GV-AI Guard PVD Motion Detection Usage and Case Studies

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Applied to

GV-AI Guard V1.1

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-AI Guard 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

With the latest patch V1.1.0.2, you can now adjust the detection thresholds. The patch is only applicable to GV-AI Guard V1.1.

GV-AI Guard patch V1.1.0.2 download:
https://dlcdn.geovision.com.tw/Software/Patch/AIGuard/GV-AIGuardV1.1.0.2.zip

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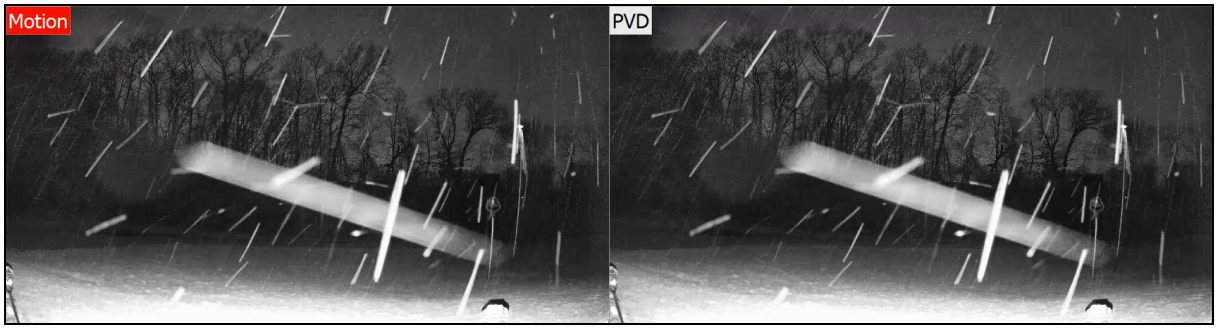
PVD vs. Traditional Motion Detection

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-AI Guard 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.

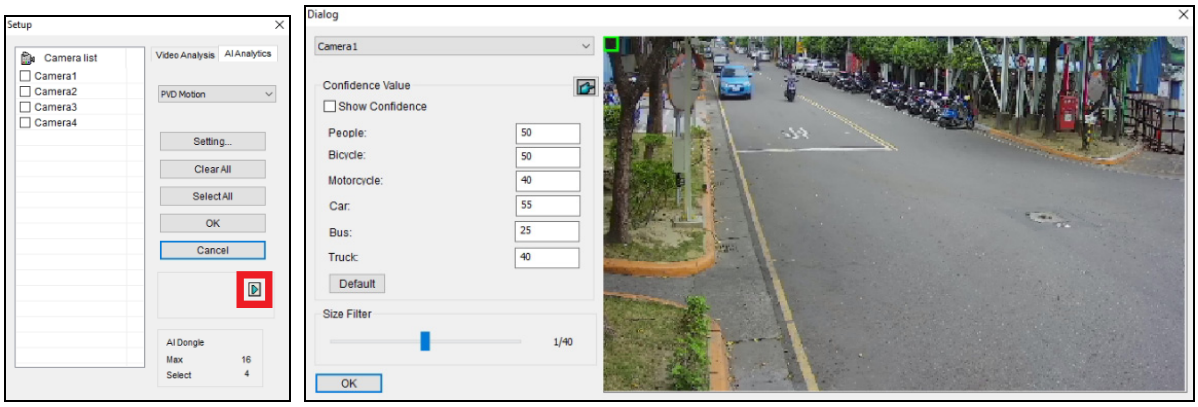
  Video clip: https://youtu.be/-ko_PsVWqoQ

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, 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**.

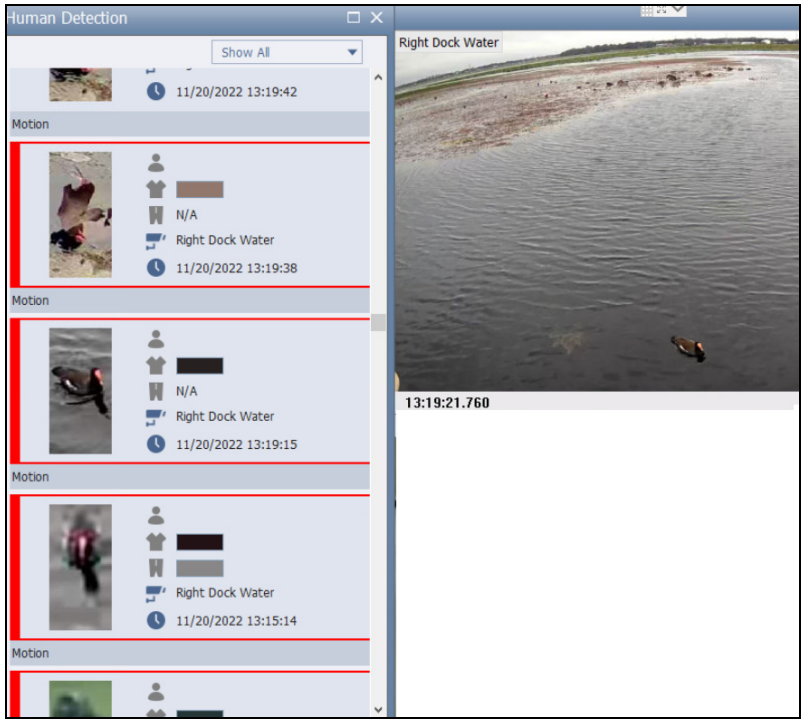


Note: In GV-AI Guard V1.1.0.2, the default threshold for People is 50, Bicycle 50, Motorcycle 40, Car 55, Bus 25, and Truck 40.

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

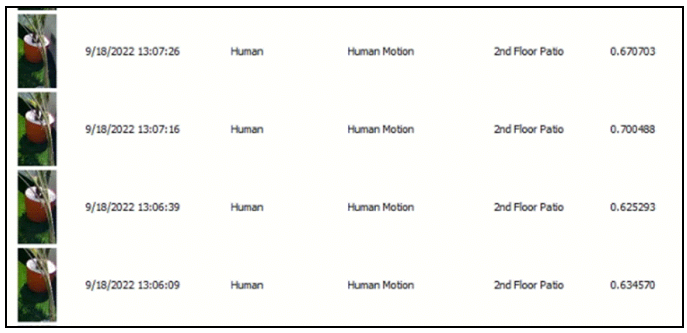
[Case 1]



Issue: A duck was misidentified as a person (people detection confidence 95, higher than the default 50).

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

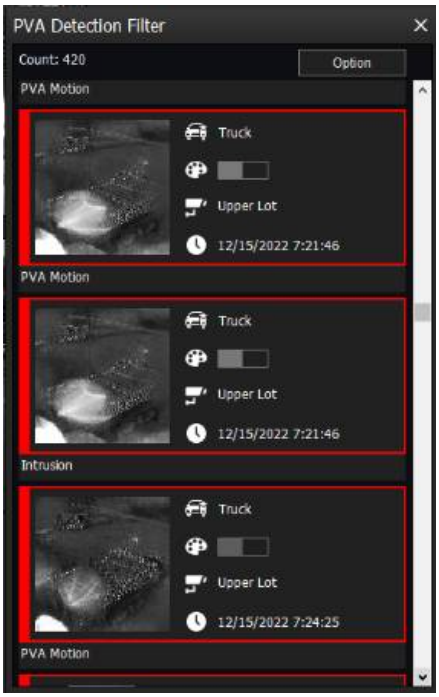
[Case 2]



Issue: A potted plant was misidentified as a person (people detection confidence is 60-70, 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: On a rainy day, the metal netting pieces on trailers were misidentified as a truck (truck detection confidence is 50-66, higher than the default 40).

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 contrast, when objects in a scene are moving, you could raise the detection threshold to 65, which would not cause misidentification issues but would increase the chances of undetected threats.