GV-VMS PVD Motion Detection

Usage and Case Studies

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Applied to

GV-VMS V18.3

Introduction

False alarms have long plagued security personnel, so reducing false alarms is a top priority for surveillance systems. People and Vehicles Motion Detection (PVD) in GV-VMS uses deep-learning algorithms to provide more robust and accurate motion detection capabilities than other motion detection approaches.

Although PVD motion detection has significantly advanced motion detection capabilities, achieving 100% accuracy is highly challenging due to inherent complexities and uncertainties in real-world scenarios. The PVD algorithms use several detection thresholds to determine detection sensitivity or to filter out false positives. You can fine-tune the thresholds to optimize the accuracy and performance of PVD motion detection for your cameras and applications.

The documentation also includes case studies on how to fine-tune the PVD motion detection, as well as the most recent software patch for improving the current PVD motion detection.

Latest Software Patch

The latest software patch for the PVD motion detection is the patch V18.3.1.18. The patch is only applicable to GV-VMS V18.3.1.

GV-VMS patch V18.3.1.18 download: https://php.gvdip.com/phpBB3/viewtopic.php?t=2651

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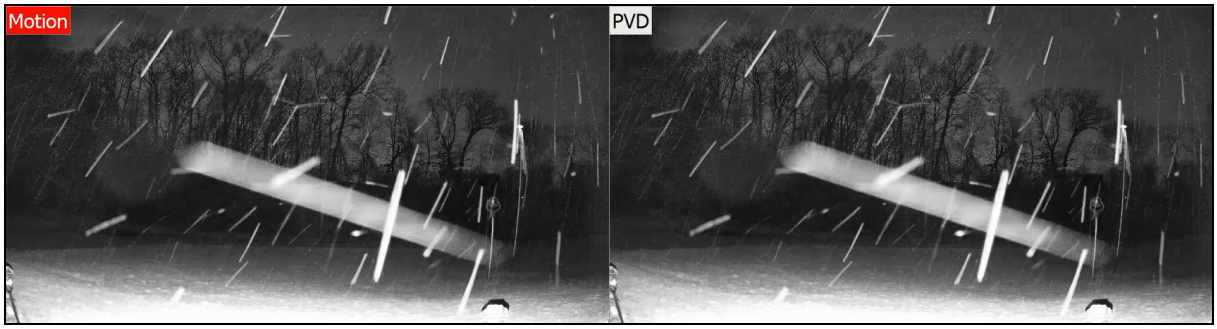
PVD vs. Traditional Motion Detection

Traditional motion detection is sensitive to lighting changes, shadows, and other environmental factors (raining, snowing, water ripples, branch swaying, etc.), whereas PVD motion detection can largely avoid these types of false positives.

Video Comparisons

- **Snow Scene**: The left camera, using traditional motion detection, continuously triggers motion events in the snow scene, with a red motion tag in the GV-VMS system. Simultaneously, the right camera, using PVD motion detection, detects no people or vehicle motion events in the snow scene.

  Video clip: https://youtu.be/UaruPu4oYNE



- **Lighting Changes:** When the lighting changes, the camera using traditional motion detection is much more likely triggered than that using PVD motion detection. In this example, when the lighting in the hallway outside the door changes, the left camera in the meeting room using traditional motion is triggered.

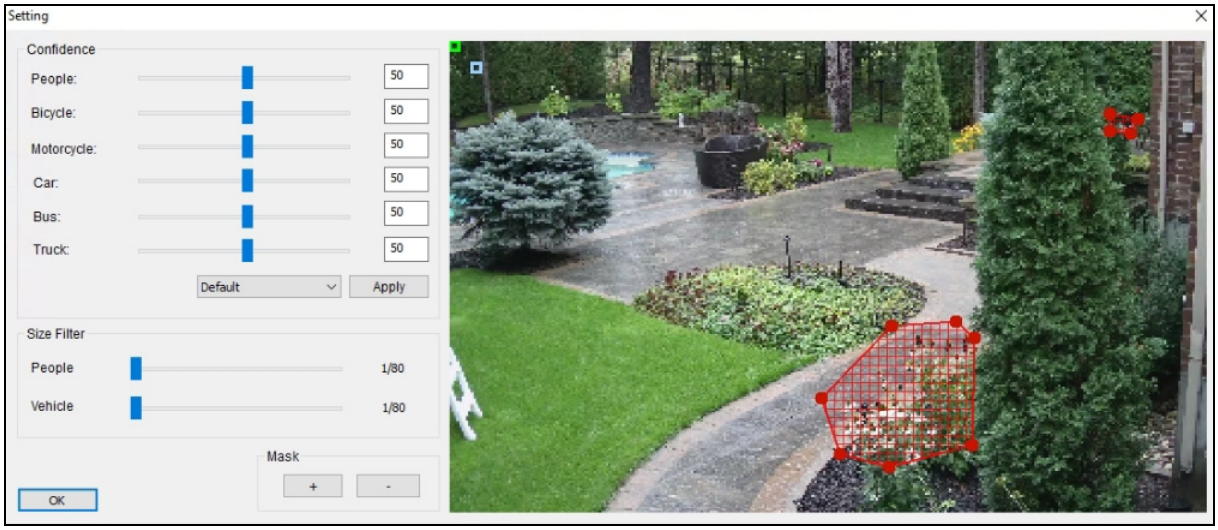
  Video clip: https://youtu.be/-ko_PsVWqoQ

Confidence Threshold Settings

The PVD algorithms identify people or vehicle motion based on several detection thresholds listed in the following dialog box. When the confidence level of a target exceeds the set threshold (50 by default), it is classified as a PVD motion.

To meet your requirements optimally, you must consider the following two factors when changing the threshold values:

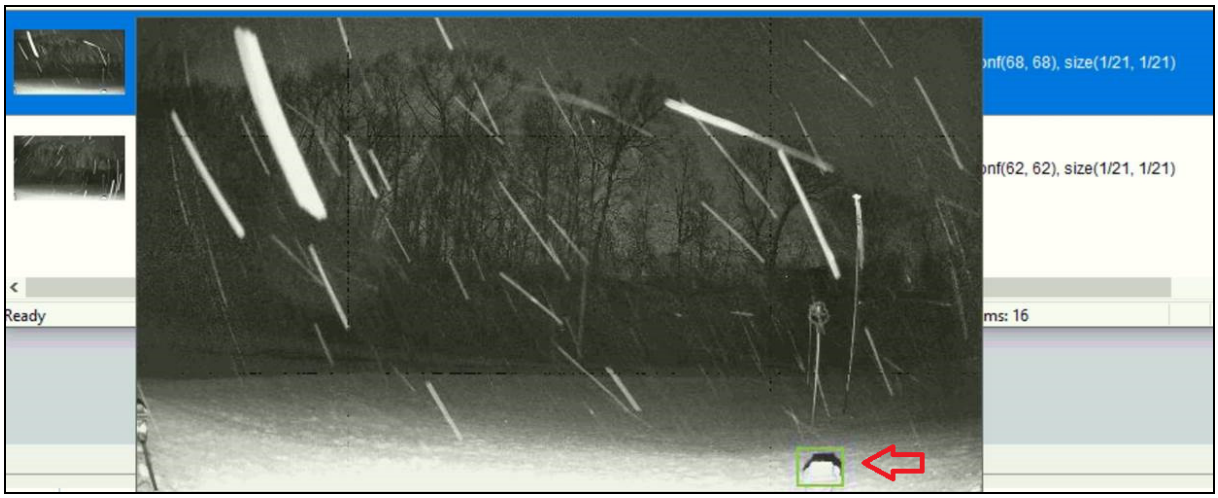
- **High confidence:** stricter identification requirements, **fewer events**, a greater likelihood of persons and vehicles, and **the possibility of undetected events**.
- **Low confidence:** less stricter identification requirements, **more events**, a lower likelihood of persons and vehicles, and **fewer chances of missing detection**.



The detected PVD motion type, confidence, and size are displayed in the AI Event Table of the system log. Based on the detection results, you can try different PVD settings to find the best confidence thresholds for your application and event frequency requirements.

Case Studies

[Case 1]



Issue: In the snow scene, a bottom-right stone was misidentified as a person (people detection confidence is 62-68, higher than the default 50).

Solution: When an object is fixed, smaller than a person/vehicle, or not placed in a main path that people/vehicles pass, it can be resolved by *masking* the false-positive object.

[Case 2]

Issue: At the office scene, a fan on a cabinet was misidentified as a person (people detection confidence is 60, higher than the default 50).

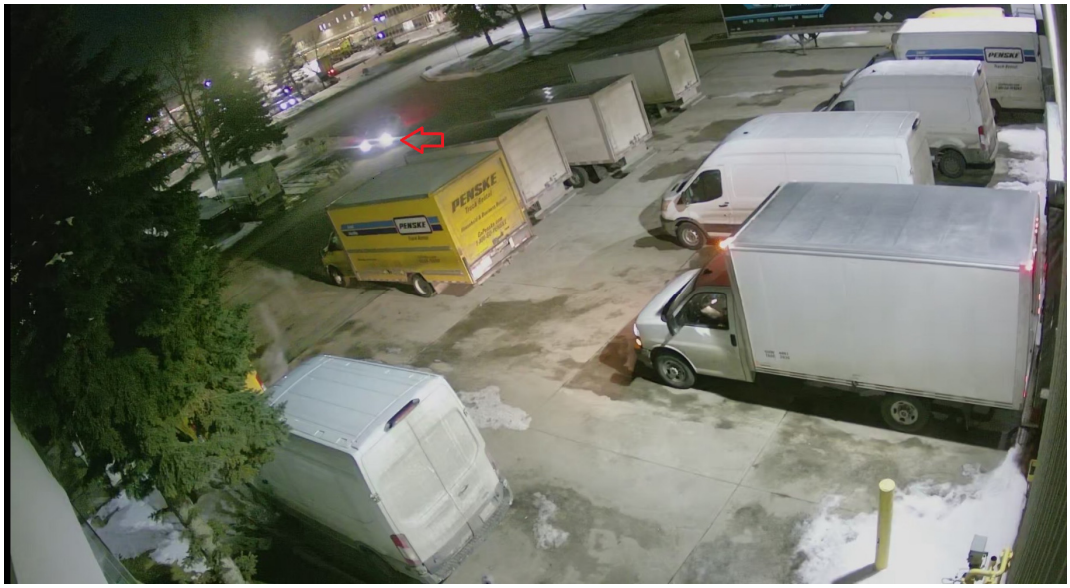
Solution: When an object is fixed, smaller than a person/vehicle, or not placed in a main path that people/vehicles pass, it can be resolved by *masking* the false-positive object.

[Case 3]

Issue: In the garden, a small bunch of flowers was misidentified as a person (people detection confidence is 50-75, higher than the default 50).

Solution: When an object is fixed, smaller than a person/vehicle, or not placed in a main path that people/vehicles pass, it can be resolved by *masking* the false-positive object.

[Case 4]

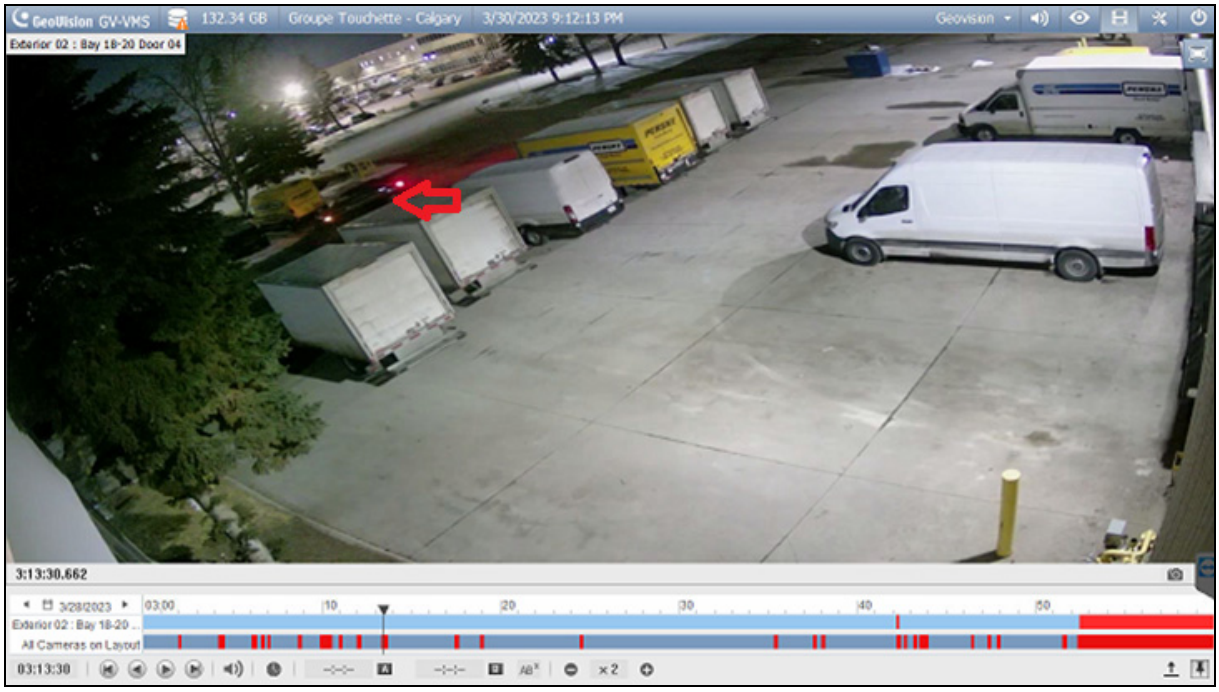


Issue: One parking lot camera missed one vehicle at night (car / truck detection confidence is 49-56, slightly higher than the default 50).

Solution: Because the nighttime outdoor scene is challenging and affected by various factors (lighting conditions, vehicle color, camera field of view, vehicle speed, etc.), it is suggested to lower car and truck detection confidence based on your event frequency needs.

Note: It is recommended to use GeoVision full-color cameras to enhance nighttime lighting: https://www.geovision.com.tw/search_result2.php?q=full%20color

[Case 5]



Issue: One vehicle went undetected at night.

Solution: Due to the car's brief appearance on screen, it is suggested that the camera's GOP (Group of Pictures) be decreased from 2 to 1 in order to improve the PVD detection and key frame capturing.

Note:

1. In upcoming GV-VMS V18.3.2, all PVD camera channels will have their GOP set to1 by default.
2. It is recommended to use GeoVision full-color cameras to enhance nighttime lighting: https://www.geovision.com.tw/search_result2.php?q=full%20color

[Case 6]

Issue: In the garden, some portion of the grass was misidentified as a person (people detection confidence 51-68, higher than the default 50).

Solution:

1. When an object is fixed, smaller than a person/vehicle, or not placed in a main path that people/vehicles pass, it can be resolved by *masking* the false-positive object.
2. In the false-positive scenario, the user set the confidence threshold to 65. Because the scenario generates few false positives (less than five per day), it is not advised to increase the confidence threshold to 70, which would not cause misidentification issues but would increase the chances of undetected threats.

[Case 7]

Issue: A cat was misidentified as a person (people detection confidence 92, higher than the default 50).

Solution: Our system currently cannot identify animals. Future versions of GV-VMS will incorporate the feature.

[Case 8]

Issue: A object in the bottom-right corner was misidentified as a vehicle (car detection confidence 56-68, higher than the default 50).

Solution: The misidentification could be caused by camera movement. When an object is fixed, smaller than a person/vehicle, or not placed in a main path, it can be resolved by *masking* the false-positive object.