AXIS Image Health Analytics

User manual

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About the application

AXIS Image Health Analytics is an AI-based application that analyzes and learns the behavior of the scene to detect changes in the image. Use the application with compatible Axis cameras to detect image degradations and tampering attempts.

The application can detect the following changes in the image:

- Blocked image
- Redirected image
- Blurred image
- Underexposed image

With the event management system in Axis devices, or with third-party software, you can trigger actions based on the detections, for example notify staff to clean the cameras, or alert security staff.

For a complete list of Axis cameras that include AXIS Image Health Analytics, see *axis.com/products/axis-image-health-analytics#compatible-products*.

Considerations

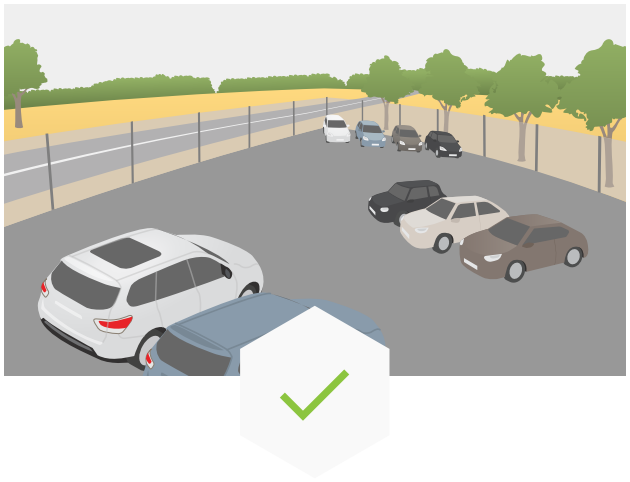
AXIS Image Health Analytics analyzes and learns the behavior of the scene to detect image degradations and tampering attempts. When the application detects a change in the image, it sends an event. Before you set up AXIS Image Health Analytics and create rules for events, consider the following:

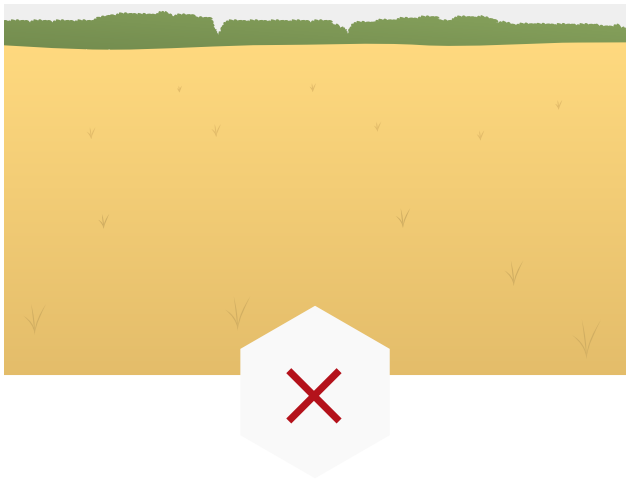
Note

The considerations in this chapter are generic. For product-specific considerations, see the user manual for your camera at *help.axis.com*.

Scenes with little or no variation

Scenes without any distinct features or details make it harder to detect changes in the image. This is typical for scenes where the background has little or no variation, like a field of grass, a blank wall, or a dark room.





For more information about scene requirements, see .

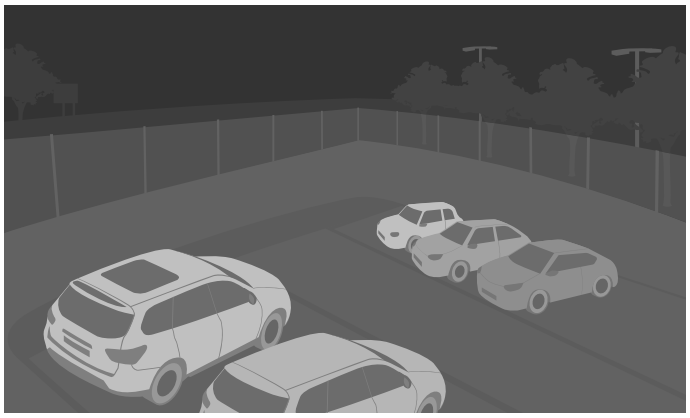
Sudden light changes

Turning on or off a light creates a sudden change in the scene. For cameras without built-in IR or sufficient illumination, an image that suddenly turns dark can cause the application to send events both due to an underexposed and a blocked image. For cameras with built-in IR, there is a risk that a sudden loss of light will make the application send an event during the switch to night mode.

An indoor scene with sufficient light

The same scene without a light source

Turning on a light can also change the appearance of the scene completely, for example by causing shadows.

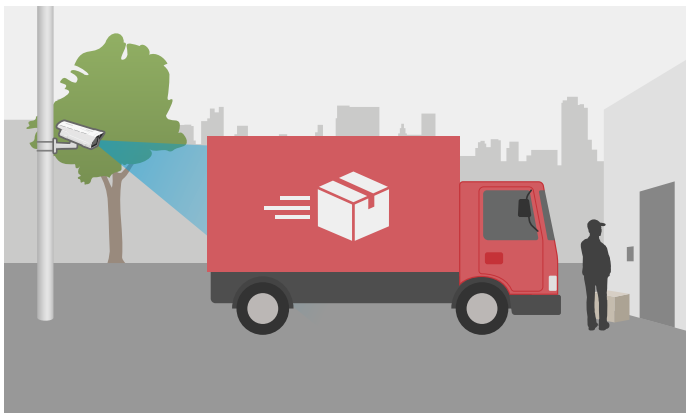


A dark outdoor scene with IR illumination

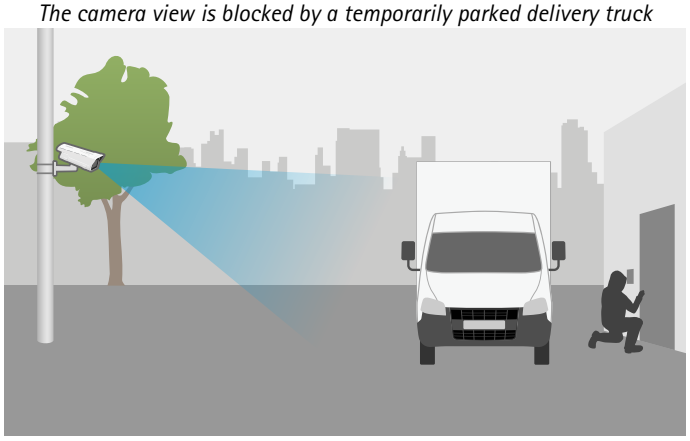
The same scene where the floodlights behind the trees cause long shadows

Objects obstructing the view

The application can detect when something blocks the camera view, but it can't determine the intention. For example, trucks or buses that happen to stop in front of the camera can obstruct the view, which makes the application send an event for a blocked image.



The camera view is blocked by a temporarily parked delivery truck



The camera view is blocked by an intentionally parked truck

If the camera view is completely blocked, the image will no longer be in focus and could also go dark. In this case, the application could send events for a blocked, blurred and underexposed image at the same time.

Moving the camera

AXIS Image Health Analytics can't determine whether camera movement is intentional or accidental. This means that the application will trigger an event for a redirected image regardless if someone moves the camera to improve the surveillance zone or to tamper with it.

Sudden movements can affect the focus, causing the application to trigger a blurred image. Additionally, if the camera moves to a scene that differs significantly from its previous position, the application can send a blocked image event.

For PTZ devices, AXIS Image Health Analytics suspends its analysis whenever the PTZ camera pans, tilts, or zooms. Once the PTZ movement stops, the analysis will resume if the camera returns to its original position, or it will relearn the scene if the view has changed.

Note

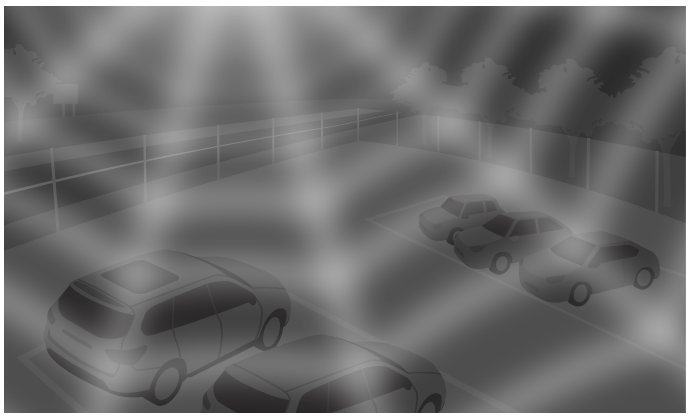
For the application to function correctly, the camera must remain stationary at each guard tour position long enough for PTZ stabilization (30 seconds), scene relearning (10 seconds), and alert confirmation.

For example, each time the camera moves to a new position, the application requires 30 seconds for PTZ stabilization before it can trigger relearning, followed by 10 seconds to relearn the scene. Only after these steps can the system begin detecting and validating alerts.

To ensure proper operation, the dwell time at each position must be longer than the total time required for stabilization, scene relearning, and alert confirmation.

Spider web in front of the camera

Spider web in front of the camera is a common issue, especially during nighttime when the web can cause reflections in the image for cameras with IR illumination.



Spider web causing reflections when using IR illumination

The application can help monitor issues with spider web in front of the camera by sending an event for a blocked or blurred image, but if spiders keep moving across the view it could cause the application to send the event several times.

Turning off the application

When you turn off the application, and then turn it on again, it relearns the behavior of the scene. For more information about relearning the scene, see .

Privacy masks

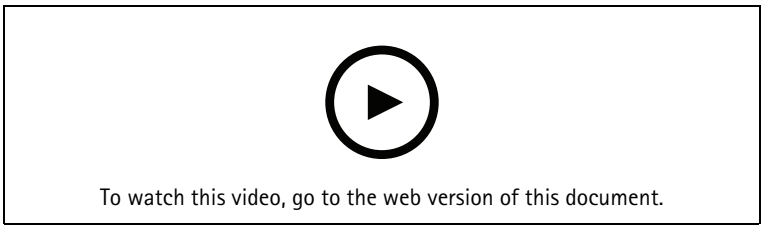
If you add a privacy mask to a camera view that is already running AXIS Image Health Analytics, the mask could make the application send an event due to a blocked image. To relearn the behavior of the scene with the privacy mask in the image, restart the application. However, no detections will be made in the masked area. For more information about relearning the scene, see .

Get started

1. In the camera's web interface, go to **Analytics > AXIS Image Health Analytics**.
2. Click **Start** to start the application.
3. Click **Open** to open the application in a new browser tab.
4. Select the image changes that you want the application to detect.
   All detection settings are turned on by default.
   - **Blocked image**: Sends an event when the view is obstructed.
   - **Redirected image**: Sends an event when the original orientation of the view changes.
   - **Blurred image**: Sends an event when the image is blurred.
   - **Underexposed image**: Sends an event when the image is too dark.

To learn more about the detection settings, see .

5. You can adjust the sensitivity slider for each detection setting.
   A higher value makes the application more sensitive to changes in the image. For more information, see .
6. Go to **Validation period** to set a time threshold in seconds for each detection setting.
   The validation period is relevant if you only want the application to send events when the image change has occurred for a set time. For more information, see .



This video shows how to set up AXIS Image Health Analytics.

Configuration

Set up rules for events

To learn more, check out our guide *Get started with rules for events*.

Send an email when the image has been blocked for 60 seconds

This example explains how to set up a rule in the camera's web interface that sends an email when the image has been obstructed for more than 60 seconds, for example by a parked truck.

Before you start:

- Create an email recipient in the camera's web interface.

In AXIS Image Health Analytics:

1. Turn on **Blocked image**.
2. Set **Validation period** to 60 seconds.

In the camera's web interface:

3. Go to **System > Events** and click **+ Add a rule**
4. Type a name for the rule.
5. In the list of conditions, under **Application**, select **Image Health Analytics – Block**.
6. In the list of actions, under **Notifications**, select **Send notification to email**.
7. Select a recipient from the list.
8. Type a subject and message for the email.
9. Click **Save**.

Learn more

Detections and events

AXIS Image Health Analytics can detect the following changes in the image:

- **Blocked image**: The application detects when the image, or camera view, is obstructed, for example if something covers the camera.
- **Redirected image**: The application detects when the original orientation of the view changes, for example if someone moves the camera.
- **Blurred image**: The application detects when the image is blurred, for example due to raindrops on the lens.
- **Underexposed image**: The application detects when the image is too dark, for example if a light source in the scene suddenly disappears.

By default, the application is set to detect all of these changes. When a detection occurs, the application sends an event. You can set up rules based on these events in the device's event management system or in the VMS. You can also set up rules based on the scene suitability.

Apart from sending an event when a detection occurs, the application also sends an event when the detected image change goes back to normal.

Scene suitability

When you turn on AXIS Image Health Analytics, it immediately starts to analyze and learn the behavior of the scene. If the scene doesn't contain any distinct features or details, it will be harder for the application to detect any changes. In this case, the application signals that the scene is unsuitable.

Example of a suitable and an unsuitable scene.

The application analyzes the scene continuously. This means that the suitability can change, for example if you change the camera's zoom level or move or redirect the camera.

Note

When the scene is unsuitable, the application can't send any events for blocked, blurred or redirected images. Regardless of suitability, the application sends events if the image is underexposed.

Learning and relearning the scene

AXIS Image Health Analytics learns the behavior of the scene to detect when something changes. If you turn off the application, and then turn it on again, it will relearn the behavior of the scene. The application will also relearn the scene when it changes from unsuitable to suitable.

If your intention is to change the camera view, turn off the application and adjust the camera view before you turn it on again.

Sensitivity to image changes

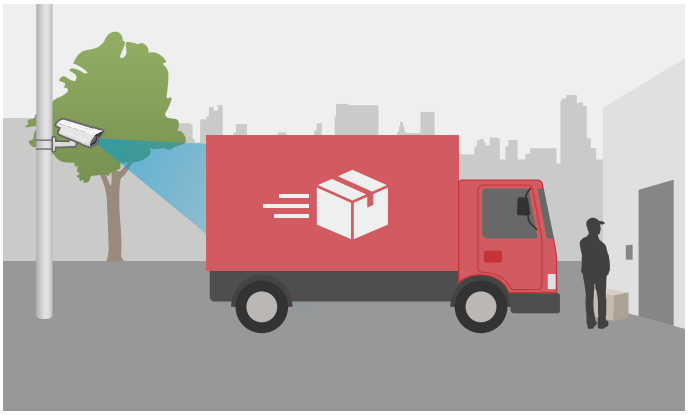
You can increase or decrease the application's sensitivity to changes in the image. A higher sensitivity means that less of the image needs to change for the application to send events, which in most cases increases the number of sent events. A lower sensitivity on the other hand requires more of the image to change, which likely will decrease the number of sent events.

- **Blocked image**: The sensitivity is affected by how much of the image that is blocked or obstructed, compared to what the image looked like when learning the scene.
- **Redirected image**: The sensitivity is affected by how much of the image that is still visible, compared to what the image looked like when learning the scene.
- **Blurred image**. The sensitivity is affected by the level of blurriness in the image, compared to what the image looked like when learning the scene.
- **Underexposed image**: The sensitivity is affected by the level of underexposure in the image.

Validation period

In AXIS Image Health Analytics, you can set a validation period for each detection setting. The validation period acts as a time threshold, and is relevant if you only want the application to send events when the detected change has occurred for a set time.

Example:
In the scene, there is a risk of delivery trucks making temporary stops in front of the camera, which can block the camera view. You only want to be notified if the camera view has been blocked for two minutes, so you set the **validation period** in AXIS Image Health Analytics to 120 seconds.



Integration

Set up alarms in AXIS Camera Station

This example explains how to set up a rule in AXIS Camera Station to alert the operator and record video when AXIS Image Health Analytics detects an image change.

Before you start

You need:

- an Axis network camera with AXIS Image Health Analytics set up and running, see .
- a computer with AXIS Camera Station installed

Add the camera to AXIS Camera Station

1. In AXIS Camera Station, add the camera. See the *user manual for AXIS Camera Station*.

Create a device event trigger

1. Click + and go to **Configuration > Recording and events > Action rules** and click **New**.
2. Click **Add** to add a trigger.
3. Select **Device event** from the list of triggers and click **Ok**.
4. In the **Configure device event trigger** section:
   - In **Device**, select the camera.
   - In **Event**, select one of the options for **AXIS Image Health Analytics**.
   - In **Trigger period**, set an interval time between two successive triggers. Use this function to reduce the number of successive recordings. If an additional trigger occurs within this interval, the recording will continue and the trigger period starts over from that point in time.
5. In **Filters**, set **active** to **Yes**.
6. Click **Ok**.

Create actions to raise alarms and record video

1. Click **Next**.
2. Click **Add** to add an action.
3. Select **Raise alarm** from the list of actions and click **Ok**.

Note

The alarm message is what the operator sees when an alarm is raised.

4. In the **Alarm message** section, enter an alarm title and description.
5. Click **Ok**.
6. Click **Add** to add another action.
7. Select **Record** from the list of actions and click **Ok**.
8. In the list of cameras, select the camera to use for recording.
9. Select a profile and set the prebuffer and postbuffer.
10. Click **Ok**.

Specify when the alarm is active

1. Click **Next**.
2. If you only want the alarm to be active during certain hours, select **Custom schedule**.
3. Select a schedule from the list.
4. Click **Next**.
5. Enter a name for the rule.
6. Click **Finish**.

Monitoring guide

AXIS Image Health Analytics helps you monitor common image health issues, either caused by external factors or originating in the camera itself. When you encounter alarms based on AXIS Image Health Analytics, follow this step-by-step guide based on the type of alarm to find out which actions to take.

Underexposure alarms

Alarms in day mode		
Does your camera operate with default settings?	Yes	Check the camera's day/night mode threshold. The longer the camera stays in day mode, the higher the risk of underexposure in low light conditions. For more information, see the camera's user manual.
	No	Check the camera's image settings. Low gain and a high shutter speed results in a darker image in low light, which increases the risk of underexposure. For more information, see the camera's user manual.

Alarms in night mode		
Does your camera have built-in IR?	Yes	• Make sure the camera's IR light is turned on and set to **Auto**. • If there is an external light source directed at the camera, try to set a custom exposure zone in the camera's image settings to exclude the illuminated parts of the scene. • If too much of the sky is visible in the camera view, adjust the camera view, or set a custom exposure zone in the camera's image settings, to exclude parts of the sky. For more information, see the camera's user manual. • Consider adding a validation period in AXIS Image Health Analytics. The validation period acts as a time threshold that gives the camera extra time to switch to night mode. For more information, see .
	No	• Consider adding external illumination to the scene. • Consider creating a scheduled rule which is active only during hours with suitable illumination. For more information, see the camera's user manual.

Blurred image alarms

Alarms due to focus issues		
Is it a recurring problem?	Yes	• Check that the camera's heater works as intended, for example by checking the temperature log. • Contact Axis support at *axis.com/support*.

Alarms due to focus issues		
	No	• If the camera has a motorized lens, start **Autofocus**. • Contact Axis support at *axis.com/support*.

Alarms due to external factors		
Is something covering the camera?	Yes	• Check if there is dirt on the dome or front glass of the camera. • Check if the protective film on the camera has been removed.
	No	• Check if there are scratches on the dome or front glass of the camera. • Check if the blur is caused by the sun or rain, and consider adding a sun- or weathershield.

Troubleshooting

Problems with suitability	
... due to a scene without distinct features	Try to adjust the camera's field of view, for example by zooming out or moving the camera. There need to be some details or distinct features in the image for the application to detect any changes. For more information, see .

Problems with false alarms	
... due to droplets from rain or snow	Try using a weathershield. Weathershields are usually included with outdoor cameras, or available as optional accessories.
... due to reflections from the sun	Try using a weathershield or a sunshield. Weather- or sunshields are usually included with outdoor cameras, or available as optional accessories.
... due to the camera rotating the image automatically	Some cameras support automatic rotation. Go to **Video > Installation > Rotate** in the camera's web interface and select a rotation angle instead of keeping it on **Auto**.
... due to headlights from approaching vehicles	Try to only include roads in your scene if they're in the area of interest. Even though cameras with IR illumination usually can handle sudden light changes, a strong headlight can make it switch from night (black/white) to day (color) mode and change the scene completely.
... due to shadows or sudden light changes	For cameras **without** built-in IR, try to add IR or white LED illumination to the scene. If the illumination is insufficient and creates shadows, or if the light suddenly disappears, the scene changes. For cameras **with** built-in IR, the switch to night mode is sometimes delayed, for example if too much of the sky is visible in the view. Try to adjust the camera view or the exposure zone in the camera's web interface to show less of the sky. You can also set a validation period in the application, which adds a time threshold that gives the camera extra time to switch to night mode. For more information, see .
... when using privacy masks	Try to restart the application. If you add a privacy mask to a camera view that already runs AXIS Image Health Analytics, the application may need to relearn the behavior of the scene.
... due to spider web and spiders moving over the camera view	Try to use an external IR light to avoid attracting spiders to the camera.

Problems with missed alarms	
... when the image has been blocked or redirected	If the view has been blocked or redirected for more than 10 minutes, the application will relearn the behavior of the scene and base detections on the new scene. Make sure to take action when the application triggers on a blocked or redirected image.

Contact support

If you need more help, go to *axis.com/support*.

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