Administrator's Guide for

Deep Motion Detection in Deep Learning NVR

Based on

Synology Surveillance Station 8.2.7
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Introduction

Overview

With its powerful AI Image Analysis, Synology Deep Video Analytics can instantly calculate millions of object attributes, filter out environmental interferences, and deliver accurate detection results. Backed with Smart Tag technology and a comprehensive management interface, it allows users to take control of events with ease and efficiency.

Among the supported algorithms, Deep Motion Detection specializes in searching for unusual movements targeted regions. Combining the AI's rapid responses with an extensive object database, you can easily set up tasks to get accurate alerts.

For you to achieve optimal precision, this guide aims to introduce the key factors of setting up Deep Motion Detection tasks. Please follow the listed points as closely as possible.

Quick Start

Camera Selection

• Select multi-stream cameras with 1280x720@20 FPS
• Select IR supported cameras if possible
• Use wired connections for stable streaming

Camera Mounting

• Position cameras 2.5 to 4 meters above the ground
• Point cameras directly at the target areas and do not tilt the screen
• Make sure the surroundings can provide lighting with over 300 lux

Software Configuration

• Set up inclusive or exclusive detection zones
• Set up central and border zones with different parameter settings
• Apply high, medium, or low detection sensitivities
• Choose to ignore small objects and background events for optimal accuracy
• Enable tampering detection for extra alerts
• Fine-tune settings with the Parameter Adjuster to fit actual detection scenes

Accuracy Enhancement

• Remove possible interferences and obstructions
• Exclude areas with constant irrelevant movements
• Avoid non-natural lights, shifting shadows, and reflections
• Use multiple cameras to cover wide areas

For more details, please refer to the following chapters.
Mount Cameras

This chapter introduces how to mount cameras and arrange proper lighting to collect clear footages for high detection accuracy.

Select and Position Cameras

Camera models, installation, and configurations directly influence the quality of recordings.

The following are some general guidelines:

- Select cameras that support multi-stream with 1280x720@20 FPS or above for a flexible stream quality.
- Select cameras with IR scheduling. This helps filter out sharp picture changes during the shift from day to night mode that may falsely trigger events.
- Keep the camera signal as stable as possible. Wired connections are highly recommended.
- Remove mobile items from the detection areas. Objects such as automatic doors, escalators, and cleaning robots may cause false alarms.
- Avoid possible sources of interference that may cause miscalculations, such as shadows on walls and mirrored objects.
- Firmly fix cameras for stable images. For instance, do not let blowing winds shake outdoor cameras.
- Mount cameras at least 2.5 to 4 meters high for optimum object-identification accuracy.
- Keep the lenses clean so that dust, insects, or other stains do not block the sight.

Prepare Suitable Lighting

Good lighting is crucial. If the surroundings are too dark, details might be lost; if there is excessive illumination, images may blur.

When setting up your cameras, please mind the following:

- Provide sufficient lighting, preferably with a light level over 300 lux, or use cameras with IR support. Features of moving objects are hard to recognize in dark images.
- Avoid direct sunlight in the detection areas. Direct light may leave streaks in the images or cause overexposure, affecting the picture quality.
Configure Software Settings

Once your cameras are mounted successfully, software configurations must be set up for DVA to suit your needs fittingly. This chapter covers the crucial settings.

Select a Stream Profile

For optimal detection accuracy, select a resolution of at least 1280x720@20FPS.

Define the Zone Type

DVA provides two zone types: Inclusive and Exclusive. Both are highly compatible with various scenarios, allowing you to cover the areas that truly matter.

Excluding irrelevant areas helps reduce false alarms. Lights from neighboring houses, roads in the distance, and on-screen display information are all potential interferences and should not be included.

Inclusive zones allow you to incorporate the places you care about most.

Customize Multi-Zone Sensitivities

Deep Motion Detection supports multiple detection zones. Different sensitivities can be applied to each zone to fit actual scenes. While the sensitivity does not require adjustments in general, suitable settings can help reduce missed detections or false positives.

For instance, due to the large areas some scenes cover, there can be great size differences between far away and close up objects. You can thus set up different detection zones, apply suitable sensitivity settings, and determine which events to filter.

In particular, in near areas, frames usually vary widely. You should, therefore, select low or medium sensitivity and enable the Ignore Small Objects function.

On the contrary, in the farther areas in camera views, changes between frames are usually more subtle. The sensitivity can be set to medium or high to increase detection accuracy.
Another concern is with the detection results. If they often do not contain valuable events, the sensitivity can be lowered to cut down the number of similar alarms. If you know that someone visited but no corresponding recordings were triggered, you can increase the sensitivity or disable Ignore Small Objects.

### Ignore Small Objects

To filter out interferences from small objects, such as insects or little animals, it is important to fine-tune the minimum object size. In the Parameters page, click the Edit button and adjust the yellow object frame to define the minimum object size. Moving objects that are smaller than the defined object size will be filtered out.

### Ignore Background Events

If there are background events in your surroundings that may affect the detection results, you can enable the Ignore background Events function to filter out such movements. For example, when it is raining or snowing, you can tick the rain and snow option; when the sun moves and causes changes in light and shadow, tick the natural light change option; and if insects fly pass cameras occasionally, tick the short-lived motion option so that movements that last less than 1 second can be screened out.

### Ignore Day-Night Mode Events

When day passes to night, cameras switch from using natural daylight to using IR to record videos. Sharp image changes during these times likely cause incorrect detections. To avoid this, you need to select a suitable filtering method.

On DVA models, filtering by Deep Video Analytics is fully automated and eliminates the sharp image changes of mode-switching through intelligent image analysis technology. Filtering by a specified time, on the other hand, works best when combined with the day-night mode scheduling of cameras themselves. Please keep the settings consistent so that you can accurately filter out events at the exact times.

**Note:**

- Day-Night Mode Integration can only be applied if your camera supports this function.
Improve Detection Accuracy

After adjusting software parameter settings, there are still some factors that may affect the accuracy of Deep Motion Detection. This chapter lists some possible causes and solutions.

Clear Surroundings

The simpler the surroundings are, the more easily can Deep Motion Detection analyze object features and provide accurate reports.

Please follow the guidelines below:

• Place a mat or carpet on the detection zone if your flooring has light reflections or if sharp shadows may appear.
• Exclude areas where irrelevant events occur constantly to prevent avoid false alarms, for instance swaying trees, neighbor’s lights, and so on.
• Remove obstructions like potted plants or columns from the detection zone so that objects will not be blocked and miss detection.

• When the areas your camera footages cover are rather wide, small objects in the distance may not be detected correctly. Please adjust the camera positions or add new cameras to include the farther corners.

Note Possible Interferences

One main cause of miscalculation is that the outlines of objects differ too much from their normal state and therefore cannot be recognized.

Please note the points below:

• People sitting, kneeling, or lying on the floor may not be identified as human as their silhouettes have changed greatly.
• Incomplete body shapes, such as when a person is hidden behind the counter or temporarily blocked behind other people, can affect detection.
• Non-natural lights like neon lights should be removed as they affect accuracy. Only natural light and shadow changes can be filtered out.
Utilize Advanced Features

Besides detailed configuration options, DVA also offers labeling features for easy file management and a Parameter Adjuster that helps fine-tune parameters.

Label and Comment

Detection results can be labeled, sorted, and commented on. For example, you can create a "Courier" label to mark related events and easily access the video files afterward.

Make Use of Smart Tags

DVA is capable of automatically tagging events according to the objects that appear in the images, such as people, animals, and vehicles. This gives administrators overall knowledge of the video content even without manual processing.

To quickly locate major events, you can also search for recordings using these tags.

Optimize Parameter Settings

The parameter adjuster allows you to use previous camera recordings or DVA detection results to fine-tune task parameters. This helps fit your actual usage scenarios.

Select a clip from the Video Source panel and drag the nodes to adjust the detection zones. Basic settings and parameters in the left panel can be edited as well.