



AI Plugin for **Wisenet WAVE VMS**

Best Practice Configuration for
Different Types of Analytics

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Overview of Different Types of Analytics

Intrusion Detection



Definition

Detects objects that move inside a defined intrusion area. The event is triggered for any new target object (person, vehicle, animal) entering the area.



Area Enter/Exit



Definition

Detects objects that enter/exit a defined area. This analytic can be employed to monitor objects detected in the area without triggering an intrusion event.



Please note that the default configuration is set to ignore stationary objects (for example, parked cars) to avoid triggering events on unmovable targets.

Area Exit/Enter vs Intrusion Detection: what's the difference?

Area Enter/Exit functionality closely resembles intrusion detection; however, it offers the flexibility of selecting whether to trigger events exclusively upon entry or exit.

The rationale behind maintaining separate functionalities for intrusion detection and enter/exit lies in the need for distinct actions in various scenarios. For instance, there are situations where monitoring an area is essential without triggering an intrusion alert. A practical example is monitoring pedestrian activity on a street to determine foot traffic, which does not constitute an intrusion.

Within a VMS, these analytics are presented as configurable events, offering users the ability to specify actions such as sending emails, SMS alerts, or other custom alerts. The inclusion of both intrusion detection and area enter/exit functionalities addresses diverse use cases, allowing for a nuanced approach to surveillance and response.

Loitering



Definition

Detects objects that stay in the defined area longer than a specified time. By default, an event will be triggered when a target object remains in the area for a duration of 10 seconds.



When configuring the “loitering” analytics type, it’s crucial to customize the time threshold to suit your specific use-case requirements.

Please note that once an individual exits the designated zone, the timer resets automatically. Additionally, if a person leaves the camera’s field of view and later re-enters, they are treated as a new target object. Consequently, any time spent in the zone before exit will not be considered for future loitering events.

Object Left/Removed

Object Guarding



Definition

Detection of objects being removed from a specified area, indicating potential theft.



Object Left Behind



Definition

Detection of objects being left in a specified area, indicating potential delivery or object abandonment.



Note:

The system requires some time to “learn” the scene to detect objects being removed or left behind accurately. After configuring the Object Guarding or Object Left Behind analytics, allow at least 10 seconds of “learning time” for the system to capture the zone of interest and be ready to detect changes.

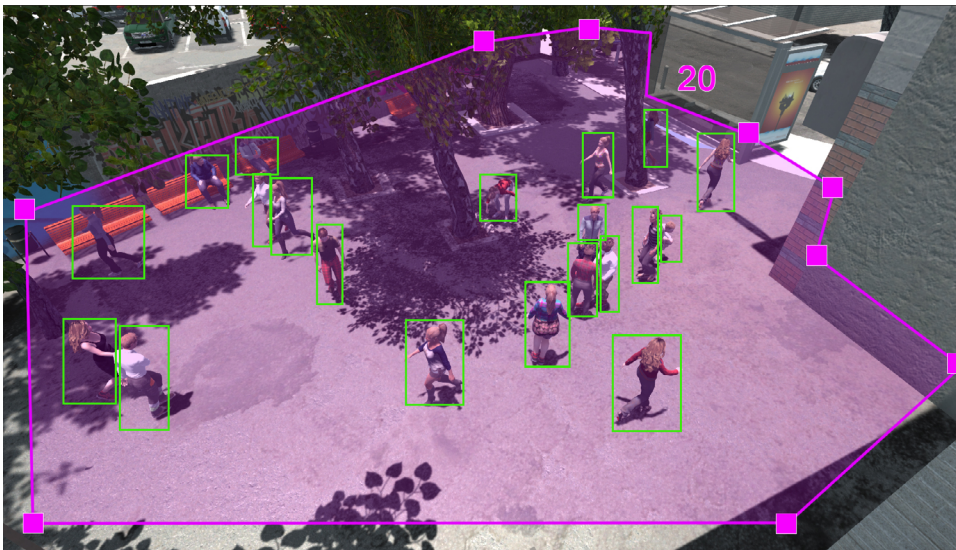
Crowding



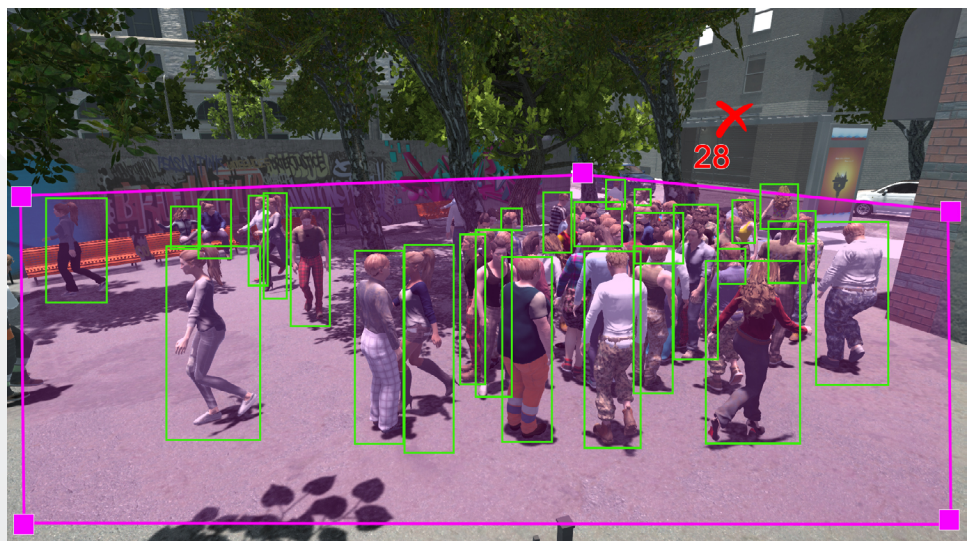
Definition

Detects when the number of objects within a defined area at any given time reaches a set threshold. For instance, it could be a useful feature to detect a sudden increase of people in a queue in front of an ATM or in a commercial environment.

While there is no hard limit, it's suggested not to set a threshold too high. The value should be chosen in relation to the occlusions that can occur when too many objects are in the view.



In this example, the correct count would be higher than 28, but, because of the heavy occlusion, it's not possible to precisely count the number of people in the area.



Tailgating

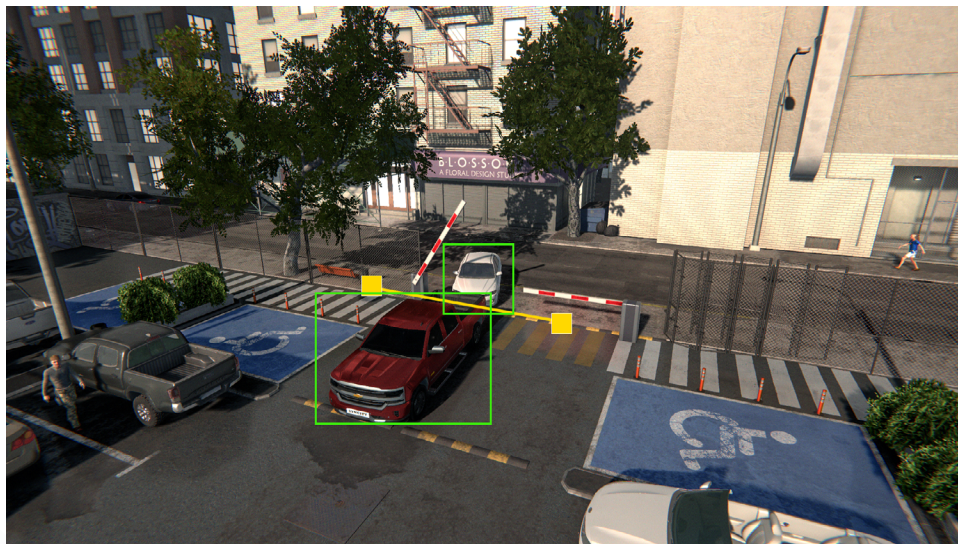


Definition

The tailgating feature detects if more than one object crosses a virtual line during a predefined time interval. This feature could be useful for detection of multiple individuals or vehicles following each other in close proximity to gain access to a secured area.

Proper camera placement is crucial for effective detection. Ensure that the camera is positioned so that the objects do not occlude each other when passing through the virtual line.

For example, if the camera is placed too close to the ground, a smaller vehicle (e.g., a white car in the example image) could be fully occluded by a larger vehicle (e.g., a red pickup truck in the example image) passing in front of it, making detection difficult. Ensure the camera angle and height provide a clear view of all objects crossing the virtual line.

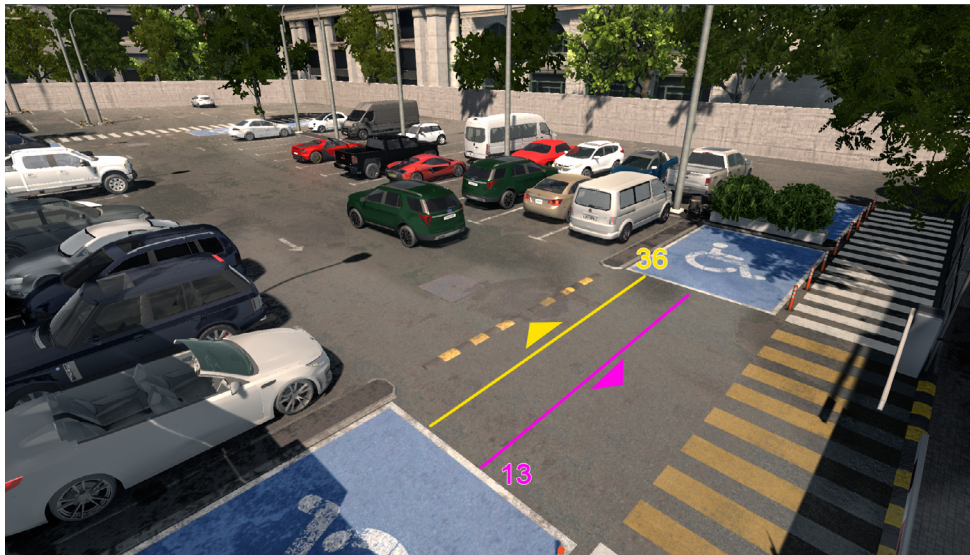


Line Crossing



Definition

Detects objects that cross a defined line. You have the option to create a multi-segment virtual line. This feature allows you to select the direction in which you intend to monitor the movement of objects.



To mitigate double triggers resulting from bounding box flickering, a bandwidth is incorporated around the virtual line. It is imperative to note that virtual line crosses are anticipated to occur in a singular direction for a given object.

Furthermore, the virtual line crossing functionality exclusively triggers for objects identified as being in motion. When configuring virtual lines, akin to zones, it is essential to account for a specified “margin.” This ensures optimal performance and prevents unintended triggers. For instance, if the virtual line is situated too close to a bustling road adjacent to a sidewalk, it may inadvertently detect objects such as bikers or scooter riders on the road, rather than focusing on the intended area of the sidewalk.

Finally, do not place a virtual line too close to the edges of the view or to occluding walls. It's necessary to keep some space for the system to start tracking an object before it crosses the line, or to allow for a tracked object to fully cross the line bandwidth before disappearing.

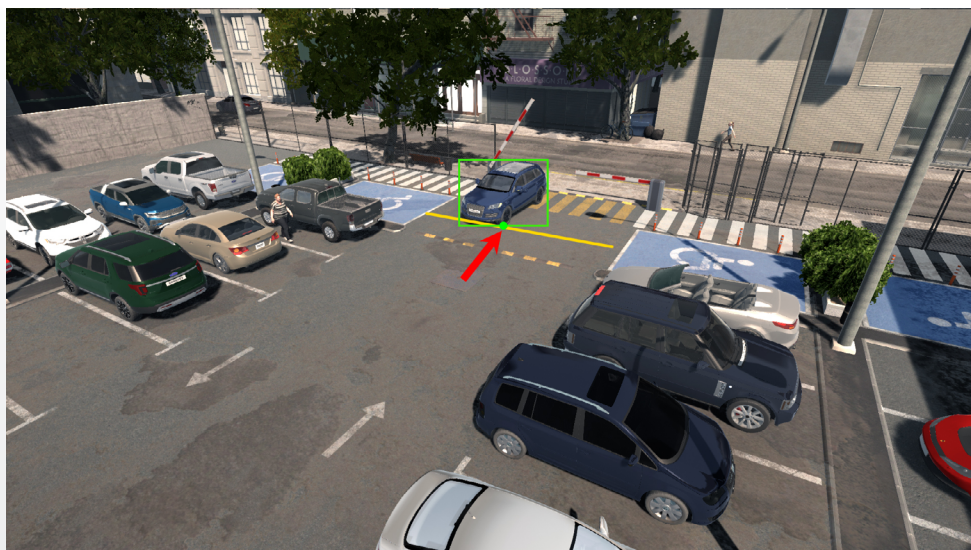
Defining Detection Areas and Virtual Lines

The inclusion area (zone) refers to the region in which the analytics identifies objects. Events are triggered for objects only if their detection point falls within this inclusion area. Detection events will not be triggered by activity outside of the detection area.



Detection Points for Zones and Virtual Lines

Consider the anchor point (the primary detection point) of the objects you aim to detect. For inclusion areas, it's the center of the objects. For virtual lines, it's the bottom center of the bounding box



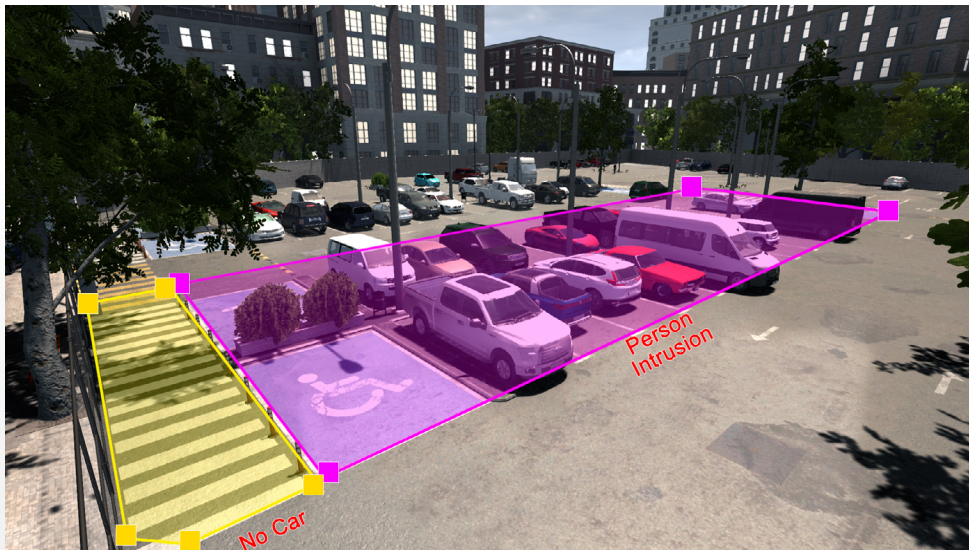
Shape and Dimensions of Detection Zones

Adjust the shape and dimensions of the polygon to encompass only the portion of the scene where object detection is needed. The inclusion area can be drawn as a convex or concave polygon.



Monitoring Multiple Zones

You can draw separate zones (areas) to detect different types of objects in different places of the scene. The zones can be visualized on the video in different colors for your convenience.



Margin Around Detection Area

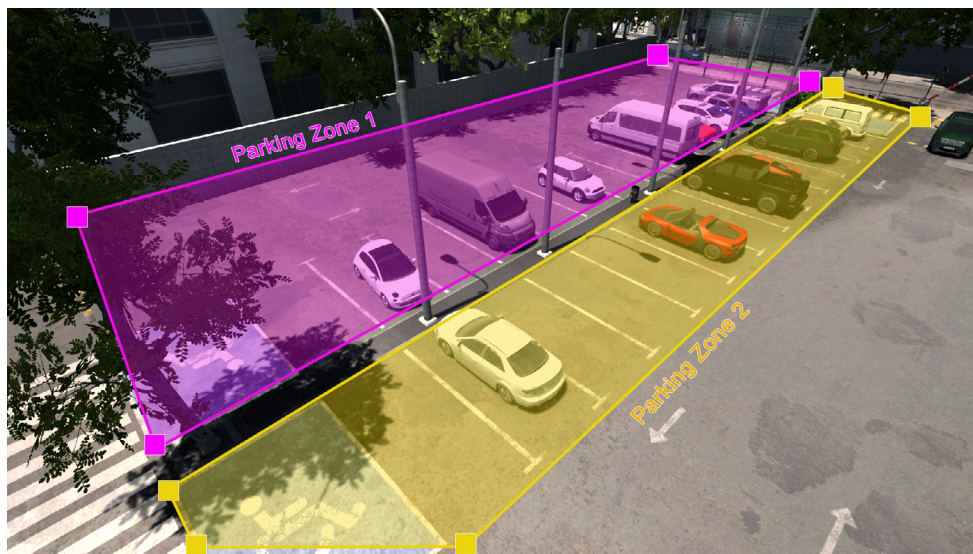
Consider incorporating a margin around the intrusion detection zone, especially when it is situated adjacent to high-traffic areas with anticipated movement, such as a parking lot adjacent to a busy road.



This margin will act as a buffer, helping to prevent potential False Positive events triggered by objects moving in the neighboring busy location. By introducing this precautionary measure, you can enhance the accuracy and reliability of intrusion detection in dynamic environments with varying levels of activity.

Zone Names

Assigning names to zones is optional but becomes beneficial after drawing polygons when aiming to generate events with detailed information. By associating specific names with drawn polygons, you enhance the clarity and organization of event-related data, streamlining the analysis and retrieval of information.



Boost Accuracy of Detection

False Positive Sources (Wrong Detections)

Certain weather conditions (like rain and snow) can be problematic for intrusion detection on exterior locations since they can be a source of False Positive events. Reducing the motion sensitivity might help alleviate some of these issues, at the cost of potentially missing relevant intrusions.

Please consider these situations as potential sources of False Positive events:

- Individuals or automobiles partially obscured from view. For example, a small van emerging from the rear of a structure might resemble a person due to the shape and perspective.
- Presence of insects on the camera lens. Cameras equipped for day-and-night use with infrared illumination may attract insects and spiders.
- A mix of vehicle headlights and intense rainfall.
- Animals in a pose comparable to humans.
- Strong light leading to the formation of shadows.

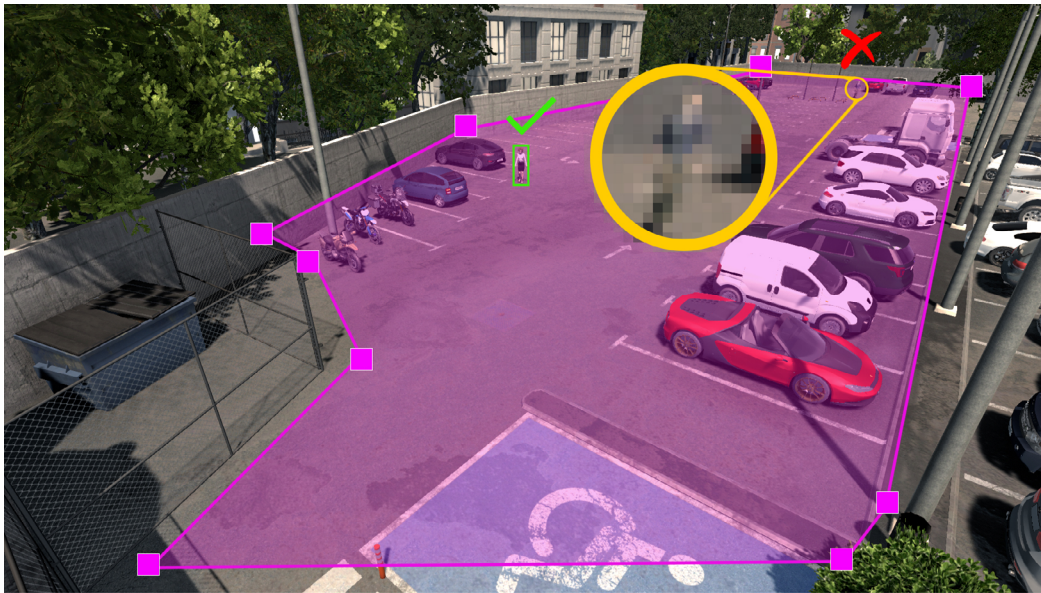
False Negative Sources (Missed Detections)

Weather Conditions

Fog, direct light shining on the camera, inadequate light.

Object Size

Very small targets (smaller than 12x12 pixels) could cause missed detections. The smaller the target, the higher the risk of a False Negative.



To detect smaller targets, it is recommended to enable the “Hi-res” mode in Operating modes. This mode uses the primary stream and a larger AI network, improving the detection of smaller objects.

- Hi-res mode is computationally more demanding and will reduce the maximum number of streams you can run AI on simultaneously.
- For more details on Hi-res mode and additional configuration options, please refer to the User Manual.

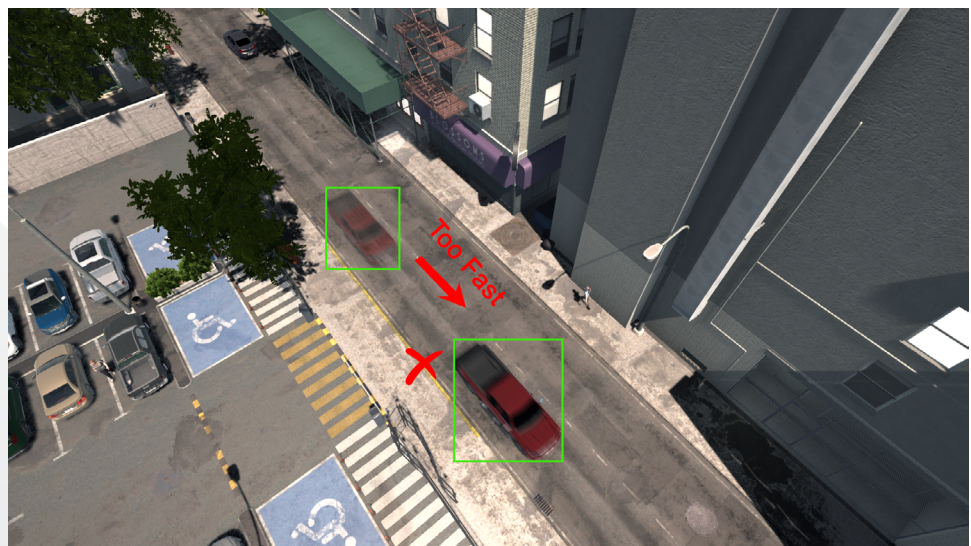
Movement Sensitivity Settings

Event Duration

Short-spanned events that last less than two seconds (like a person appearing and disappearing right away) typically require higher sensitivity.

Object Speed

If an object moves more than its own size between frames, it can be very hard to track. Hence, fast-moving vehicles (or people on scooters, for instance) can be challenging to detect as intruders. Please be sure to use high movement sensitivity and set at least 10 FPS on the camera stream in use if you plan to catch those.



Occlusions

Detecting objects moving behind other objects can be challenging, especially if they are small. Try to minimize the number of occlusions to improve results, by placing the camera in positions with better viewing angles.



Object Quantity

When employing analytics such as Crowding or Intrusion, it is important to adjust the camera angle to minimize overlapping of the target objects.



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