Rule** and then select **Fast Moving** from the drop-down list.

The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name. The rule is enabled by default.

Step 5 Click  on the right of the image, and then draw 1 detection area. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-19 Configure fast moving



Step 6 Configure IVS parameters.

Table 3-6 Description of IVS (fast moving) parameters

Parameter	Description
Target Filter	After you enable **Target Filter**, effective targets are not detected and alarms will not be triggered. This function is currently supported by tripwire, intrusion and fast moving. Effective targets include human and motor vehicle. Among them, non-motor vehicle belongs to the category of human.
Effective Target	
Sensitivity	• For fast moving, the sensitivity is related to the triggering speed. Lower sensitivity requires faster moving speed to trigger the alarm. • For crowd gathering, the sensitivity is related to the alarm triggering time. It is easier to trigger the alarm with higher sensitivity.

Step 7 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add linkage actions and configure linkage parameters.

Step 8 Click **Apply**.

3.3.1.5 Parking Detection

When the target remains static for longer than the configured time, an alarm is triggered, and then the system performs configured alarm linkages. It is suitable for road monitoring and traffic management scenes.

Prerequisites

The global configuration for IVS are complete. For details, see "3.3.2 Global Configuration".

Operations

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS**, and then click **Next**.

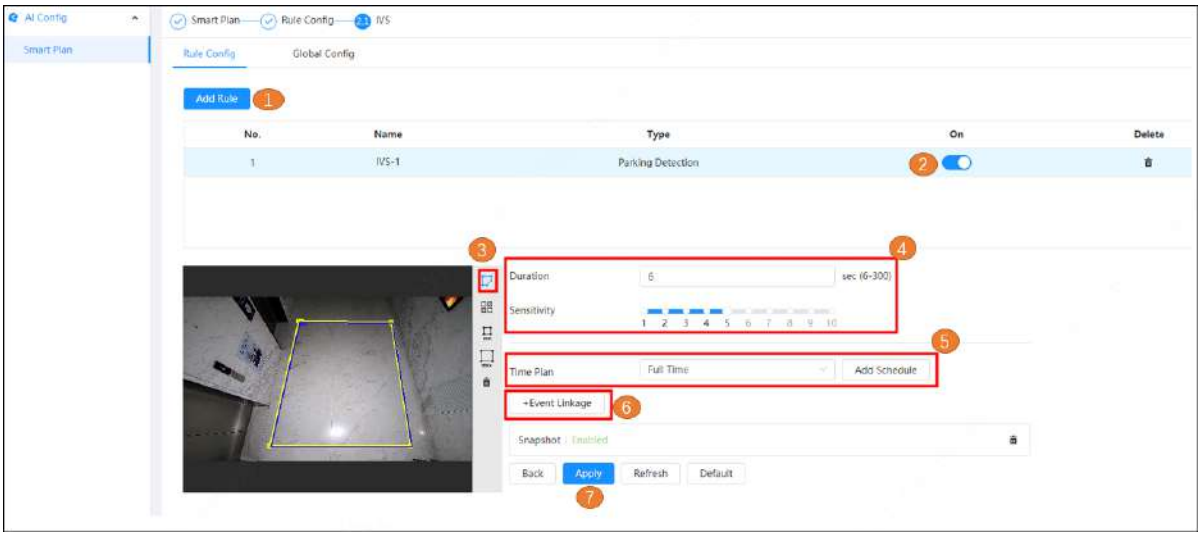
Step 3 Click the **Rule Config** tab.

Step 4 Click **Add Rule** and then select **Parking Detection** from the drop-down list. The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name. The rule is enabled by default.

Step 5 Click on the right of the image, and then draw 1 detection area. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-20 Configure parking detection parameters



Step 6 Configure IVS parameters.

Table 3-7 Description of IVS (parking detection) parameters

Parameter	Description
Duration	For parking detection, crowd gathering and loitering detection, the duration is the shortest time for triggering an alarm after an object appears in the area.
Sensitivity	• For fast moving, the sensitivity is related to the triggering speed. Lower sensitivity requires faster moving speed to trigger the alarm. • For crowd gathering, the sensitivity is related to the alarm triggering time. It is easier to trigger the alarm with higher sensitivity.

Step 7 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.

- Click E**vent Linkage** to add linkage actions and configure linkage parameters.

Step 8 Click **Apply**.

3.3.1.6 Crowd Gathering

When the crowd gathers or the crowd density is large, an alarm is triggered, and then the system performs configured alarm linkages. It is suitable for scenes with medium or long distance, such as outdoor plaza, government entrance, and station entrance and exit. It is not suitable for short-distance view analysis.

Prerequisites

The global configuration for IVS are complete. For details, see "3.3.2 Global Configuration"..

Operations

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS**, and then click **Next**.

Step 3 Click the **Rule Config** tab.

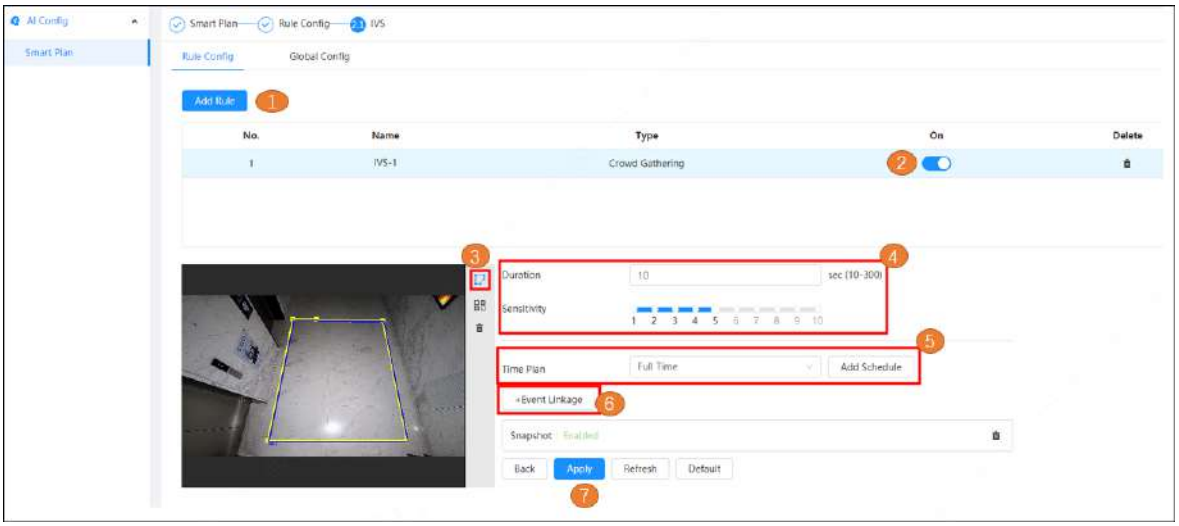
Step 4 Click **Add Rule**, and then select **Crowd Gathering**.

The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name. The rule is enabled by default.

Step 5 Click on the right of the image, and then draw 1 detection area. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-21 Configure crowd gathering parameters



Step 6 Configure IVS parameters.

Table 3-8 Description of IVS (crowd gathering) parameters

Parameter	Description
Duration	For parking detection, crowd gathering and loitering detection, the duration is the shortest time for triggering an alarm after an object appears in the area.
Sensitivity	• For fast moving, the sensitivity is related to the triggering speed. Lower sensitivity requires faster moving speed to trigger the alarm. • For crowd gathering, the sensitivity is related to the alarm triggering time. It is easier to trigger the alarm with higher sensitivity.

Step 7 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add linkage actions and configure linkage parameters.

Step 8 Click **Apply**.

3.3.1.7 Missing Object

When an object is taken out of the detection area for longer than the defined time, an alarm is triggered, and then the system performs configured alarm linkages. It is suitable for scenes with sparse targets and without obvious and frequent light change. Detection areas with simple texture are recommended.

- Missed alarms might increase in scenes with dense targets, frequent occlusion, and long people stay.
- False alarms might be triggered for abandoned or missing object in scenes with complex foreground and background.

Prerequisites

The global configuration for IVS are complete. For details, see 3.3.2 Global Configuration.

Operations

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS**, and then click **Next**.

Step 3 Click **Rule Config** tab.

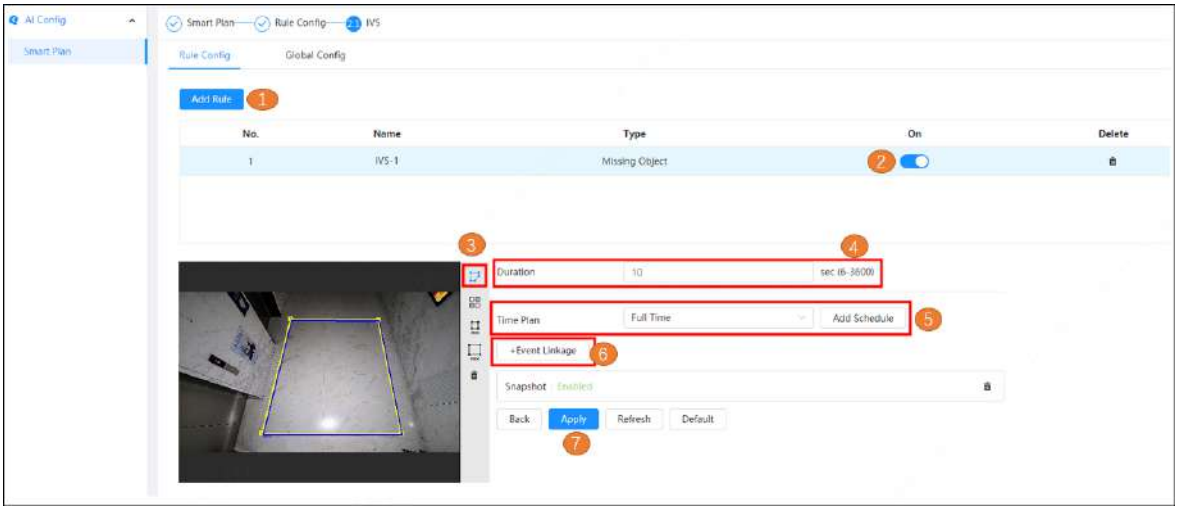
Step 4 Click **Add Rule** and then select **Missing Object** from the drop-down list.

The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name. The rule is enabled by default.

Step 5 Click  on the right of the image, and then draw a detection area. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-22 Configure missing object



Step 6 For missing object, the duration is the shortest time for triggering an alarm after an object is missing.

Step 7 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add linkage actions and configure linkage parameters.

Step 8 Click **Apply**.

3.3.1.8 Loitering Detection

When the target loiters for longer than the shortest alarm time, an alarm is triggered, and then the system performs configured alarm linkages. After an alarm is triggered, if the target stays in the area within the alarm interval, alarms will be triggered again. It is suitable for scenes such as industrial parks and halls.

Prerequisites

The global configuration for IVS are complete. For details, see Global Configuration.

Procedures

Step 1 On the home page, select AI > AI Config > Smart Plan.

Step 2 Enable **IVS**, and then click **Next**.

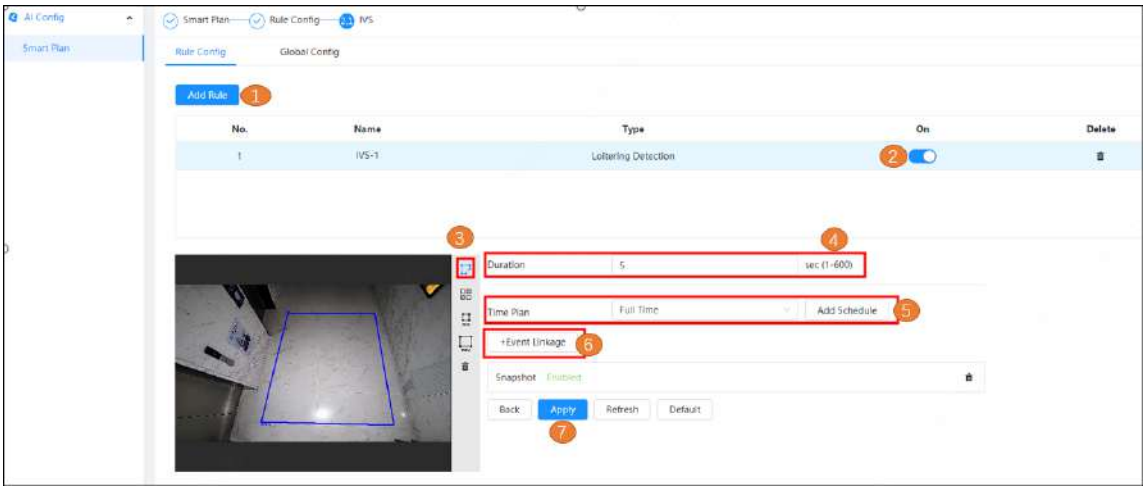
Step 3 Click the **Rule Config** tab.

Step 4 Click **Add Rule** and then select **Loitering Detection** from the drop-down list. The added rule is displayed on the following list. Click the text box under **Name** to edit the rule name. The rule is enabled by default.

Step 5 Click on the right of the image, and then draw 1 detection area. Right-click to finish the drawing.

Different rules have slightly different drawing requirements. Please follow the drawing rules below. After you draw the rules, drag the corners of the detection area or line to adjust the range.

Figure 3-23 Configure loitering detection parameters



Step 6 For loitering detection, the duration is the shortest time between the target appearing in the area and triggering the alarm.

Step 7 Configure the arming time plan and event linkage action.

- If the added schedule does not meet the requirements, click **Add Schedule** to add an arming schedule.
- Click **Event Linkage** to add linkage actions and configure linkage parameters.

Step 8 Click **Apply**.

3.3.2 Global Configuration

Configure global rules for IVS, including calibration drawing, calibration verification and sensitivity.

Background

Determine the relationship between the 2D image obtained by the camera and 3D actual object according to 1 horizontal ruler and 3 vertical rulers calibrated by the user and the corresponding actual distance.

- A medium or distant view with the installation height of more than 3 m is recommended. It is not suitable for scenes with parallel view or ceiling mount.
- Calibrate horizontal plane, not vertical walls or sloping surfaces.
- This function is not applicable to scenes with distorted view, such as the distorted views captured by wide-angle cameras.

Precautions

- Calibration Drawing
  - ◇ Calibration area: The calibration area drawn should be on one horizontal plane.
  - ◇ Vertical ruler: The bottom of 3 vertical rulers should be on the same horizontal plane. Select 3 reference objects with fixed height in triangular distribution as vertical rulers, such as vehicles parked at roadside or road lamp poles. Arrange 3 people to draw at each of the 3 positions in the monitoring scene.
  - ◇ Horizontal ruler: Select reference objects with known length on the ground, such as signs on the road, or use a tape to measure the actual length.
- Calibration Verification
  After configuring the ruler, draw a straight line on the image, check the estimated value of the straight line, and then compare this value with the value measured in the actual scene to verify calibration accuracy. In case of major difference between the estimated value and the actual one, fine-tune or reset parameters until the error requirement is met.

Procedures

Step 1 On the home page, select **AI > AI Config > Smart Plan**.

Step 2 Enable **IVS**, and then click **Next**.

Step 3 Click the **Global Config** tab.

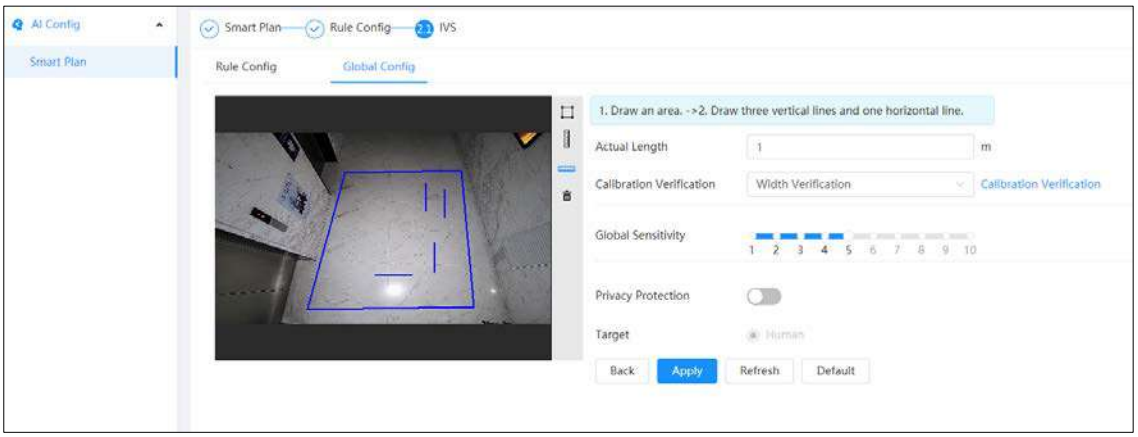
Step 4 Configure the calibration area and rulers on the left of the image.

1) Click , draw a calibration area on the left of the image, and then right-click to finish the drawing.
2) Click the ruler icon to draw 1 horizontal ruler and 3 vertical rulers in the calibration area.
   - ◇ represents the vertical ruler; represents the horizontal ruler.
   - ◇ Select the added rulers on the left of the image, and then click to delete the selected ruler.
3) Configure the actual length.

Step 5 Configure global configuration parameters of IVS.

Sensitivity: Adjust the filter sensitivity. With higher value, it is easier to trigger an alarm when low-contrast target and small target are captured, and the false detection rate is higher.

Figure 3-24 Global configuration (IVS)



Step 6 Click **Apply**.

Related Operations

1. Select the verification type, and then click **Calibration Verification**.
   To verify the vertical ruler and horizontal ruler, respectively select **Height Verification** and **Width Verification**.
2. Draw a straight line in the image to verify whether the rulers are correctly set. In case of major difference between the estimated value and the actual one, fine-tune or reset parameters until the error requirement is met.

4 FAQ

4.1 Stereo analysis does not trigger alarms.

Problem

No alarms are triggered when the device detects an alarm event.

Possible Reasons

- The device programs are not the latest baseline version.
- The scene does not meet the detection requirements.
- Human pixels do not meet the detection requirements.
- Stereo analysis is not enabled.
- Detection rules are not enabled.
- The ground calibration effect is not satisfactory.

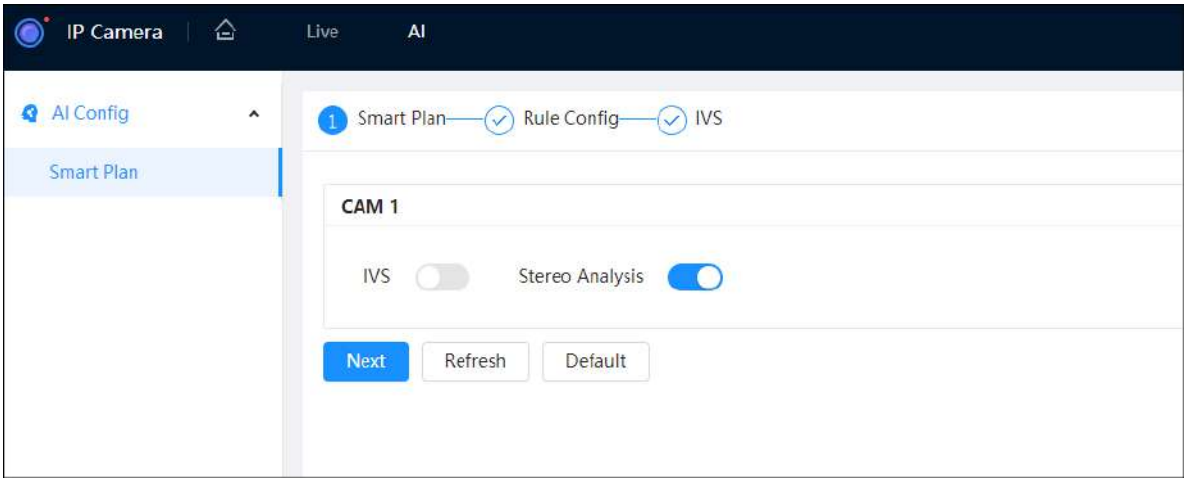
Solution

Step 1 Make sure that the scenarios meet the requirements, there is no backlight and occlusion, and the pixels of human meet the detection requirements.

Step 2 Check whether stereo analysis is enabled.

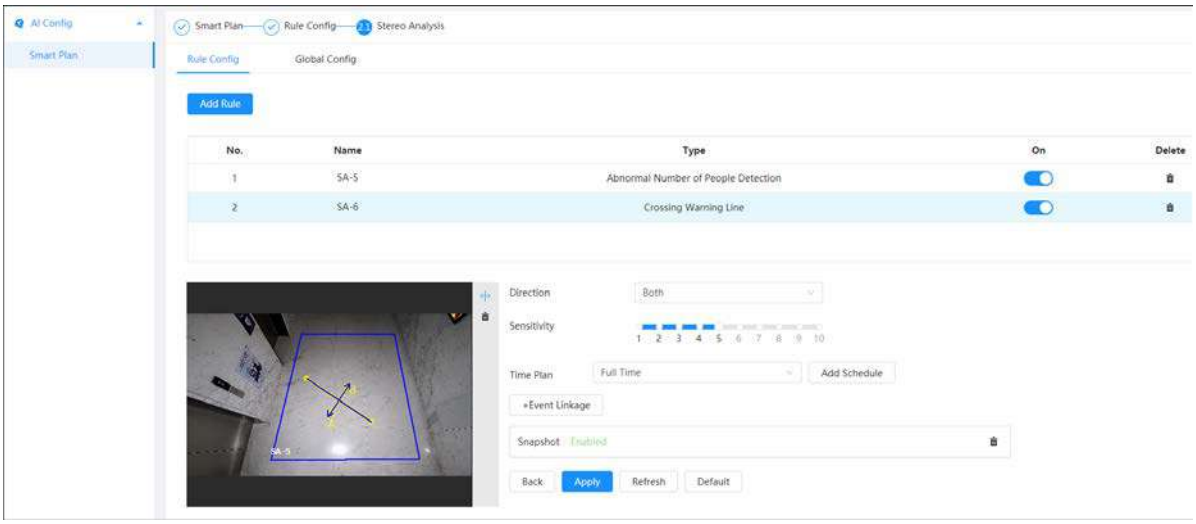
1) If it is not enabled, enable the function, and click **Next**.

Figure 4-1 Enable AI function



2) If the function is already enabled, check whether the rule is enabled.

Figure 4-2 Enable the rule



3) If both the AI function and the rule are enabled, select **System Info > Device Info**, and check whether the device program version is updated to the latest baseline or related customized programs.

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