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Scene Analysis Training Technical Note

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Contents

| | |
|--|----|
| Introduction to Scene Analysis | 5 |
| Train Scene Analysis | 6 |
| Create a New Configuration | 6 |
| Configure Category Details | 8 |
| Set Reference Points | 10 |
| Define a Region of Interest | 11 |
| Set a Scene Mask | 11 |
| Define the Size, Shape, and Orientation of an Alarm Object | 12 |
| Define the Velocity of an Alarm Object | 13 |
| Define a Moving Object | 14 |
| Define a Stationary Object | 15 |
| Define the Color of an Alarm Object | 16 |
| Define Traffic Light Location | 16 |
| Preview the Training | 17 |
| Push a Configuration to HPE Media Server | 19 |
| Confirm HPE Media Server Tracks Objects | 19 |
| Background Objects | 20 |
| Generate an Alarm | 20 |
| Classify Alarms | 21 |
| Refine the Region of Interest | 22 |
| Replace the Sample Object | 23 |
| Optimize Category Settings | 24 |
| Create Additional Categories | 25 |
| Configure Scene Analysis Settings | 26 |
| Troubleshoot Scene Analysis | 29 |
| Objects are not detected or tracked | 29 |
| HPE Media Server generates too many false alarms | 29 |
| Send documentation feedback | 30 |

Introduction to Scene Analysis

Scene analysis recognizes events in video that you consider important. Typical examples of objects and events you might want to detect in CCTV footage include:

- A vehicle breaking traffic laws, for example by running a red light.
- Abandoned bags.
- Abandoned vehicles.
- Traffic congestion.
- Zone breaches and trip wire events, for example a person entering a restricted area.

Train Scene Analysis

To run scene analysis, you must create a training configuration that specifies how to detect objects and describes the events that you want to detect. A *configuration* describes all of the events that you want to detect from a single camera.

A configuration can include multiple categories. A *category* describes a single type of event for which you want to generate alarms, for example a vehicle breaching a red light or a person entering a restricted area.

HPE Media Server includes the scene analysis training utility, a Windows application that you can use to rapidly train scene analysis. You can use the Training Utility to:

- Define regions of interest for each category in your configuration.
- Mask parts of the scene that you do not want to monitor for any category.
- Define the size, shape, orientation, velocity, and color of the objects that you want to detect, and the permitted variations in all of these properties.
- Define the position of traffic lights in the scene, so that HPE Media Server can read the lights and generate alarms if an event occurs while the lights are red.
- Display the video being analyzed by HPE Media Server, with an overlay that shows objects being tracked, so that you can confirm objects are tracked correctly.
- Set up filters to reduce the number of false alarms. For example, you might want HPE Media Server to generate alarms only for objects that remain in the scene for a certain amount of time.
- Review the alarms that have been generated using your training, and classify each one as a true alarm for a specific category, or as a false alarm. The training utility can then optimize the training to minimize the number of false alarms and the number of missed alarms.

Create a New Configuration

This section describes how to start a new training configuration.

To create a new training configuration

1. On a Windows machine, open the HPE Media Server installation folder and start the training utility by double-clicking `MSSceneAnalysisTU.exe`.

2. Click **Create a new Scene Analysis config** .

The training utility creates a new configuration and the **Add New Category** dialog box opens. A category describes a single type of event that you want to detect from the camera. You can add several categories to a configuration, but each configuration must have at least one category.

3. Configure the first category:

| | |
|--------------------|---|
| Name | The name for the category, for example "Person", or "Abandoned bag". |
| Object Type | The type of object that you want to detect: <ul style="list-style-type: none">• Person adds a sample object designed to detect a person. |

- **Vehicle** adds a sample object designed to detect a vehicle.
- **Other** adds a generic sample object.

Movement

The type of movement that should cause an alarm:

- To generate alarms for objects that move into the scene but then do not move, click **Idle**.
- To generate alarms for objects that move in a specific direction, click **Directional**.
- To generate alarms for objects that are initially stationary, but are then removed, click **Removed**.
- If velocity is not an important characteristic for your configuration, click **N/A**. For example, use this option if you want to generate an alarm for any vehicle that moves in the scene, regardless of speed or direction.

Region of Interest

Specify the region of interest:

- To draw your own region of interest on the scene image, click **User Defined**.
- To monitor the entire scene, click **Full Screen**.

Create Two Sample Objects To Account for Perspective

Unless your camera looks directly down on a scene, objects far away appear smaller than those that are closer. The training utility can create two sample objects to adjust for differences in object size and speed due to perspective. To create two sample objects, select this check box. If the camera is at the same height as the objects, do not select this check box because in this case HPE Media Server is not able to determine the distance to an object (if the camera is at the same height as an object, movement towards or away from the camera does not result in movement within the scene).

Use Color

To detect objects that match a specific color (for example if you want to detect red vehicles but not blue vehicles), select **Use Color**.

Use Other Objects

To generate alarms based on the proportion of the scene that contains objects, select **Use Other Objects**. For example, at a railway station, HPE Media Server can generate an alarm for a detected person if a train is present in the scene.

Use Traffic Lights

To generate alarms only when traffic lights are red, select **Use Traffic Lights**.

4. Click **OK**.

The Training Utility adds the new category. A dialog box opens, asking if you want to connect to HPE Media Server and obtain a scene image.

5. Click **Yes**.

The **Save As** dialog box opens.

6. Choose where to save the new configuration and click **Save**.

A message box opens, which asks you to check the connection details.

7. In the **HPE Media Server Connection** area, confirm or type the following information:

Host The host name or IP address of the machine hosting HPE Media Server.

ACI Port The HPE Media Server ACI Port.

8. Click **Session Management**.

The **HPE Media Server Session Management** dialog box opens.

9. In the **Source URL** box, type the URL of the stream that you want HPE Media Server to ingest. For example, the URL of a stream from an IP camera.

10. Click **Process**.

- If HPE Media Server is running fewer than the maximum number of processing tasks, it starts ingesting the video.
- If HPE Media Server is already running the maximum number of processing tasks, it does not start ingestion but places the new task in a queue. Before you can proceed, you must either wait for processing tasks to finish, or stop them. You can click **Stop Session** to stop a task, and **Refresh List** to refresh the list.

11. In the list of sessions, click the session that you started, and click **OK**.

12. Click **View Live Video**.

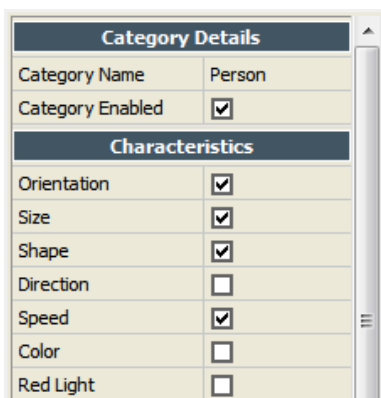
The video being ingested by HPE Media Server is displayed in the Training Utility.

13. Click **Get Training Image**.

The Training Utility stops displaying live video from the camera and instead displays the captured scene image. You can now begin training.

Configure Category Details

The category details area specifies settings for the category (a single scenario for which you want to generate alarms). The settings are divided into groups. You can show or hide each group by double-clicking the title.



| Category Details | |
|------------------|-------------------------------------|
| Category Name | Person |
| Category Enabled | <input checked="" type="checkbox"/> |
| Characteristics | |
| Orientation | <input checked="" type="checkbox"/> |
| Size | <input checked="" type="checkbox"/> |
| Shape | <input checked="" type="checkbox"/> |
| Direction | <input type="checkbox"/> |
| Speed | <input checked="" type="checkbox"/> |
| Color | <input type="checkbox"/> |
| Red Light | <input type="checkbox"/> |

TIP:

The category details area contains some settings that are not described here. To set values for these, classify some alarms and then optimize the category (see [Classify Alarms](#), on page 21 and [Optimize Category Settings](#), on page 24).



| Category Details | |
|---|--|
| Category Name | The name of the category. |
| Category Enabled | Specifies whether the category is enabled. If a category is disabled, HPE Media Server does not produce alarms for it. |
| Characteristics specify the criteria to use to decide whether an object should cause an alarm. | |
| Orientation | To use the orientation of an object to determine whether it should cause an alarm, select this check box. |
| Size | To use the size of an object to determine whether it should cause an alarm, select this check box. Otherwise, objects of any size can cause alarms. |
| Shape | To use the shape of an object to determine whether it should cause an alarm, select this check box. Otherwise, objects of any shape can cause alarms. |
| Direction | To use the direction of an object to determine whether it should cause an alarm, select this check box. Otherwise, objects moving in any direction can cause alarms. To specify the direction of an alarm object, see Define the Velocity of an Alarm Object , on page 13. |
| Speed | To use the speed of an object to determine whether it should cause an alarm, select this check box. Otherwise, objects moving at any speed can cause alarms. To specify the speed of an alarm object, see Define the Velocity of an Alarm Object , on page 13. |
| Color | To use the color of an object to determine whether it should cause an alarm, select this check box. Otherwise, objects of any color can cause alarms. |
| Red Light | To generate alarms based on traffic light colors, select this check box. An object or activity can only cause an alarm when the light is red. If you clear this check box, objects can cause alarms at any time. |
| Other Objects | To generate alarms when the proportion of the scene covered by other objects is close to a specified value, select this check box. For example at a railway station, HPE Media Server can alarm on a person only when no train is present. |
| Other Objects% | The percentage of the scene that should contain other objects. When the Other Objects check box is selected, HPE Media |

| | |
|---|--|
| | Server is more likely to generate an alarm when the proportion of the scene covered by other objects is close to this value. Regions under a scene mask are not included when calculating the total size of the scene, so specify the value as the percentage of the scene that is not masked. |
| Alarm Filters specify criteria that must be met for an object to cause an alarm. | |
| Min Time In Scene (seconds) | The minimum amount of time that an object must be present in the scene. The time in scene does not include time in masked areas, because objects are not tracked in masked areas. |
| Min Time in ROI (seconds) | The minimum amount of time that an object must be continually present in a region of interest. If an object moves outside the region, its time in the region is reset to zero. |
| Max Time In Scene (seconds) | The maximum amount of time that an object can be in the scene. Objects that remain in the scene for longer than this can no longer cause alarms. |
| TOD Mask Start/Stop | HPE Media Server does not generate alarms between the start and stop times. For example, to generate alarms only between 09:00 and 17:00, set TOD Mask Start1=17:00 and TOD Mask End1=09:00 . To generate alarms outside of these times, reverse the start and stop values, for example TOD Mask Start1=09:00 and TOD Mask Stop1=17:00 . You can define up to three time ranges. |

Set Reference Points

You can set reference points in the scene so that you can reposition the camera if it is moved, and avoid the need to alter the scene analysis configuration.

To define reference points


1. Click **Set Reference Points** .
2. On the scene image, drag a box around the first reference area.
3. On the scene image, drag a box around the second reference area.
4. Click **Set Reference Points**  again.

The reference points are saved. After you have sent the configuration to HPE Media Server (see [Push a Configuration to HPE Media Server, on page 19](#)) you can view the reference points (select the check box **Show Reference Points**, and click **View Live Video**).

Define a Region of Interest


A region of interest is part of the scene in which you expect events to occur. Scene analysis only generates alarms for a category when the center of an object is within a region of interest for that category.

To define a region of interest

1. Click **Draw a Region of Interest** .
2. In the **Scene Image** area, draw a polygon to specify the region of interest.
 - a. Click the point where you want to start drawing.
 - b. Move the mouse pointer and click the image again. Each time you click another edge is drawn.
 - c. Close the polygon by clicking the starting point.

The training utility displays the completed region of interest. You can draw additional regions if you want to monitor more than one part of the scene.

To erase a region of interest

1. Click **Draw a Region of Interest** .
2. Right-click the region of interest and click **Erase**.

Set a Scene Mask

There are often parts of a scene that add no value when monitored. If you are sure a region will never contain interesting activity, you can instruct scene analysis to ignore it by drawing a scene mask. This can filter out false alarms and improve performance because HPE Media Server ignores activity in the masked regions. Objects in masked areas are never detected or tracked.


An object can only cause an alarm when the center of the object is within a region of interest. If an object is outside a region of interest but is not in a masked area, it is in a *non-alarm zone*. The object is detected and tracked, but cannot cause alarms. Time spent in a non-alarm zone contributes to the object's total "time in scene".

NOTE:



A scene mask applies to every category in your configuration.

To add a scene mask

1. Click **Mask uninteresting scene areas** .
- The training utility displays regions of interest in green, and any masked areas in red.

2. In the **Scene Image** area, draw the region that you want to mask.
 - a. Click the point where you want to start drawing.
 - b. Move the mouse pointer and click the image again. Each time you click the training utility draws another edge of the polygon.
 - c. To close the polygon and finish drawing, click the starting point.
The training utility displays the masked region.
3. (Optional) To mask another region of the scene, repeat step 2.
4. To finish drawing scene masks, click **Mask uninteresting scene areas** .

To remove a scene mask

1. Click **Mask uninteresting scene areas** .
The training utility displays regions of interest in green, and any masked areas in red.
2. Right click the region to remove and click **Erase**.
3. To finish drawing scene masks, click **Mask uninteresting scene areas** .

Define the Size, Shape, and Orientation of an Alarm Object

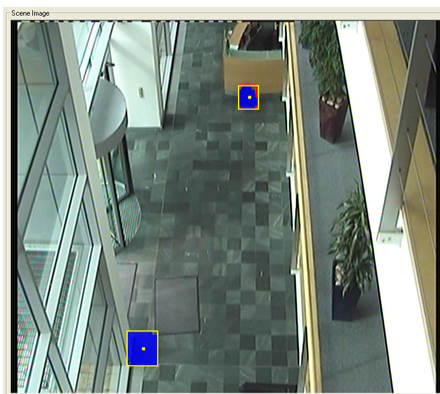
This section describes how to define a sample object. The sample should represent an alarm object as closely as possible. When you draw a sample object, you define the expected size, shape, and orientation of objects that you want to detect.

TIP:



You added a sample object when you created the category.

Due to the camera angle, objects at the top of a scene might appear smaller (cover fewer pixels) than objects at the bottom of the scene. If perspective effects are noticeable, draw one example in the foreground and one in the background, as shown below. The Training Utility can then correct for perspective effects.

A pair of sample objects to simulate an abandoned bag



To draw a sample object

1. Click **Switch to object simulation mode** .
The user interface changes to drawing mode.
2. On the toolbar, click one of the brush sizes .
3. On the scene image, draw a “blob” to approximate the size of the object that you want to detect. If the scene image contains an example of the object (for example a person, vehicle, or unattended bag), you can draw over the object.
 - To draw the object, hold down the left mouse button and move the mouse pointer over the object.
 - To erase part of the object, hold down the right mouse button and move the mouse pointer over the object.

The Training Utility shows the simulated object. The center of the object is denoted by a yellow dot.

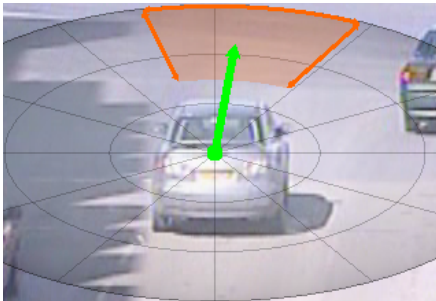
TIP:

If you see two yellow dots you might have created two samples.

Define the Velocity of an Alarm Object

Scene analysis can generate alarms when the speed or direction of an object matches suspicious behavior. You must define the expected speed and direction of movement for an alarm object.

The image below shows a velocity vector and range of variation that has been drawn on a sample object in the training utility.



The length of the green arrow represents expected speed (pixels moved per second). The angle at which it is pointing indicates the expected direction of movement. The training utility also allows you to configure some variation in the expected speed and direction. In the example image, after one second has passed, the green dot at the center of the object can be expected to be located anywhere within the orange region.

The amount of variation you should allow depends on the use case. Allow a small variation for objects, such as vehicles on a road, that you expect to have a predictable path and speed. Allow a greater variation for objects where the velocity is difficult to predict, for example a person loitering outside a building.

TIP:

When you optimize a category, the training utility optimizes the velocity vector and variation based on the values from classified alarms. For information about how to optimize a category, see [Optimize Category Settings, on page 24](#).

Objects can appear to have different velocities depending on their distance from the camera and the angle from which the camera sees them. A camera looking down on a moving object detects movement in all directions. However, a camera mounted at the same height as an object only sees the object move laterally (left and right). Any movement towards or away from the camera is not detected, because the object does not move within the image.

To compensate for these effects, you can specify the camera angle. This aligns the velocity grid in the training utility with the ground that the object is moving on. After performing this alignment you can see that movement vertically within the scene is scaled differently to movement laterally, reflecting the influence of camera angle.

Define a Moving Object

To simulate the velocity of a moving object, follow these steps. To simulate a stationary object (for example an abandoned bag), see [Define a Stationary Object, on the next page](#).

To define the velocity of an alarm object

1. Click **Switch to object simulation mode**



2. Click **Switch to velocity drawing mode**





A circular grid appears over the object.

3. Set the expected speed and direction by dragging the green arrow. The length of the arrow represents speed (pixels moved per second). The longer the arrow, the faster the object is expected to move. The direction of the arrow represents the expected direction of travel.
4. Set the expected variation in speed.
 - Hold the right mouse button, and scroll up to increase the variation or down to decrease it.
 - With the keyboard, press the **Up** arrow key to increase the variation, or press the **Down** arrow key to decrease it.
5. Set the expected variation in direction.
 - With the mouse, scroll up to increase the variation, or down to decrease it.
 - With the keyboard, press the **Right** arrow key to increase the variation, or press the **Left** arrow key to decrease it.
6. Compensate for the camera angle by moving the **Compass Pitch** slider. A compass pitch of 0 degrees indicates that the camera's focal plane is perpendicular to the object's path (the camera is looking down on the object).

Define a Stationary Object

You might want to generate alarms for abandoned objects, which remain stationary. To define the velocity of a suspicious object as stationary, follow these steps.

To define the velocity of a stationary object

1. Open **Switch to object simulation mode** .
2. Click **Switch to velocity drawing mode** .
3. Drag the green arrow to the center of the object.

A circular grid appears over the object.

3. Drag the green arrow to the center of the object.



A yellow dot appears. The following image shows a stationary velocity vector.



Define the Color of an Alarm Object

Scene analysis can generate alarms based on the color of an object. For example, you can generate alarms for cars only if they are blue. Color differentiation works well when the object has a dominant, uniform color. The more similar the colors between objects in a scene, the harder it is for scene analysis to differentiate between them, so lighting is an important factor in color definition.

To define the color of an alarm object

1. In the **Characteristics** area, ensure that the **Color** characteristic is enabled (select the **Color** check box).
2. Click **Switch to object simulation mode** .
3. Click **Select Object Color** .
The color palette opens.
4. Define the object color.
 - To define the object color using the color palette, click the color, or click **More** to set a custom color.
 - To define the object color by sampling an object in the scene image, double-click the scene image. HPE recommends that you use this method because it provides the most accurate results.

The training utility generates a color swatch.

5. Move the **Color Swatch Variation** slider to define the acceptable variation in color.
The color swatches are updated. The center color is the sample that you defined. The other swatches show the upper and lower variations. The amount of variation to set depends on lighting conditions and how closely the sample scene image matches real cases you expect to see.

Define Traffic Light Location

You can configure scene analysis to generate alarms only when traffic lights are red. This can be useful for detecting vehicles breaching red lights at traffic intersections and level crossings. When the lights are not red, vehicles driving through the intersection or level crossing are ignored.

So that HPE Media Server can read the traffic lights, you must define the location of the lights in the scene.

Scene analysis supports signal detection for both traffic lights and level crossings. You can therefore define up to two red lights, one amber light, and one green light. You do not need to define a location for all of these.

To define the location of traffic lights

1. In the **Characteristics** area, select the **Red Light** check box so that HPE Media Server only generates alarms when the lights are red.

2. Click **Set Traffic Light Location** .

The message "Define Red Light" is displayed in the scene image area.

3. Drag the mouse pointer across the scene image to draw a circle that defines the location of the red light.

TIP:

Try to cover as much of the light as possible, but minimize the overlap into the region surrounding the light.

The message "Define Green Light" is displayed in the scene image area.

4. Drag the mouse pointer across the scene image to draw the position of the green light. If you are defining traffic lights for a level crossing, or there is no green light, press the right mouse button.

The message "Define Second Red Light" is displayed.

5. Draw the location, or press the right mouse button to skip the second red light.

The message "Define Amber Light" is displayed.

6. Draw the location, or press the right mouse button to skip the amber light.

7. Click **Set Traffic Light Location** .

The training utility returns to the default view.

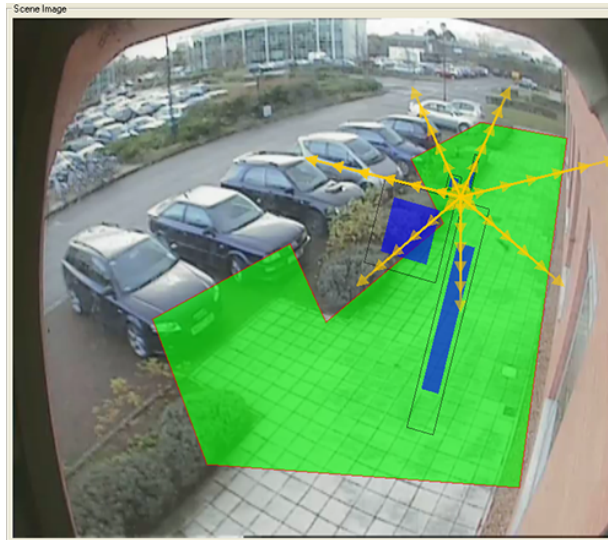
TIP:

To confirm that HPE Media Server reads traffic lights correctly, push your configuration to HPE Media Server and start viewing live video. If object tracking is enabled, the Training Utility displays the message "Traffic lights are red" at the top of the scene image window whenever the lights turn red. For information about how to push a configuration to HPE Media Server, see [Push a Configuration to HPE Media Server, on page 19](#).

Preview the Training

After you have drawn a sample alarm object, defined its expected velocity, and configured any optional parameters such as color, you can view a preview of the training. You can use the preview to assess whether the Training Utility has made suitable approximations of the appearance and movement of the alarm object, or whether you need to adjust the properties of the sample.

The following image shows a typical training preview.



- The blue rectangles depict the expected size and shape of alarm objects at the current position. The rectangles above the mouse pointer depict the minimum expected object size, and the rectangles below the mouse pointer depict the maximum expected size. Each pair of rectangles shows the minimum and maximum aspect ratio.
- The black rectangles represent the size and shape of the bounding box around an alarm object. The difference between the blue and black rectangles shows the difference between the number of pixels covered by the object and the size of its bounding box.
- The yellow arrows represent the expected velocity of an object. If you have defined an object as stationary (for example, to simulate an abandoned bag) the preview presents a stationary red dot at the location of the mouse pointer.
- As you move the mouse pointer, the orientation of the rectangles changes to show the possible orientations. If you defined two examples to correct for perspective effects, the rectangles and velocity indicators change size as you move the mouse pointer up and down the image.


To preview the training

1. On the **Categories** menu, click the category for which you want to preview training.

2. Click **Preview** .

3. To preview the size, shape, orientation, and velocity of the sample object, hold down the left mouse button and drag the mouse pointer around within the region of interest.
4. If you defined the expected color of the object, you can preview the training for the object color. Hold down both the left and right mouse buttons and drag the mouse pointer over the region of interest.

Three color swatches appear. The center swatch displays the expected color and the others show the permitted variation.

5. After you have previewed the training, click **Preview**  to exit preview mode.
If necessary, modify the properties of your sample object.

Push a Configuration to HPE Media Server

After you have completed training, push the training configuration to HPE Media Server.

To push a configuration to HPE Media Server

1. Save the configuration.

NOTE:

When the Training Utility saves a training configuration file, it also saves a training file (with a .trn extension) that contains the training session information in the Training\ directory. If you want to load the training session at a later date, both the .cfg and the .trn files must remain in their respective directories.

TIP:

It is important to save the configuration because you might need to adjust it later.

2. Click **Connect to HPE Media Server** .
3. Click **Send Configuration**.

HPE Media Server starts using the configuration to detect suspicious activity. If HPE Media Server starts generating alarms, proceed to [Classify Alarms, on page 21](#).

Confirm HPE Media Server Tracks Objects

In the Training Utility, you can view live video and see the objects that are being tracked. You should confirm that objects in the scene are being tracked correctly, because HPE Media Server can only generate alarms for objects that it identifies.

NOTE:

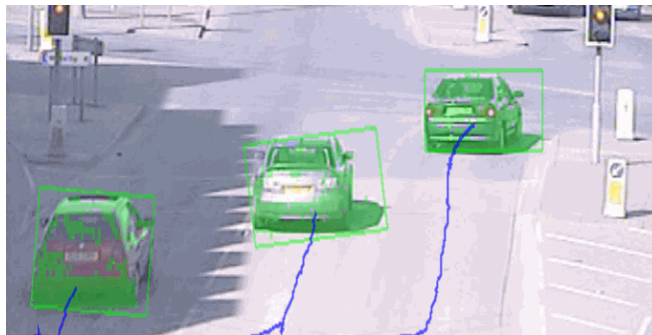
To show tracked objects, you must set the IsasTuDataOption parameter in the configuration sent to HPE Media Server by the Training Utility (mediaserver-sceneanalysis-session.cfg).

- To show tracked objects, set IsasTuDataOption=DisplayObjects.
- To show tracked objects, and generate an alarm when you click on a tracked object, set IsasTuDataOption=ClickableObjects.

After changing this parameter, you must restart processing.

Enabling the object tracking overlay increases CPU use significantly. For this reason HPE recommends that you do not enable the object tracking overlay in a production environment.

When you show object tracking, the Training Utility highlights objects in the scene:



When an alarm occurs, the object that caused the alarm is highlighted with a red tracking rectangle and the message "ALARM OBJECT!" is displayed at the top of the scene image window. The message includes the name of the category that caused the alarm.

Background Objects

You can use scene analysis to detect abandoned objects. For example, airports and shopping malls are interested in abandoned bags and highways agencies are interested in vehicles that are parked illegally.

To detect abandoned objects, you would set a high value for the *Min Time in Scene* or *Min Time in ROI* alarm filter. However, when an object is stationary for longer than the *background update* interval, HPE Media Server adds the object to the background. It is likely that an abandoned object will be added to the background before it causes an alarm. So that it can track stationary objects for longer than the *background update* interval, HPE Media Server creates a template of the object. Templates are created for all objects that match a simulated object where the simulated object has zero speed and the *Min Time in Scene* or *Min Time in ROI* for the category is longer than the *background update* time. For more information about the *background update* and *stationary time* settings, see [Configure Scene Analysis Settings](#), on page 26.

When you view live video in the Training Utility and enable object tracking, the Training Utility shows template objects that have been added to the background. These objects are always stationary. They might have already caused alarms, or might cause alarms when the *Min Time in Scene* is reached. Template objects that have not caused alarms are surrounded by an orange tracking rectangle. Template objects that have already caused alarms are surrounded by a red tracking rectangle. To see how long a template object has been in the scene, click the object.

Generate an Alarm

You can use the Training Utility to manually generate alarms for objects. You can then classify these alarms and use them to improve the training.

NOTE:

To manually generate alarms, you must set the `IsasTuDataOption` parameter in the configuration sent to HPE Media Server by the Training Utility (`mediaserver-sceneanalysis-session.cfg`). Set this parameter to `ClickableObjects`, and then restart processing.

To generate alarms

1. Connect to HPE Media Server and click **View Live Video** (with object tracking enabled).
2. When an object appears in the scene, click the object. You can identify objects that should cause an alarm and objects that should not cause an alarm.

A message is briefly displayed at the top of the scene image window, to inform you that an alarm has been generated.

3. After you have generated some alarms, you can use them to train scene analysis. First, you must classify all of the alarms that you generated. For information about how to do this, see [Classify Alarms](#), below.


TIP:

When you classify alarms, the Training Utility displays the scene image at the time of the alarm. The object that caused the alarm is surrounded by a rectangle, which is green for user-generated alarms and red for system-generated alarms.

Classify Alarms

After HPE Media Server has generated alarms based on your training configuration, you can classify these alarms as true or false, and then use these classifications to optimize the original training configuration.

To classify alarms

1. Click **Connect to HPE Media Server** .
2. Click **Review and Classify Alarms**.

The alarm review dialog box opens.

3. (Optional) Choose the alarms that you want to review and classify. In the **Display** list, click an option:
 - To review all alarms, click **All**.
 - To review only those alarms that you generated manually, click **User Defined**.
 - To review only those alarms that were generated for a specific category, click the category name.

The Scene Image area displays a still image from the first alarm.

4. Classify the alarm by selecting one of the following options from the **Category** list:
 - If the alarm represents a true suspicious event, click the category name to which the alarm belongs (if the category is already correct, go to the next step).
 - If the alarm is a false alarm, click **False Alarm**.
 - If it is not possible to tell whether the alarm represents a suspicious event, click **Ignore**.

5. Click **Set alarm**.

The training utility saves your choice and advances to the next alarm.

6. Repeat step 4 and step 5 for all of the alarms. If you need to move between the alarms, click the following buttons:



Go to the first alarm



Go to the last alarm



Go back 10 alarms



Go forward 10 alarms



Go to the previous alarm



Go to the next alarm

7. Click **Apply classifications**.

8. Close the dialog box.

You can now use the classified alarms to refine the region of interest (see [Refine the Region of Interest, below](#)) and optimize the category settings (see [Optimize Category Settings, on page 24](#)).

Delete Classifications

You might need to delete classifications if you create a new category to detect a different type of event but had previously classified those events as false alarms.

To delete classifications

1. Click **Show locations of classified alarms** .

The training utility shows the position of classified alarms on the scene image.

2. In the category details area, click **Delete All Classified Alarms**.

A message box opens, asking you to confirm.

3. Click **Yes**.

The alarms are deleted.

Refine the Region of Interest

The Training Utility can overlay the position of classified alarms on the scene image. This can help you to refine the region of interest. For example, if there are many false alarms on the edge of the region, you can reduce the size of the region.

To refine the region of interest

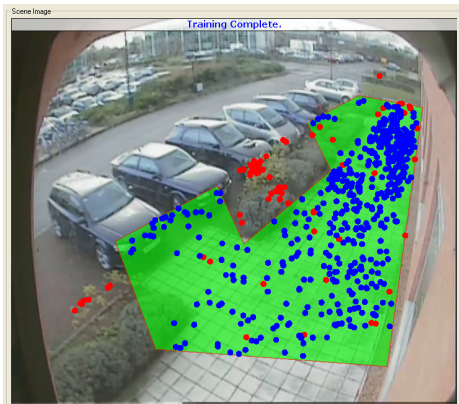
1. On the **View** menu, click the category that you want to modify.

2. Click **Draw a region of interest** .

3. Click **Show locations of classified alarms**



The training utility shows the position of classified alarms on the scene image. The blue dots represent alarms you classified as true alarms and the red dots represent false alarms.




4. Right-click the region of interest that you want to refine and click **Erase**.
5. Draw the new region of interest.
 - a. Click the point where you want to start drawing.
 - b. Move the mouse pointer and click the image again. Each time you click another edge is drawn.
 - c. To close the polygon and finish drawing, click the starting point.

The training utility displays the completed region of interest.

Replace the Sample Object

To improve the training you can use a real alarm object to replace the sample object that was created when you created the category.

To replace the sample object

1. Click **Connect to HPE Media Server** .
2. Click **Review and Classify Alarms**.

The reviewing alarms dialog box opens.

3. Navigate to an alarm where HPE Media Server has identified a true alarm object.

TIP:

To show the location of the alarm object in the **Scene Image** window, select the **Overlay Box** check box.

4. In the **Category** box, select the category for which you want to change the simulated object.
5. Click **Set As Simulated Object**.

A message box opens, asking you to confirm.
6. Click **Yes**.

The sample object is replaced.

NOTE:

If the category has two example objects to correct for perspective effects, the sample closest to the alarm object is changed.

Optimize Category Settings

The training utility can optimize the settings for a category based on the alarms you have classified. This reduces the number of *false* and *missed* alarms by making your sample objects more closely resemble real alarm objects and by optimizing alarm filters.

- *False alarms* are events that scene analysis identified as suspicious, but were not.
- *Missed alarms* are events that scene analysis should have identified as suspicious, but did not.

Sometimes it is not possible to eliminate all false alarms and all missed alarms, and you must decide what to do:

- Minimize the number of missed alarms when you want to prioritize capturing true alarms over reducing the number of false alarms. This might result in HPE Media Server generating some false alarms.
- Minimize the number of false alarms when you want to prioritize eliminating false alarms over capturing true alarms. This might result in some suspicious events being missed.

NOTE:

To optimize the category settings, you must have classified a sufficient number of alarms. For information about how to classify alarms, see [Classify Alarms, on page 21](#)

To optimize the category settings

1. On the **Categories** menu, click the category that you want to modify. This procedure only modifies the sample objects and alarm filters for the current category.
2. In the category details panel, click **Optimize Category Settings**.

The training utility calculates the effect of changing the category settings. If you have enabled many characteristics (for example object size, speed, direction, and color), this can take some time.

3. Choose how to optimize the category:
 - To suggest the best overall balance between false and missed alarms, click **Auto Suggest**.
 - To minimize the number of missed alarms, drag the slider towards **Minimize Missed**.
 - To minimize the number of false alarms, drag the slider towards **Minimize False**.

After you have made a choice and have released the mouse button, the training utility shows the number of false and missed alarms that would occur if you optimized the category. Select the **Display Extra Detail** check box to see more information about why classified alarms are filtered.

4. Decide whether to optimize the category.


- To optimize the category and view the changes made to the configuration, select the **Display Extra Detail** check box and click **Optimize**.
- To optimize the category without showing the changes, clear the **Display Extra Detail** check box and click **Optimize**.
- If you do not want to optimize the category, click **Cancel**.

Create Additional Categories

Create additional categories if you want to generate alarms for different scenarios that might take place in the scene.

TIP:
Switch between categories using **Categories** menu.

To add another category

1. Click **Add Category** .
The **Add New Category** dialog box opens.
2. Configure the category as required and complete the relevant training:
 - [Define a Region of Interest](#)
 - [Define the Size, Shape, and Orientation of an Alarm Object](#)
 - [Define the Velocity of an Alarm Object](#)
 - [Define the Color of an Alarm Object](#)
 - [Define Traffic Light Location](#)
 - [Classify Alarms](#)
 - [Refine the Region of Interest](#)
 - [Optimize Category Settings](#)

Link Categories

When you optimize a category, the training utility considers any alarm that you have classified as a true alarm for one category as a false alarm for another. For example, you might have a category to detect people loitering and a category to detect abandoned bags. Any alarm that you classify as a true alarm for the "people loitering" category is considered as a false alarm for the "abandoned bags" category. A person has different characteristics to an abandoned bag, so the training utility can use the characteristics of the alarm object to optimize the training for both categories.

In some cases, you might want to modify this behavior. A configuration might have two categories, one to detect any car in the scene and another to detect cars turning down a one-way street. In this example, the objects that should be detected by the two categories share characteristics such as shape, size, and velocity. If the training utility used the characteristics of an alarm object in one category as an example of a false alarm for the other, the quality of the training could be reduced. In this case, you should link the categories. When categories are linked, true alarms in either category are not used to optimize the training of the other category.

To link categories

1. On the **Categories** menu, click the name of one of the categories that you want to link.
2. In **Linked Categories** area, select the check box for each category that you want to link to this category.

Configure Scene Analysis Settings

You can modify the following settings to optimize object detection and tracking. These settings apply to every category in the configuration.

To modify the settings, click **Scene Analysis Configuration Settings** .

| Video Source | |
|----------------------------|---|
| Camera Moving | If the camera is on a moving platform, or is panning or rotating, select this check box. HPE Media Server attempts to compensate for the movement when it analyzes the scene. |
| Analysis Settings | |
| Auto Luminance | To automatically determine the most appropriate Luminance Threshold, select this check box. You can then specify the minimum and maximum threshold. |
| Luminance Threshold | The difference in intensity required between the foreground and background for HPE Media Server to determine that a group of pixels represent an object. The lower the Luminance Threshold, the more objects are detected. To set the Luminance Threshold, clear the Auto Luminance Threshold check box. |
| Background Update | HPE Media Server identifies objects by comparing a scene to a known background image. This parameter controls the amount of time that must elapse before an object in the foreground is added to the background image. The default background update time is 10 seconds. |
| Tolerance | The Tolerance specifies the confidence level required to determine that objects in different frames are the same. The higher the tolerance, the more likely it is that objects are considered the same. HPE Media Server makes these calculations based on an object's distance from its previous position, relative to its size. |

| | |
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| Reset Background | <p>Large changes in illumination, or lens flare, can impede object detection. You can select the Reset Background check box so that HPE Media Server captures a new background image when the activity level exceeds the specified value. The activity level is defined as a percentage of the viewable space.</p> <p>A low percentage can cause problems as objects might be grabbed into the background.</p> <p>By default the background is reset when the activity level exceeds 90%.</p> |
| Stationary Time | <p>The amount of time after which a template is created for a stationary object.</p> <p>An object could move into the scene and satisfy all of the alarm criteria except “time in scene”. However, after the Background Update interval, a stationary object is added to the background. So that the scene analysis engine can continue to monitor the object, it creates a template of the object.</p> <p>The Stationary Time must be less than the Background Interval.</p> |
| Dormant Track Thresh | <p>The amount of time during which an object can be recovered if it disappears and reappears within the scene. For example, if a person walks behind a car, they are considered as the same person only if they reappear before the dormant track time has elapsed.</p> |
| Expiry Time | <p>The maximum amount of time to continue tracking stationary objects.</p> |
| Background Type | |
| <p>The Simple background type is suitable for most configurations. Set the Background Type to Complex only when the background is never unobstructed for longer than the background update time.</p> | |
| Fine Tuning | |
| Use Limits | <p>To generate alarms only when the detected object is within the upper and lower limits of any parameter (for example object size, velocity, and so on), select this check box.</p> |
| Object Smoothing | |
| <p>HPE Media Server can smooth the edges of objects. Object smoothing can help detect objects correctly in busy or low-contrast scenes.</p> | |
| None | <p>No object smoothing.</p> |
| Open | <p>Opening can help to isolate and separate objects that are in close proximity. For example, if you are tracking large numbers of people in a scene, open object smoothing can help prevent multiple people being detected as one object.</p> |
| Close | <p>Closing can connect parts of an object and fill gaps, preventing a single “real” object being detected as multiple small, separate objects. Closing</p> |

| | |
|--|--|
| | can help to detect objects correctly in low-contrast scenes. |
|--|--|

Troubleshoot Scene Analysis

This section describes how to solve some problems that you might encounter when using scene analysis.

Objects are not detected or tracked

To generate alarms correctly, HPE Media Server must be able to detect and track suspicious objects that appear and move within the scene.

To check that HPE Media Server is detecting objects correctly, push your configuration to HPE Media Server (see [Push a Configuration to HPE Media Server, on page 19](#)). View the video being analyzed, with object tracking enabled, and watch the scene image window as objects move through the scene. With object tracking enabled, the Training Utility highlights objects that are detected (see [Confirm HPE Media Server Tracks Objects, on page 19](#)).

If suspicious objects are not detected, you might need to adjust the following settings:

- **Luminance Threshold.** Objects that are a similar color and luminosity as the scene background are more difficult for HPE Media Server to detect. If HPE Media Server does not reliably detect these objects, consider reducing the Luminance Threshold. The Luminance Threshold specifies the difference in intensity required between the foreground and background for HPE Media Server to determine that a group of pixels represent an object. It is important to set the Luminance Threshold if you are attempting to detect objects in low-contrast or low-light images, for example during the night.
- **Background Update.** HPE Media Server identifies objects by comparing a scene to a known background image. The Background Update setting specifies the amount of time that must elapse before an object in the foreground becomes part of the background image. If the Background Update time is shorter than the Min Time in Scene then stationary objects can be added to the background image and are never detected.
- **Scene Mask.** Objects in non-detection zones are ignored. Check whether the scene mask is preventing objects from being detected (see [Set a Scene Mask, on page 11](#)).
- **Min Time in Scene.** HPE Media Server does not generate alarms for objects until they have been in the scene for longer than the Min Time in Scene.
- **Track Scope.** To detect stationary objects, ensure that the **Track Deviation Min** is zero (0.0). This is the distance that an object moves, relative to its width.

HPE Media Server generates too many false alarms

If HPE Media Server generates too many false alarms, use alarm filters to exclude the false alarms. For example, you can remove false alarms generated by transient objects by using the Min Time in Scene filter. The best way to set most of the alarm filters is to disable the category, classify the alarms that have been generated, optimize the training using the classified alarms, and then enable the category again. For information about how to classify alarms and optimize a category, see [Classify Alarms, on page 21](#) and [Optimize Category Settings, on page 24](#).

Send documentation feedback

If you have comments about this document, you can [contact the documentation team](#) by email. If an email client is configured on this system, click the link above and an email window opens with the following information in the subject line:

Feedback on Scene Analysis Training Technical Note (HPE Media Server 11.3)

Add your feedback to the email and click **Send**.

If no email client is available, copy the information above to a new message in a web mail client, and send your feedback to AutonomyTPFeedback@hpe.com.

We appreciate your feedback!