AICUDA
TECHNOLOGY

VAIDIO 6.1.0
ANALYTICS GUIDE

TABLE OF CONTENTS

AI ANALYTICS

FALSE DETECTION REPORT

☐ Notice a false object detection in Vaidio? Send it to Aicuda

☐ False Detection Reporting strengthens the accuracy of future results

☐ Applies to all analytics

☐ The icon to send the false detection report is included in the **detail page** in every dashboard (Video Search, LPR, Alert, etc.)

☐ Internet is required to send the snapshot to Aicuda

Note: Aicuda engineering team uses the falsely detected image for correct labeling and adds it to training

Original Snapshot | Scene ID : 9383493

2021-01-01 14:58:55
Drug Store

False Detection

Truck

Person

Face

Detail page

Object Type: Truck
Color: Yellow, Black
Width : 325
Height: 856

False Detection Report

To help us improve our product, please send this report if you discovered false detection in the scene.

Scene ID:19473097
Scene Image Time:2022-08-05 04:12:06

Description (Optional)

Cancel   Send Report

Enter Description after clicking on **False Detection** icon

VIDEO SEARCH

- Dashboard
- Camera ROI
- Object Types
- Person: Age, Gender, Emotion, Name, Mask, PPE

- Vehicle: Make, Model, Partial License Plate
- Animal & Object
- Dangerous Object
- Smart Tag

VIDEO SEARCH – DASHBOARD

Icons from left to right:

- Show a specific area/point of view
- Show the bounding box of the detected objects
- Enlarge an area in the image
- Add hashtag to the detected event for future search, e.g., #caraccident
- Download the image
- Blur/unblur faces/people in the image
- Conduct **Face Search** for an individual
- Show **Cross Camera Tracking**
- False Detection Report
- Show image of the detected event (default)
- Show video playback if NVR has been added to the camera
- Show camera location on GPS map
- Show camera location on indoor map

VIDEO SEARCH – CAMERA ROI
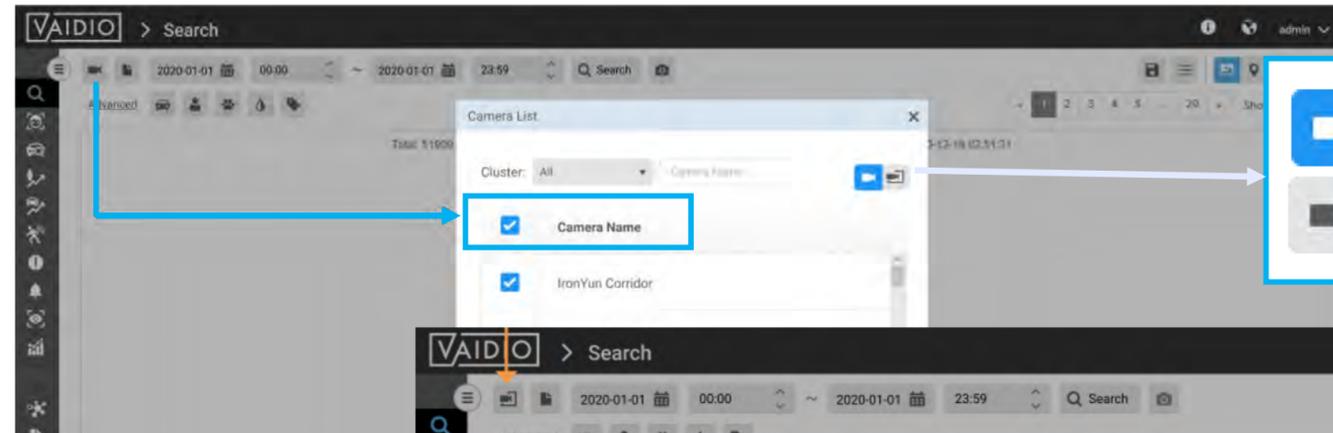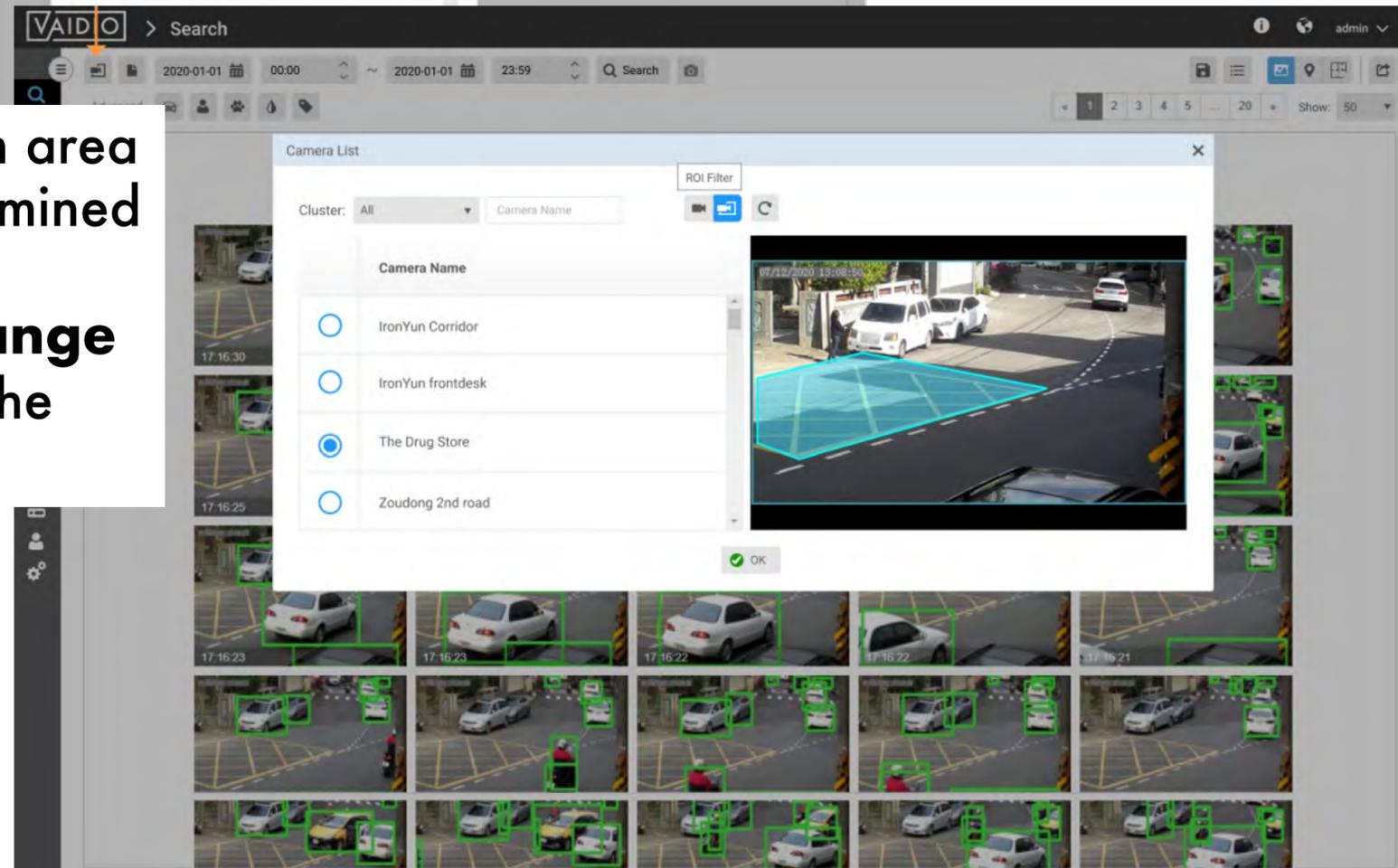

Wide Range (multi-camera): Regular video search to get more results

Precise (single-camera): Define an ROI in the camera FOV to get fewer but more precise results

Specify an ROI to narrow down the search area
- ☐ ROI is drawn on demand, not pre-determined during setup
- ☐ Toggle Camera ROI between **Wide Range** and **Precise** modes at the top right of the Camera List window

VIDEO SEARCH – OBJECT TYPES

☐ Make sure that the correct object types are enabled to be detected:

   ☐ **Camera > Edit > Profile**

☐ Make sure that the correct AI engine(s) are activated to detect certain attributes:

   ☐ **Camera > Edit > AI Engines**

   ☐ FR: Name, List, Face, with/without mask, Emotion

   ☐ Age & Gender and/or FR: Age group, gender

   ☐ PPE: Person with/without hardhat/helmet, safety vest

   ☐ LPR: Vehicle license plate

   ☐ Vehicle make and model recognition (MMR): contact your local Aicuda support team (or email support@Aicuda.world) if MMR is in your purchase order but does not appear in the search dashboard

Return to Video Search

VIDEO SEARCH – PERSON

Check "**Face**" to get the detected results that include a face and filter out those classified as a person but without a face.

Select the specific criteria of the target object.
• Color
• Name & FR List
• Age & Gender
• Emotion
• Facemask
• PPE: Hard Helmet, Safety Vest
• Quantity

Click the face icon to directly go to **Face Search** (opened in a new tab) to find a particular person across multiple cameras based on this snapshot.

Can combine different objects to search for a specific scene/event

VIDEO SEARCH – PERSON (CONT.)

To search for the person who is in the face database, enter the **Name** and select the FR **list**.

VIDEO SEARCH – PERSON (CONT.)

☐ When **System > Setting > Privacy Protection** is ON, in the detail page, the Face Search icon is disabled

☐ To do **Face Search**, the user must first Unblur the image by clicking on the Blur/Unblur icon

Blur/Unblur

Face Search

VIDEO SEARCH – VEHICLE

Select the specific criteria of the target object.
- Types
- Color
- Partial License Plate
- License Plate List
- Make & Model
- Quantity
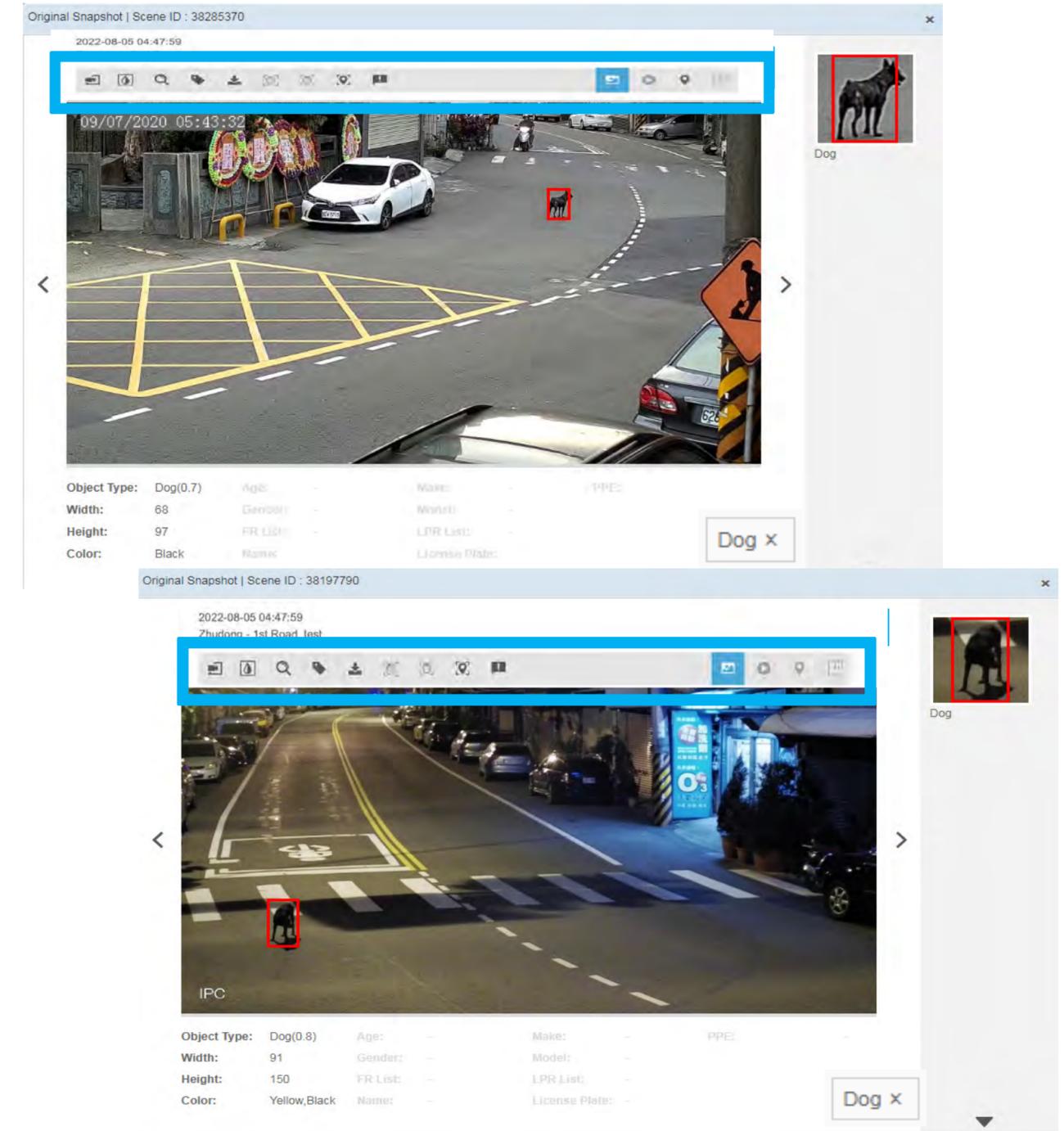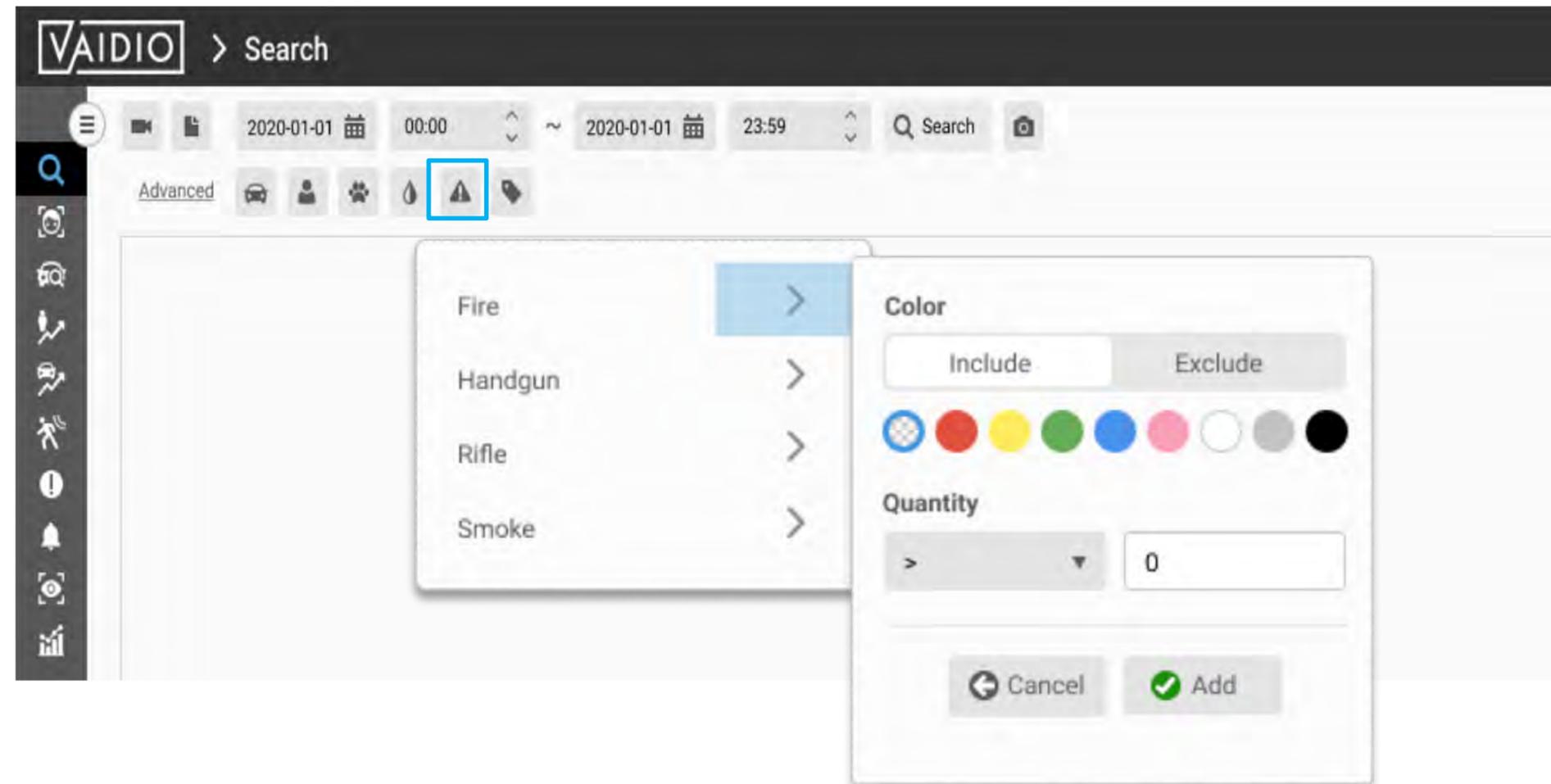
Recognize different vehicle types.

VIDEO SEARCH – ANIMAL & OBJECT
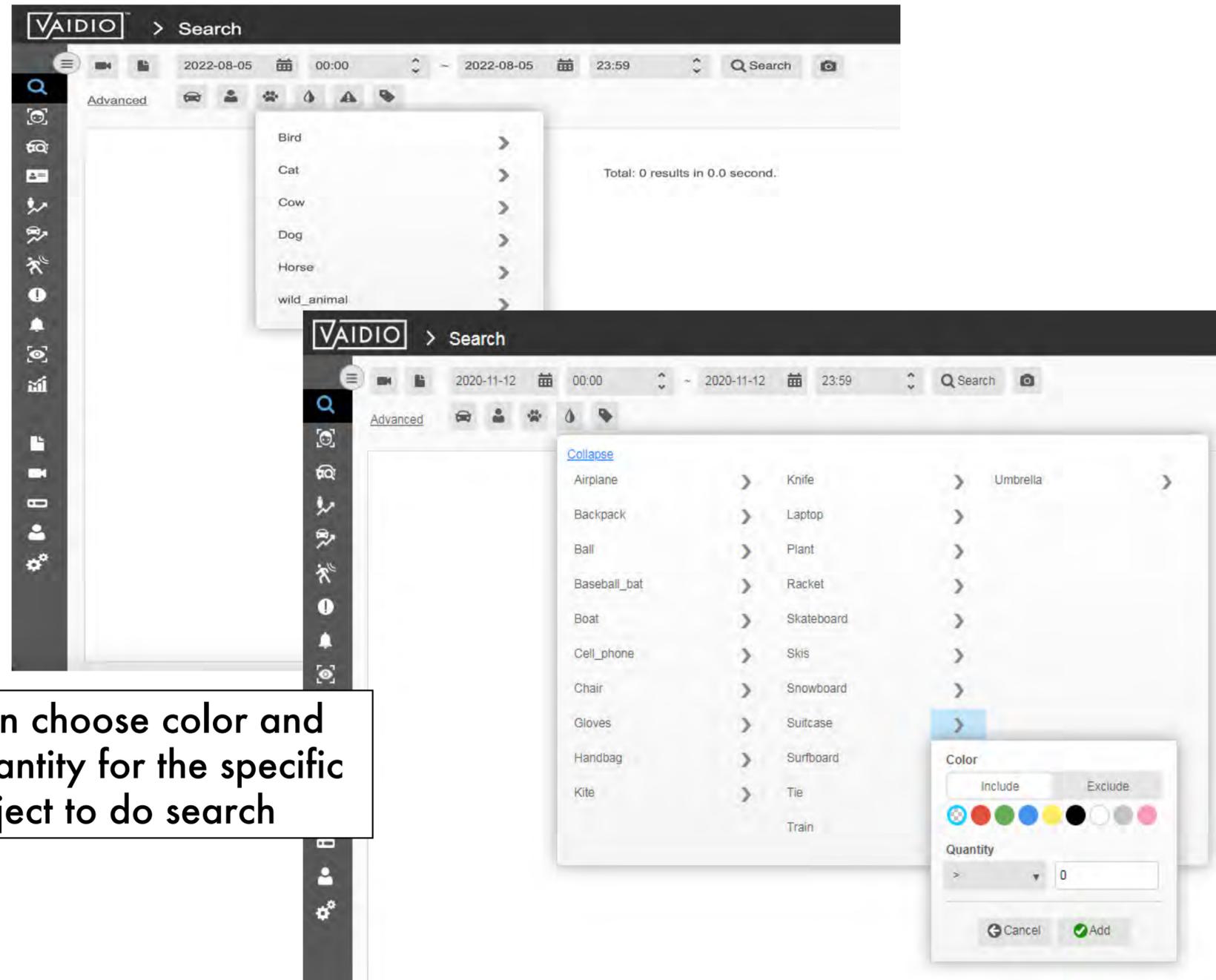
Can choose color and quantity for the specific object to do search

DANGEROUS OBJECT

- Specifically search for dangerous objects
- Object Types:
  - Fire
  - Smoke
  - Handgun
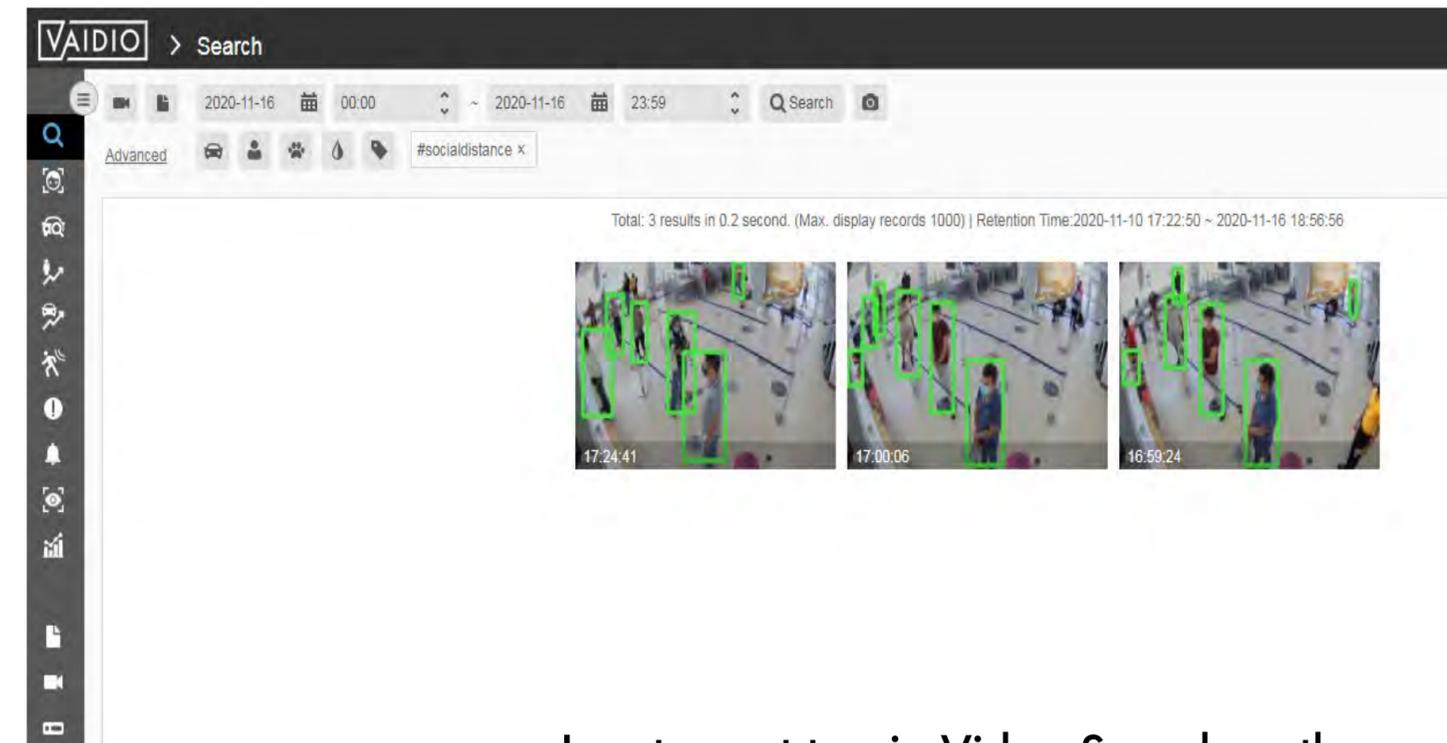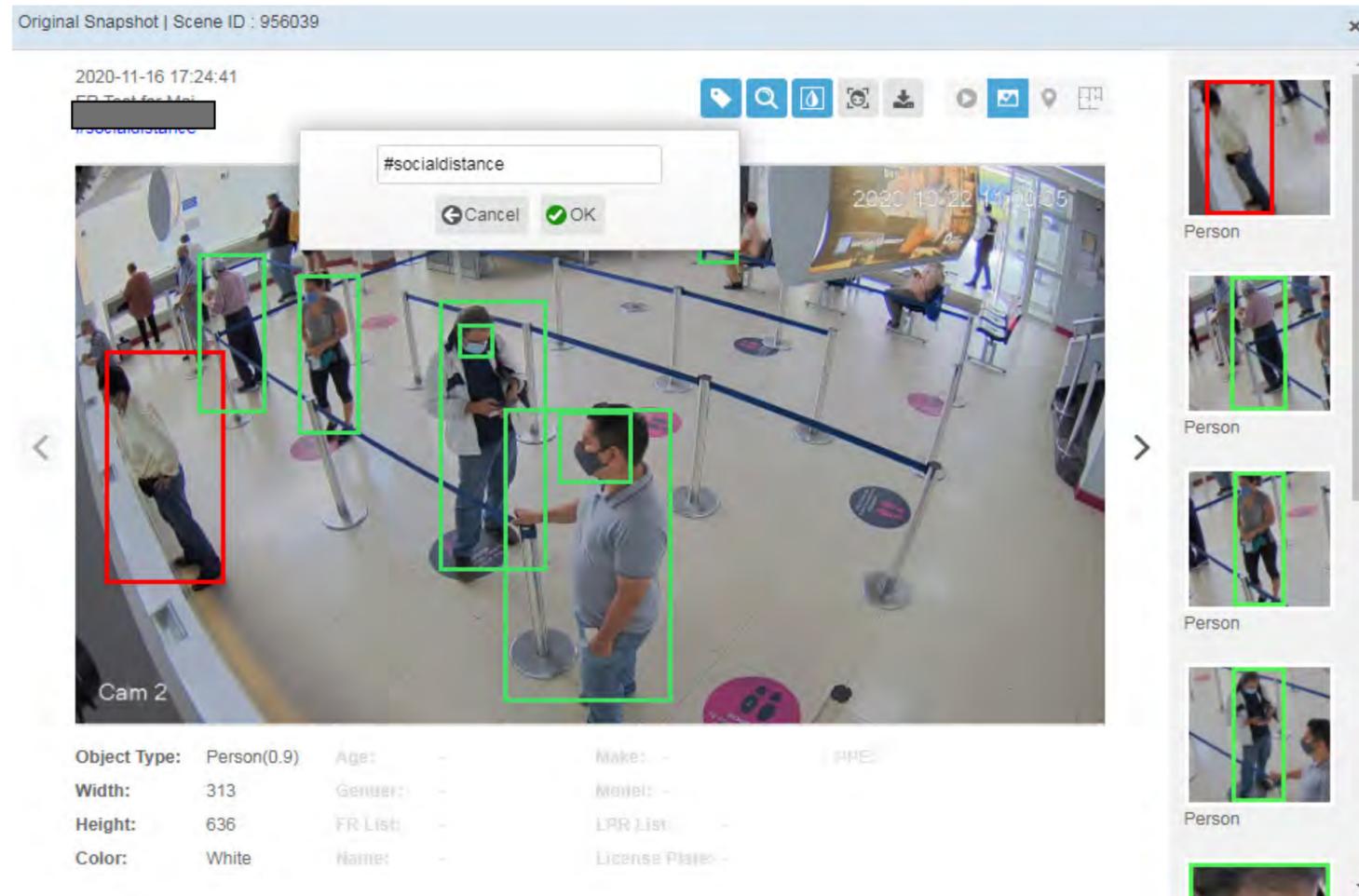 - Rifle

VIDEO SEARCH – SMART TAG

Add a Smart Tag to the detected events (results) for a special situation.
☐ Smart Tag(s) can be added to all analytic results, including object search, intrusion, face recognition, abnormal, etc.

Input smart tag in Video Search as the scenarios to get all results with the same tag, e.g., #socialdistancing.

Return to Video Search

INTRUSION DETECTION

CONFIGURE ROI (REGION OF INTEREST)

In **Camera Setting**, activate **Intrusion** AI Engine

- Click on the Pencil icon 🖉 in the **Intrusion** tab to draw the regions of interest
- Add **Exclusion** ROI ⧉ as necessary: no object is detected in the exclusion region; use this feature to exclude areas that cause false alarms (e.g., statues in a person detection ROI)

Note: The **General ROI** tab is to adjust the entire field of view of the camera. The Intrusion ROIs must be within the General ROI.

Advanced

AI Model : 1 selected ▼   AI Engines : 1 selected ▼   ⚙ Profile : backpack dog

General ROI   Intrusion ✕

🖉 ⧉   Resolution: 1280x720 pixel   👁 Preview

Adjust the shape of the intrusion ROI as necessary. ROI can be of any shape and can overlap other ROI's.

No.	Draw Type	Name	🗑
1	ROI	Crowd detection	🔧 🗑
2	Exclude ROI		🗑

Object Type
🚗 👤 👥 💧

* Make sure the selected object is also checked in Profile.

📅 Schedule

Sensitivity

Detect 5 ⌃⌄ (1~20) scene(s) with defined object

every 10 ⌃⌄ (1~30) second(s)

Skip Duplicate Event ⬤

*Turn on to prolong time in between events.

✅ Save

Adjust **Sensitivity**:
- More scenes with object per second
  = lower sensitivity + higher certainty that the object detected is the correct object type of interest = lower probability of false alarms
- Fewer scenes per second
  = higher sensitivity = shorter delay time

Click to open the side window to add detection rules for the ROI

CONFIGURE ROI (CONT.)

Parameters:

☐ ROI name: **must be unique** across all cameras in Vaidio

☐ Day/night support: strongly suggest adding **at least 2 ROIs** with different <u>schedules</u> and sensitivity settings for day/night support

☐ <u>Object type</u>: Pre-define object type to be detected, number, and color (Optional).

☐ The trigger rule in List can be configured as "AND" or "OR" statements; i.e., all selected object types must be detected to trigger the alarm for "AND" statements, or any of the selected object types must be detected to trigger the alarm for "OR" statements.

Tips:

☐ Due to the computation resource consumption, at most 4 ROI's should be set for best performance

☐ <u>ROI setting for Crowd Detection</u>: set to the desired number of people with low sensitivity

☐ Upper limit: 30 objects per type; e.g., Person > 35 will trigger when there are 31 people, and Person < 25 will trigger when there are 30 people

Make sure to select the profile where the object types to be detected are activated

INTRUSION DETECTION - DASHBOARD

When the defined object is detected, the results appear on the dashboard in real time. The user can click the thumbnail and see detailed information of the detected event.

Select the intrusion ROI to show on Dashboard.
(Default: show the event results of all ROIs)

INTRUSION DETECTION - ILLEGAL PARKING & LOITERING

☐ Search for set amount of time vehicle is loitering in unwanted area or parked illegally in **Camera Setting.**

☐ Loitering & Illegal Parking AI engines must be turned on.

Time Check Period: Range can be extended to 10-1,200 sec.

Cooldown Interval Time: Adjust when the event occurs (0-1 hour)

INTRUSION DETECTION – AND/OR SELECTION

☐ Select the "**AND**" or "**OR**" option to trigger an event when **all** or **only 1** of the selected objects is detected

☐ Max: 10 object types per ROI

Result

INTRUSION DETECTION - HISTORY

Select the intrusion ROI and adjust the time period to review the events.

Check to delete the events in the history if needed.
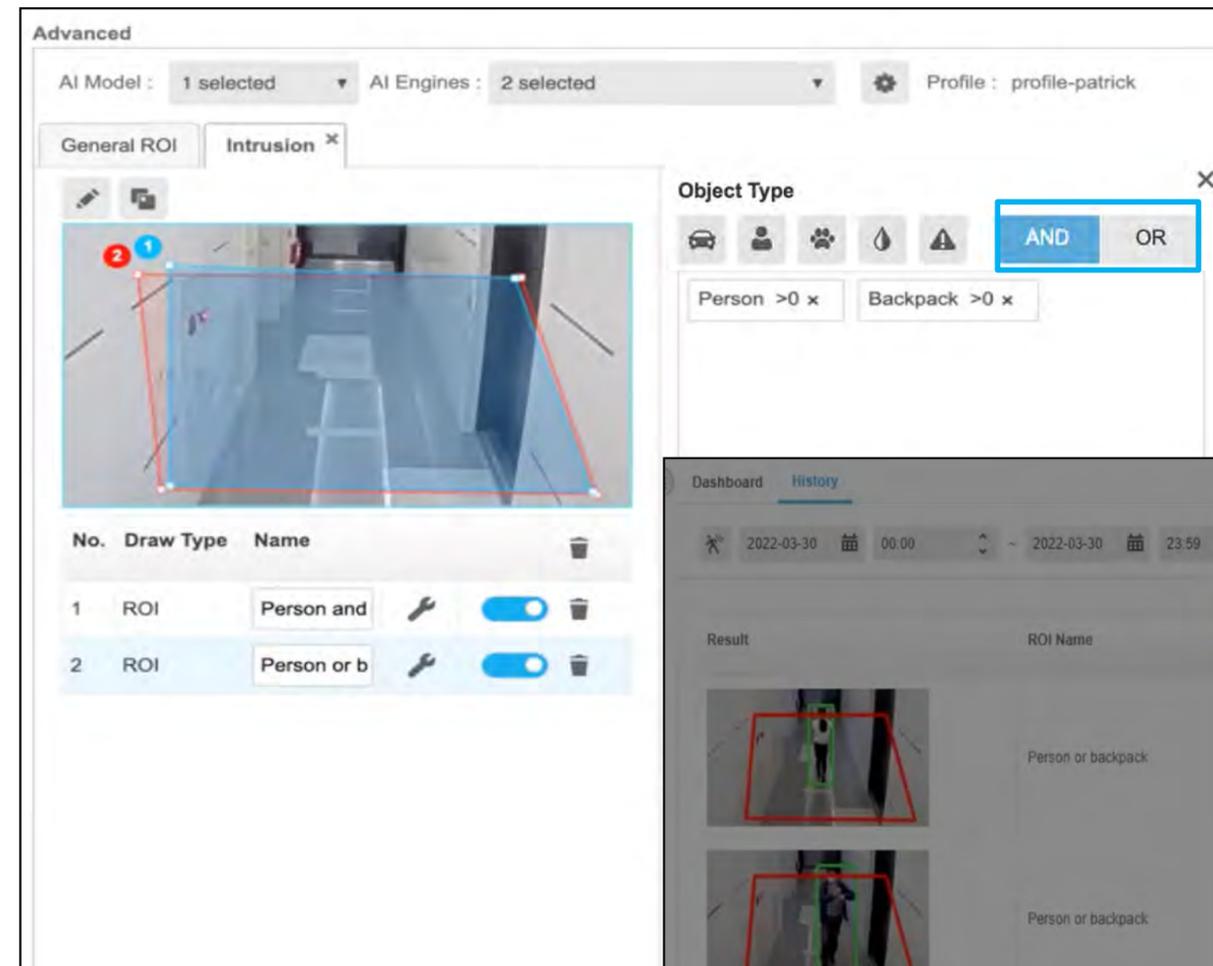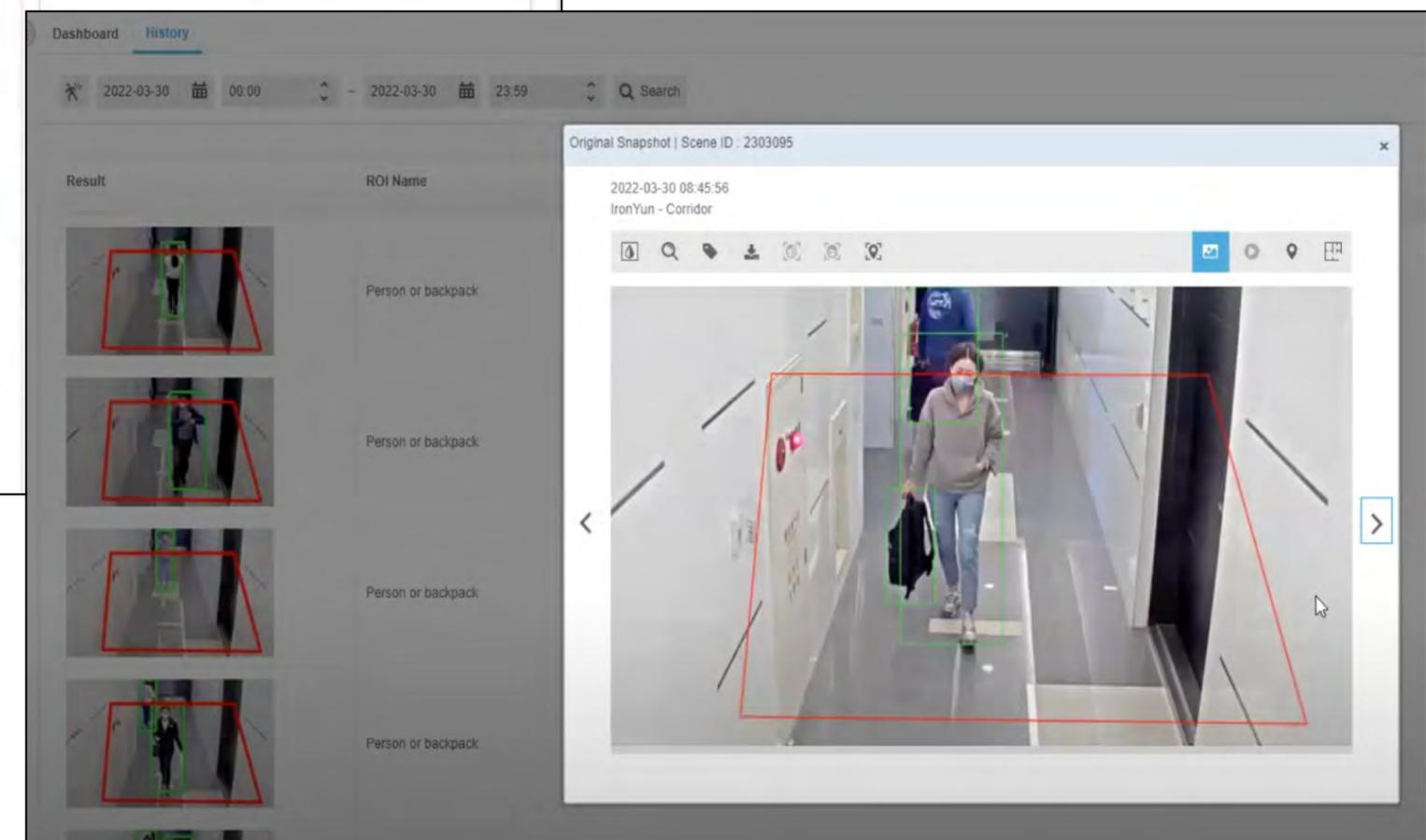
Return to Intrusion Detection

FACE RECOGNITION

- Camera Placement & Settings
- Create Face List
- Face Image Quality
- Dashboard – Real-time Detection

- History
- Face Search
- Mask Detection
- Emotion Detection

CAMERA PLACEMENT AND SETTING

To detect facial features for Face Recognition, please make sure that:
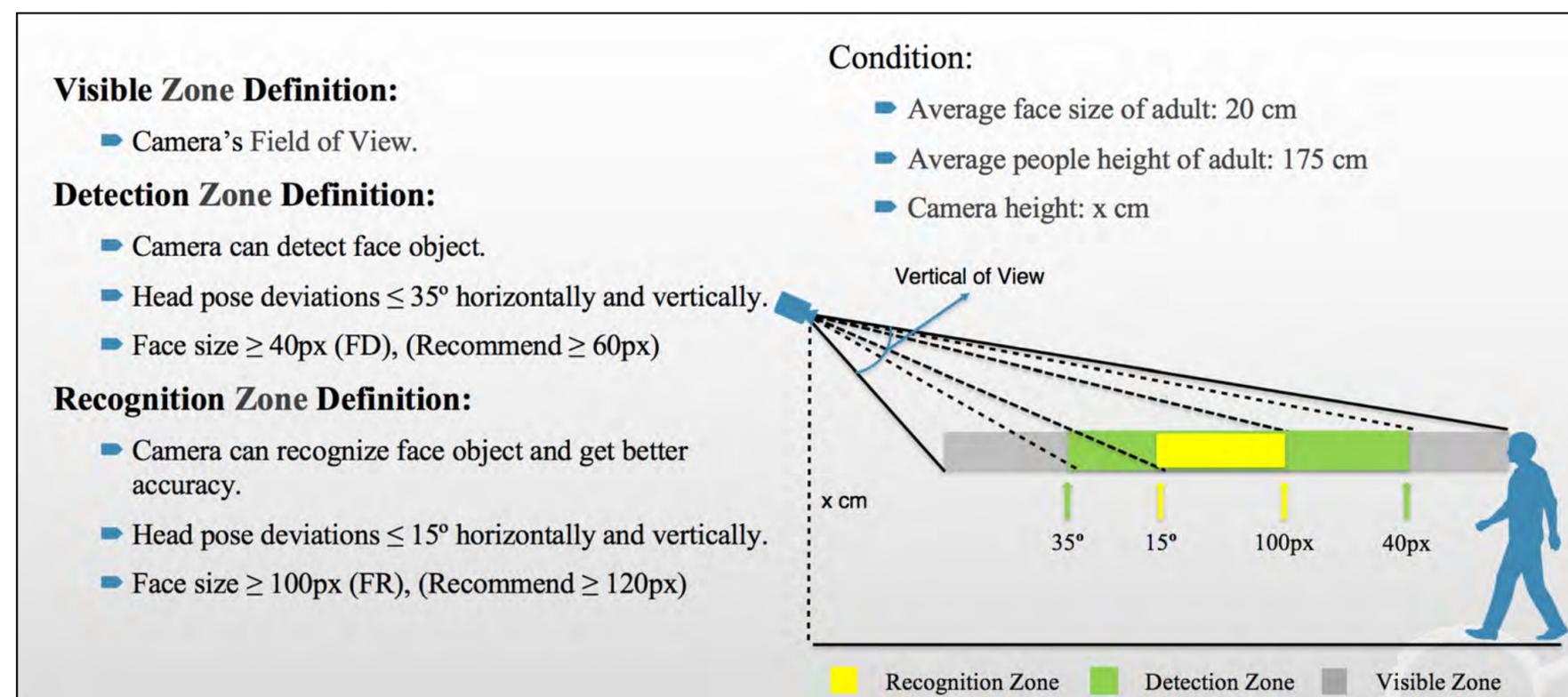
- ☐ **Face Recognition** AI Engine is enabled in Camera setting

- ☐ Face Recognition ROI (region of interest) is defined for each camera within its FoV; e.g., the entrance, to avoid wasting computing power on irrelevant areas in the FoV, increase accuracy and increase speed

- ☐ Each face should be **at least 100 px** wide for clear detection of facial features

Recommended camera placement for FR:

- ☐ Camera is placed at an angle as close to eye level as possible
- ☐ Must be placed 6-7 ft. high in order to obtain face profiles
- ☐ In order for a face to be detected, the camera's height must be **at least** 8% of total screen height

Recommended face image to save in list:

- ☐ Capture images from surveillance camera and save in list (Too high-res image will result in few or no matches because the similarity level between uploaded image and captured image would be too low)
- ☐ Save 5 images for better results

Visible Zone Definition:
- ➡ Camera's Field of View.

Detection Zone Definition:
- ➡ Camera can detect face object.
- ➡ Head pose deviations ≤ 35° horizontally and vertically.
- ➡ Face size ≥ 40px (FD), (Recommend ≥ 60px)

Recognition Zone Definition:
- ➡ Camera can recognize face object and get better accuracy.
- ➡ Head pose deviations ≤ 15° horizontally and vertically.
- ➡ Face size ≥ 100px (FR), (Recommend ≥ 120px)

Condition:
- ➡ Average face size of adult: 20 cm
- ➡ Average people height of adult: 175 cm
- ➡ Camera height: x cm

Vertical of View

Recognition Zone | Detection Zone | Visible Zone

CAMERA PLACEMENT AND SETTING (CONT.)

If too few faces are recognized by matching to lists:
- ☐ <u>Decrease</u> **Similarity Threshold** in **Camera > Edit > Profile** (click on the gear icon > **FR tab**)
- ☐ **Suggested threshold: 70**
- ☐ Toggle OFF **Quality Detection**

Vice versa, if camera is placed at a great angle/lighting for face recognition and too many detections occur, increase **Similarity Threshold** for higher accuracy and toggle ON the **Quality Detection**.

[Return to Face Recognition](#)

CREATE FACE LIST

Add Target, each target can have 5 images to be uploaded. User can upload the images with different face angles to increase the accuracy.

List to categorize different groups of targets
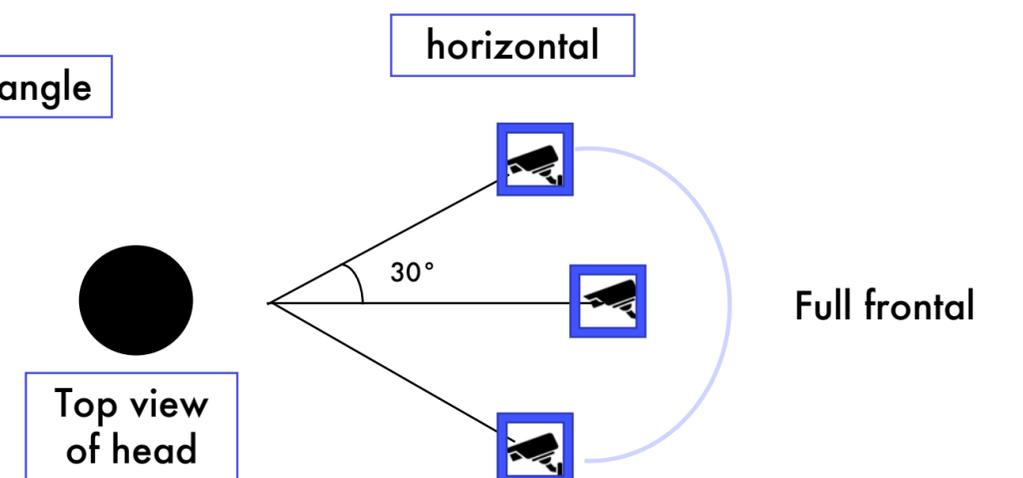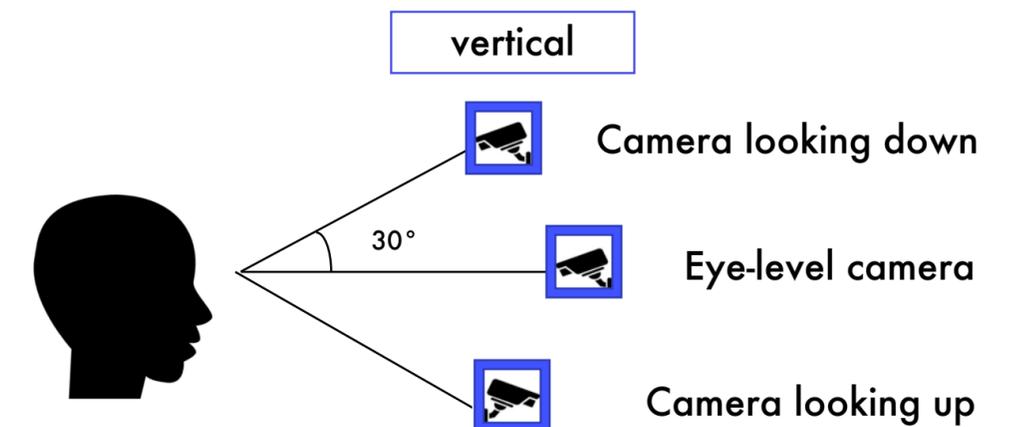
Return to Face Recognition

FACE IMAGE QUALITY

The camera should be positioned so that each face is not at an angle >30°, vertically and horizontally.

One image capturing the full frontal profile of the person's face is recommended for high accuracy.

Side profiles, as well as upward & downward profiles may also be added to improve accuracy.

~90⁰ vertical angle

90⁰ horizontal angle
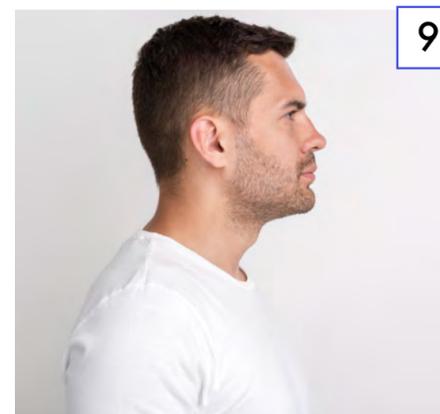
Horizontal & Vertical Angles

vertical

Camera looking down

30°

Eye-level camera

Camera looking up

horizontal

30°

Full frontal

Top view of head

[Return to Face Recognition](#)

FACE IMAGE QUALITY (CONT.)

☐ Images should not have a strong backlight or a strong point light source

Strong backlight or strong light point may result in distortion of facial features, possibly causing errors in recognition

☐ Faces should not be poorly illuminated
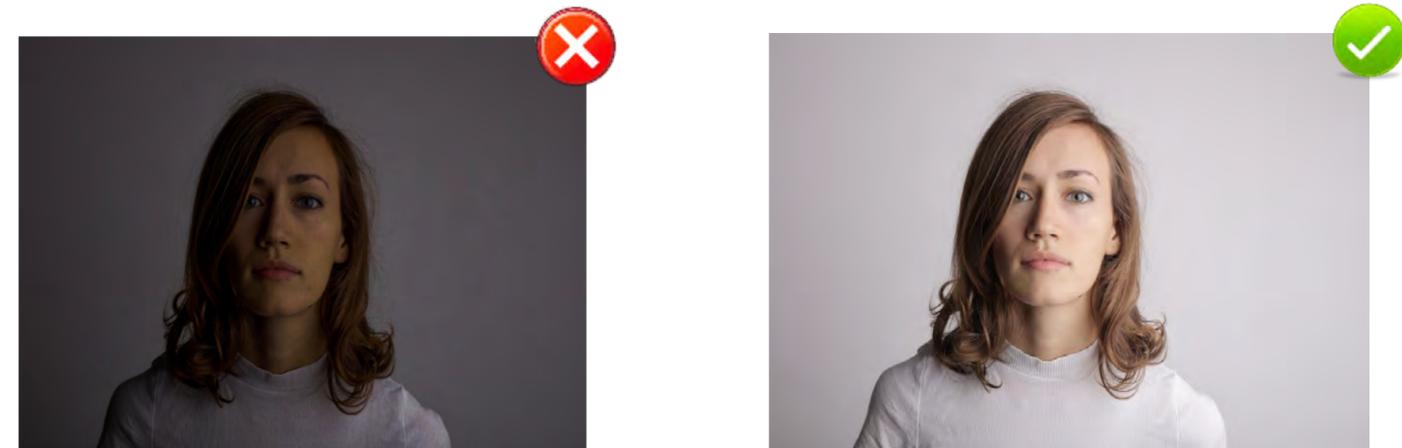
FACE IMAGE QUALITY (CONT.)

- Images for registration purposes should not have multiple or partial faces in the background. Each image should be of one single face.

- The face in each image must not be cropped. Faces partially concealed with hats, sunglasses, etc. can be added as variations of the same person to increase matching probability.
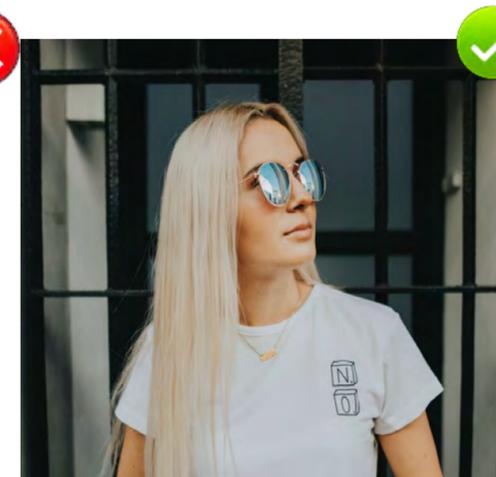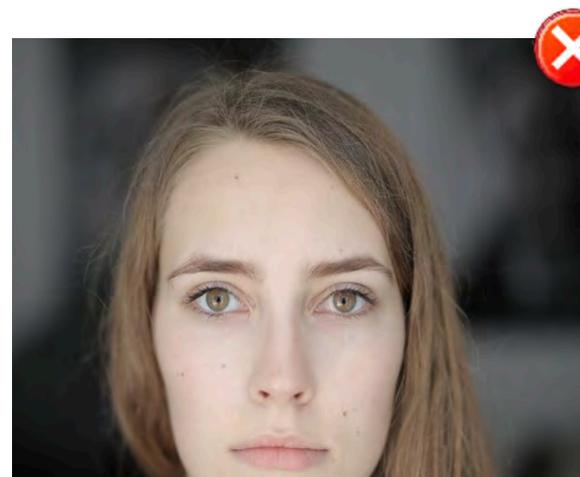
Cropped images should be avoided

[Return to Face Recognition](#)

FACE IMAGE QUALITY (CONT.)

☐ Image noise should be low

☐ Images must be shot from a distance

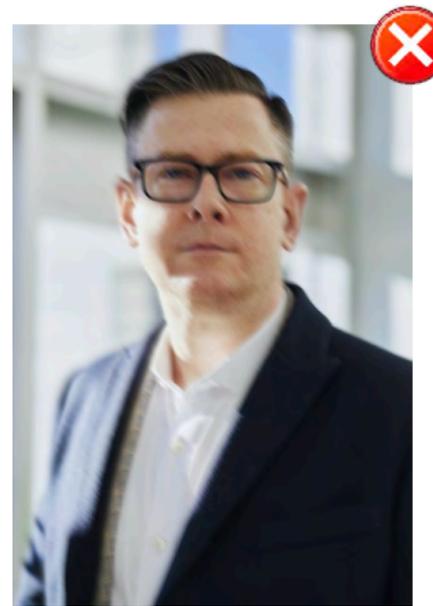☐ Color images are preferable to black and white images, but the latter can be used.
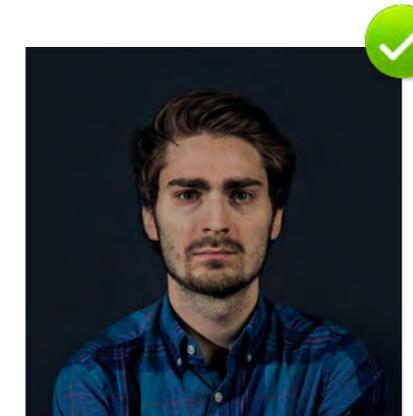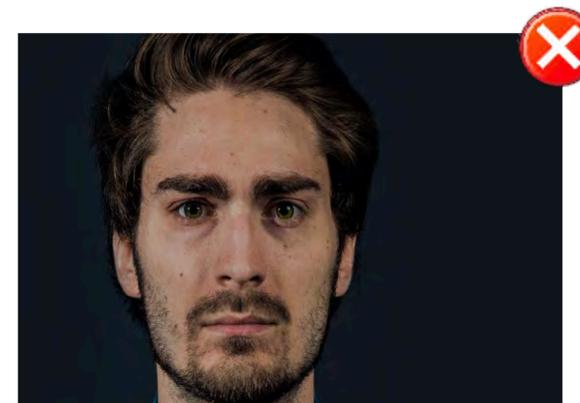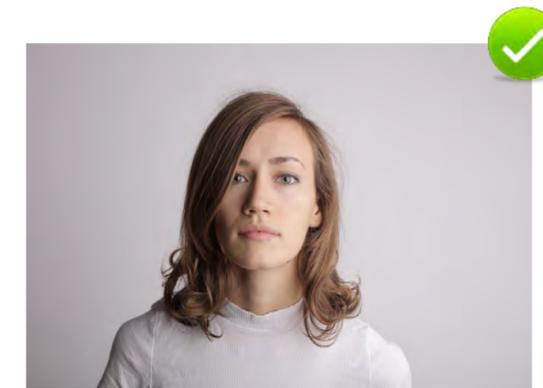
Height of the image must not be the same as the height of the face

Return to Face Recognition

REGISTERING A FACE (CONT.)

☐ Images should not be blurry
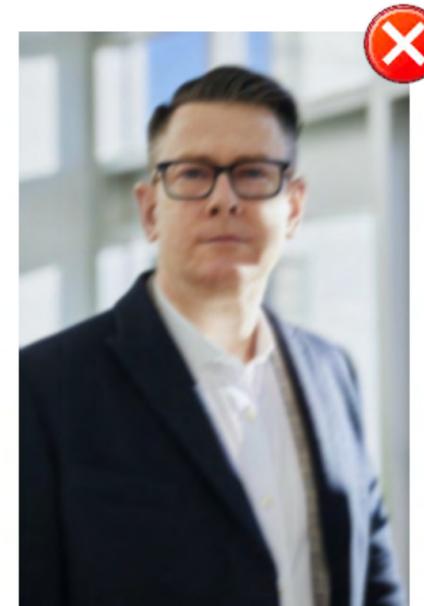
Images must not be blurred due to motion blurring or lens blurring

☐ Image resolution must be sufficient.

☐ For **FR**, it is best to add an image of the same resolution as the face image actually detected by the security camera

Return to Face Recognition

FACE RECOGNITION – DASHBOARD

The detected faces will appear on the **Face Recognition Dashboard** in real time

Click on Image icon to display the snapshot on the left

Click to create a new target or directly add the detected face to the existing target

Return to Face Recognition

FACE RECOGNITION – HISTORY

In **History**, input the criteria to search for a specific person

Click **Match Target** to see the details of the matched person in the preset face database.

Return to Face Recognition

FACE SEARCH – MATCH VIDEO

Select cameras/files and adjust the time period to search for a target. Adjust the similarity as desired.

Show in Timeline

In **Match Video**, use the detected faces in the search result or upload a face image to search through the selected cameras and files.

[Return to Face Recognition](#)

FACE SEARCH MATCH LIST

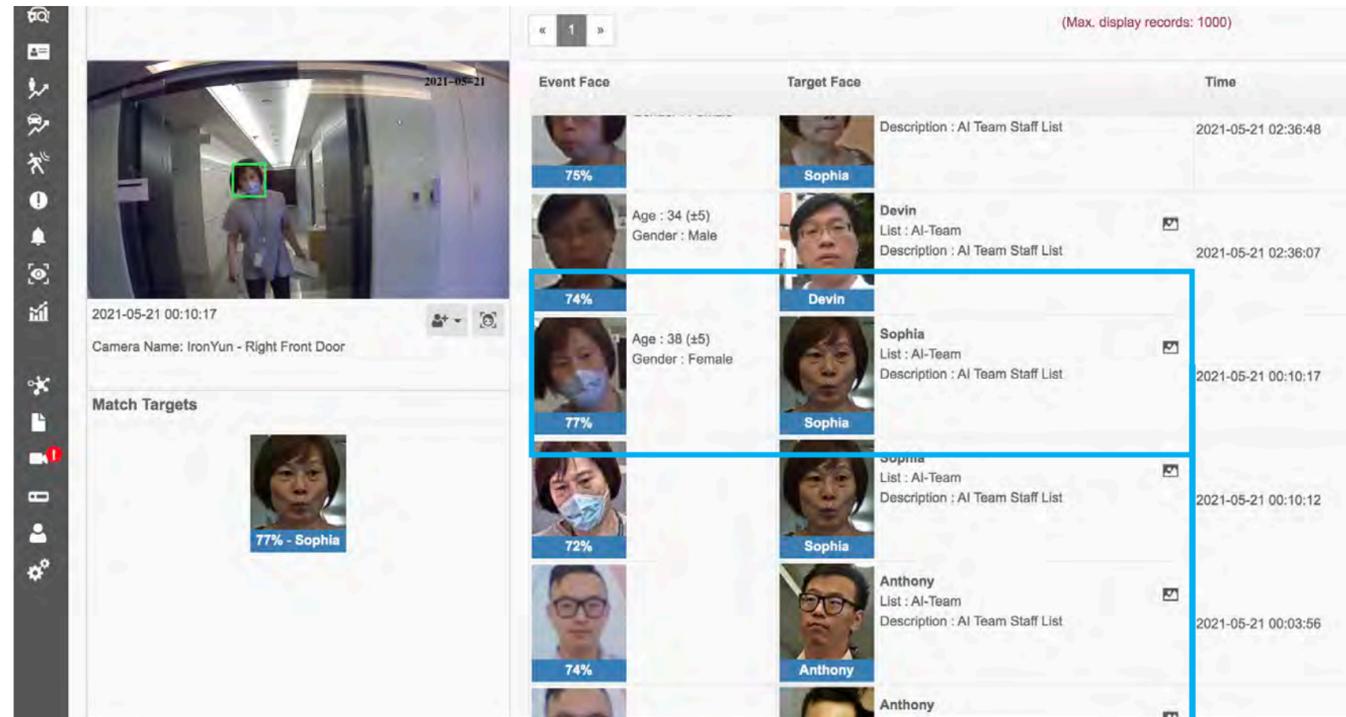In **Match List**, match the detected face from the camera or file with the face database.
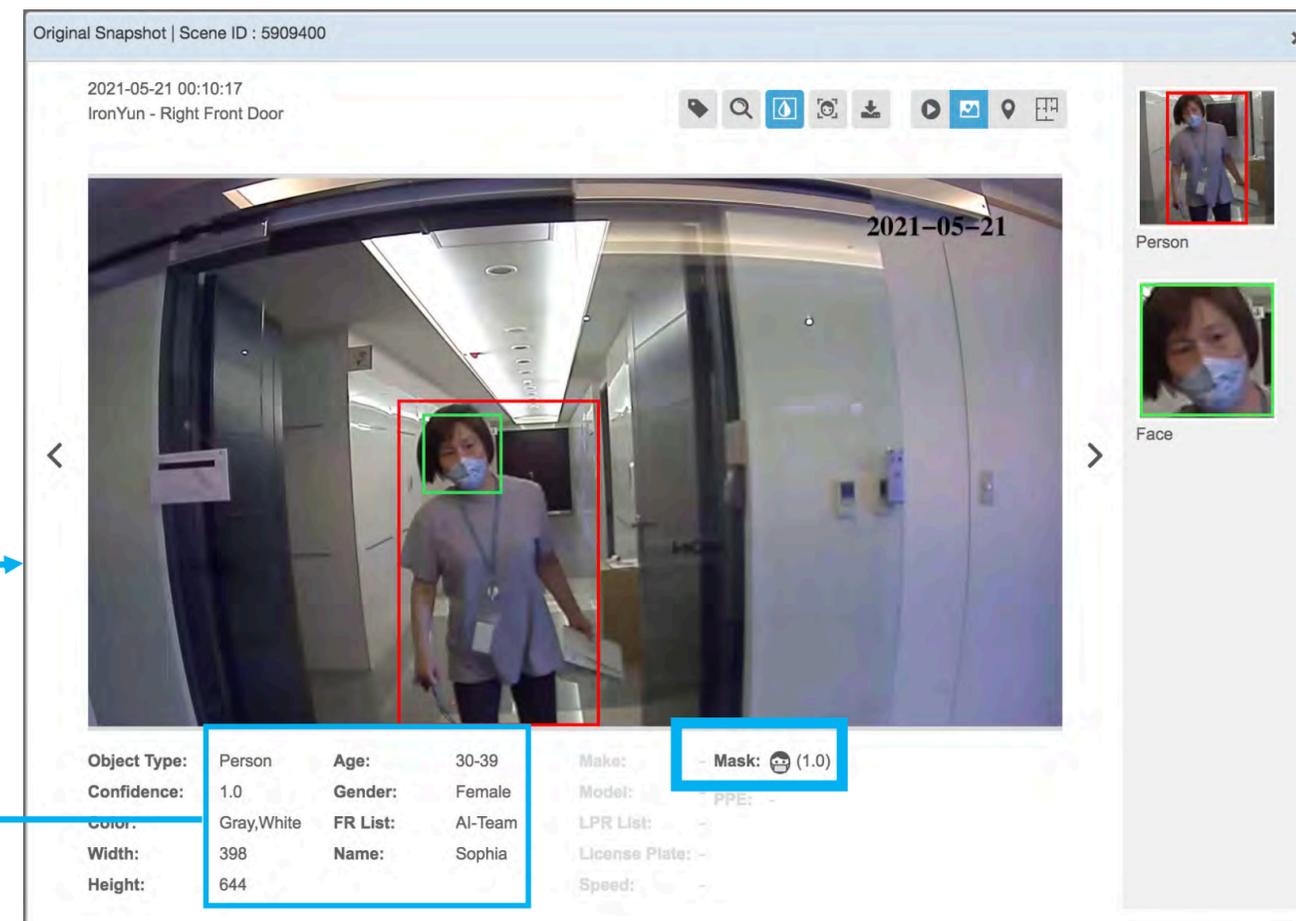
Return to Face Recognition

MASK DETECTION

In 5.1.0, **Mask Detection** was built into **Face Recognition**.

There is no separate Mask Detection AI engine in Vaidio.

By running **PPE** and **Face Recognition** together, the user can see the detected personal information and the condition of wearing or not wearing a facemask in the result.

☐ The users can search for these instances in **Video Search**, view new detections in real time in **Face Recognition** dashboard, or receive real-time alerts in the **Alert** dashboard.
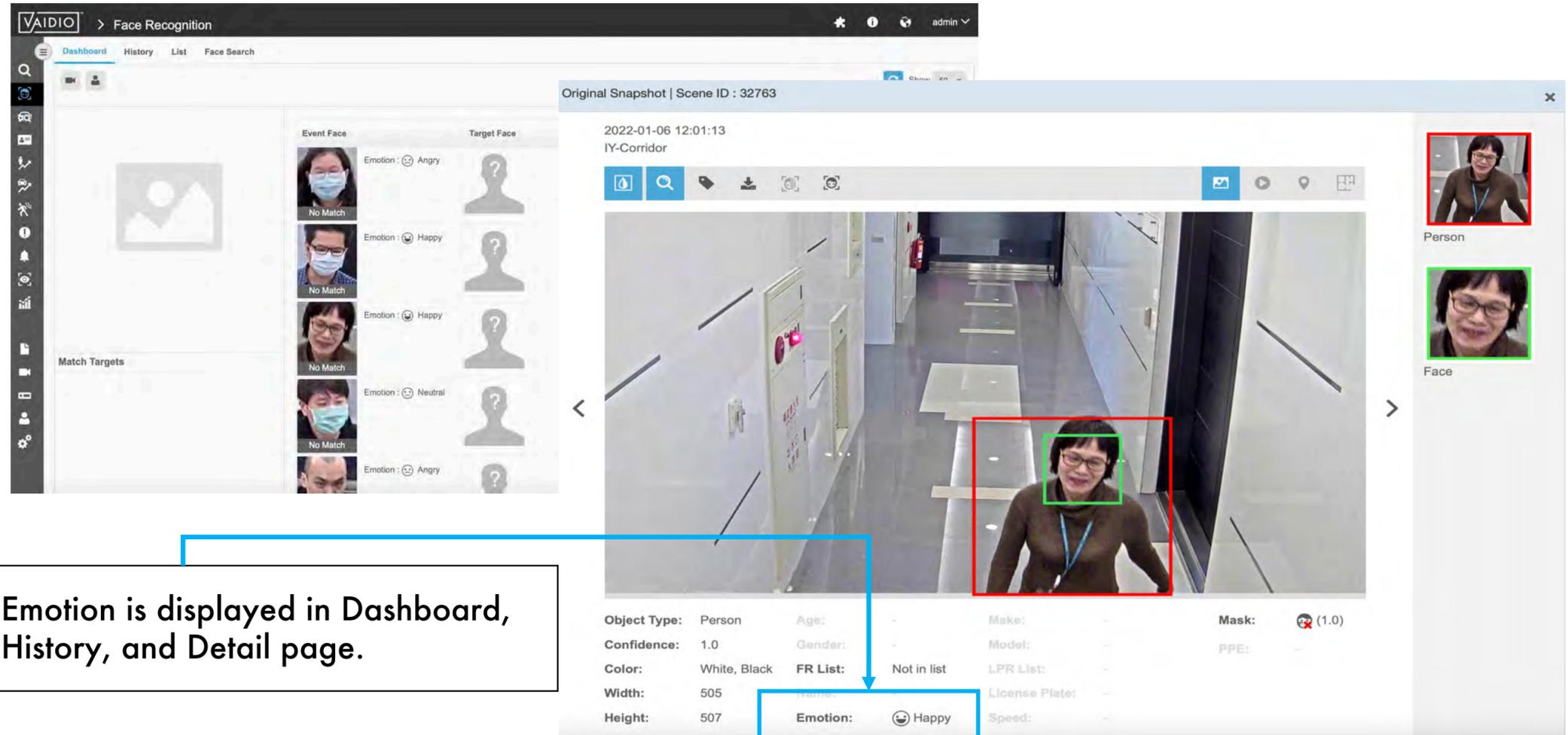
EMOTION DETECTION

In the **Facial Recognition** dashboard, the user can see the faces detected from each camera, and their emotion.

Note: <u>In 6.0.0, Emotion Detection will no longer work be applied to faces with masks to ensure quality control</u>. If the system recognizes a person wearing mask, a corresponding emotion will no longer appear as it did in these screenshots. This change is to ensure improved accuracy in emotion detection.
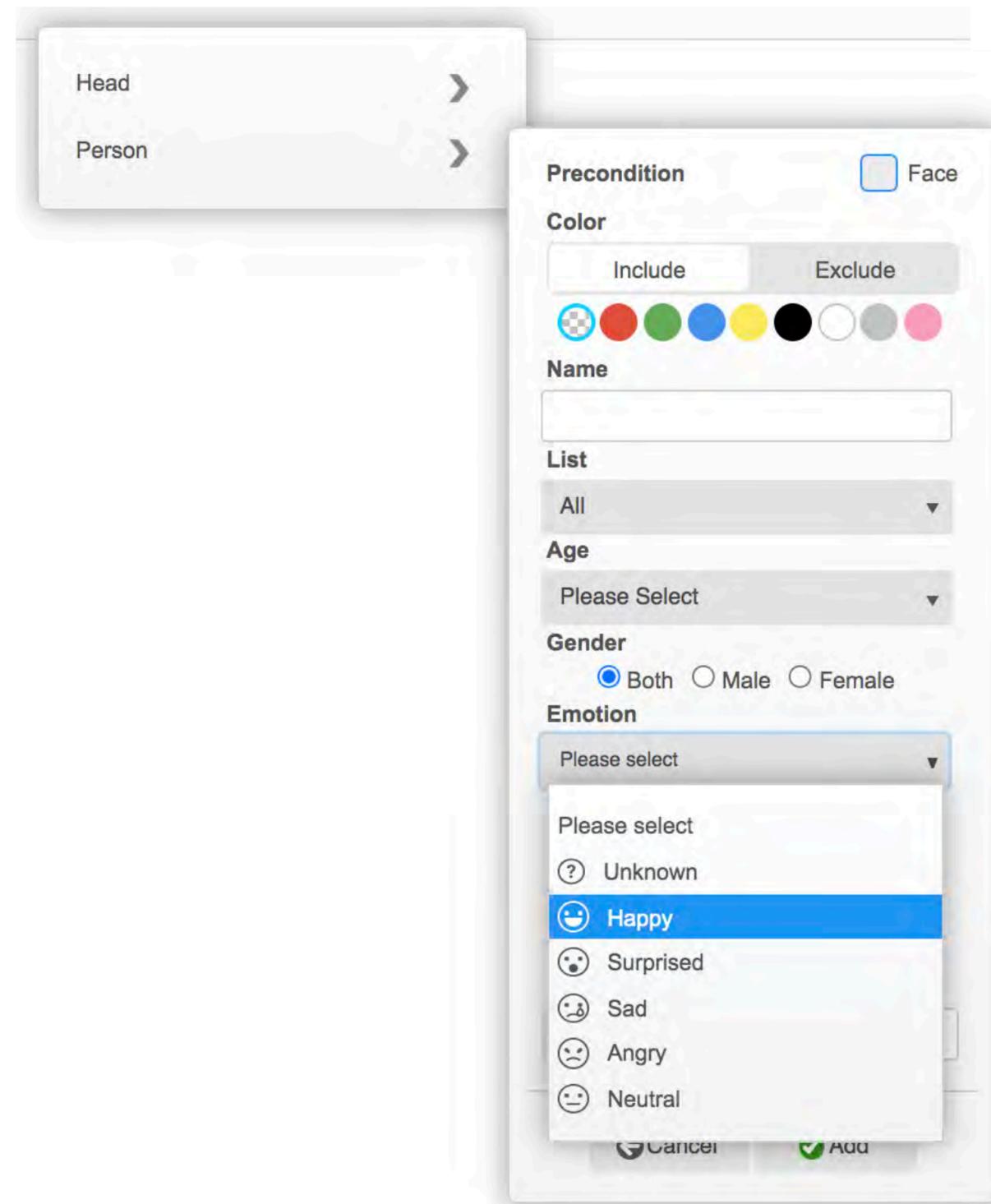

Emotion is displayed in Dashboard, History, and Detail page.

EMOTION DETECTION (CONT.)

☐ In **Search** and **Alert**, the user can set the search/alert criteria for people with certain emotions

☐ Categories: Angry, Happy, Neutral, Sad, Surprised, Unknown

EMOTION DETECTION (CONT.)

General   Time   Storage   Mail   LDAP   Log   Audit Trail   License   **Setting**   AI Model   Utility

Theme Selection :   ☐ Light   ☑ Dark   ☐ Grey

Privacy Protection :

Camera Connection Retry Interval :   10 ⌄   Seconds.

Suggested Value : 3 ~ 60 Seconds.

Log Retention Time :   7 ⌄   days   3 ~ 365 days

Audit Trail Retention Time :   7 ⌄   days   3 ~ 365 days

People Counting Reset Time :   00:00 ⌄

Vehicle Counting Reset Time :   00:00 ⌄

Search Result Display :   1000 ○   1000-10000

Suggested value: 1000

Emotion detection :   ⬤

GPS Map :   ⬤

API Basic Authentication :   ⬤

SSL Certificate

* Required to activate Certificate

* Private Key :   Upload File

* Public Key Certificate :   Upload File

Certificate chain :   Upload File

Password :

Enable or disable Emotion Detection in System > Setting for the entire server
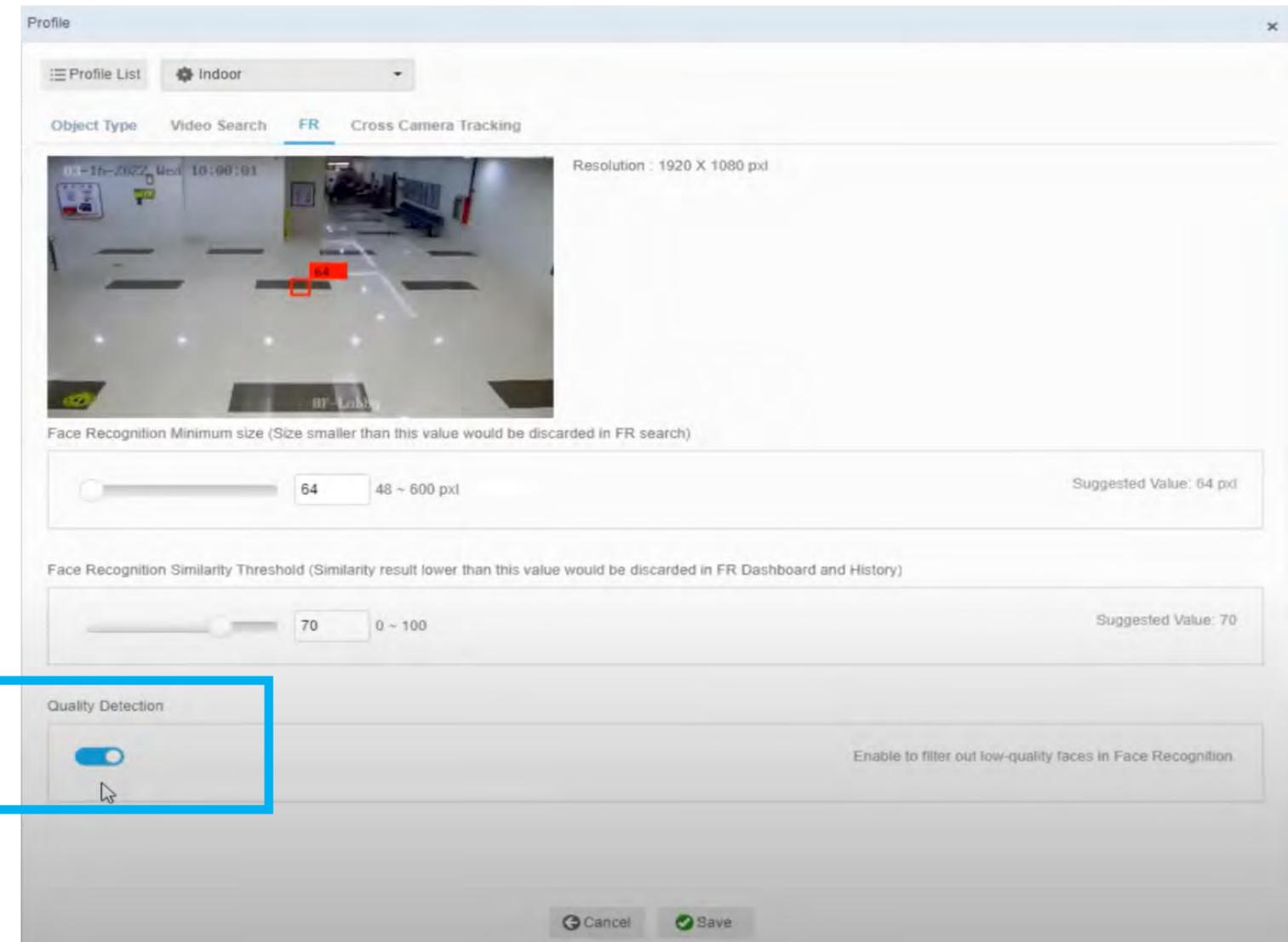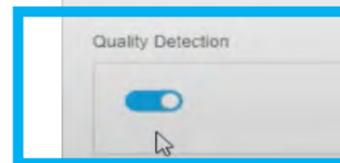
Return to Face Recognition

EMOTION DETECTION (CONT.)

Enable **Quality Detection** for face detection to filter out faces with mask, taken from an incorrect angle or with insufficient details for face matching, age and gender detection, or emotion detection.

To turn on or off **Quality Detection**, go to
Camera > **Edit Camera** > **Profile**
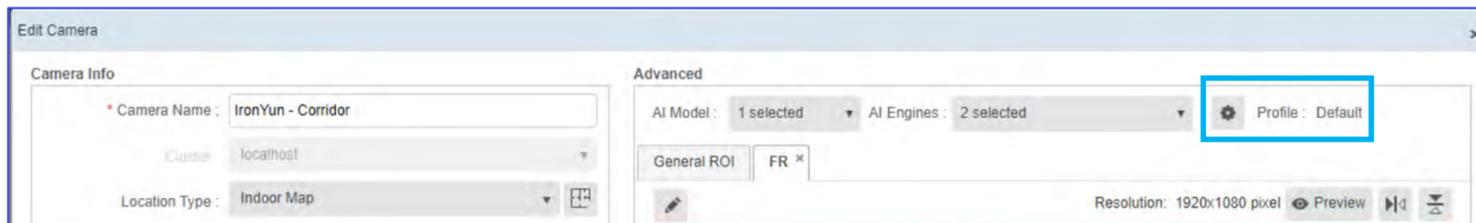
Enable **Quality Detection** for better accuracy

LICENSE PLATE RECOGNITION

- ☐ [Camera Placement & Setting](#)
- ☐ [ROI Setup](#)
- ☐ [Vehicle Type](#)
- ☐ [Create License Plate List](#)
- ☐ [Illegal Parking & Loitering](#)
- ☐ [Dashboard – Real-time Detection](#)
- ☐ [History](#)

CAMERA PLACEMENT & SETTING

To detect license plate for LPR, please make sure that:

☐ **License Plate Recognition** AI Engine is enabled in Camera setting

☐ Object type "license plate" is enabled in Camera Profile

☐ **Each character on license plate is at least 16 px wide** for clear detection; e.g., a plate with 6 alphanumeric characters should be at least 100 px wide for clear detection

☐ Typical best-performance deployment: **cameras** at parking lot entrances and traffic light, car moving at **< 10 mph**, and detecting **max. 3 lanes** of vehicles at the same time

Maximum Speed Supported:

▪ Depending on camera height, vertical camera angle, camera vertical FOV (provided by camera manufacturer), camera resolution and size of characters on license plate

▪ Example: camera height = 3m (typical street light), vertical angle = 25°, vertical FOV = 18°, resolution 1080p, license plate character = 7cm tall → maximum speed = 31.38 km/h ~19.5 miles per hour

▪ For more calculation, contact support@Aicuda.world

Recommended camera placement for LPR:
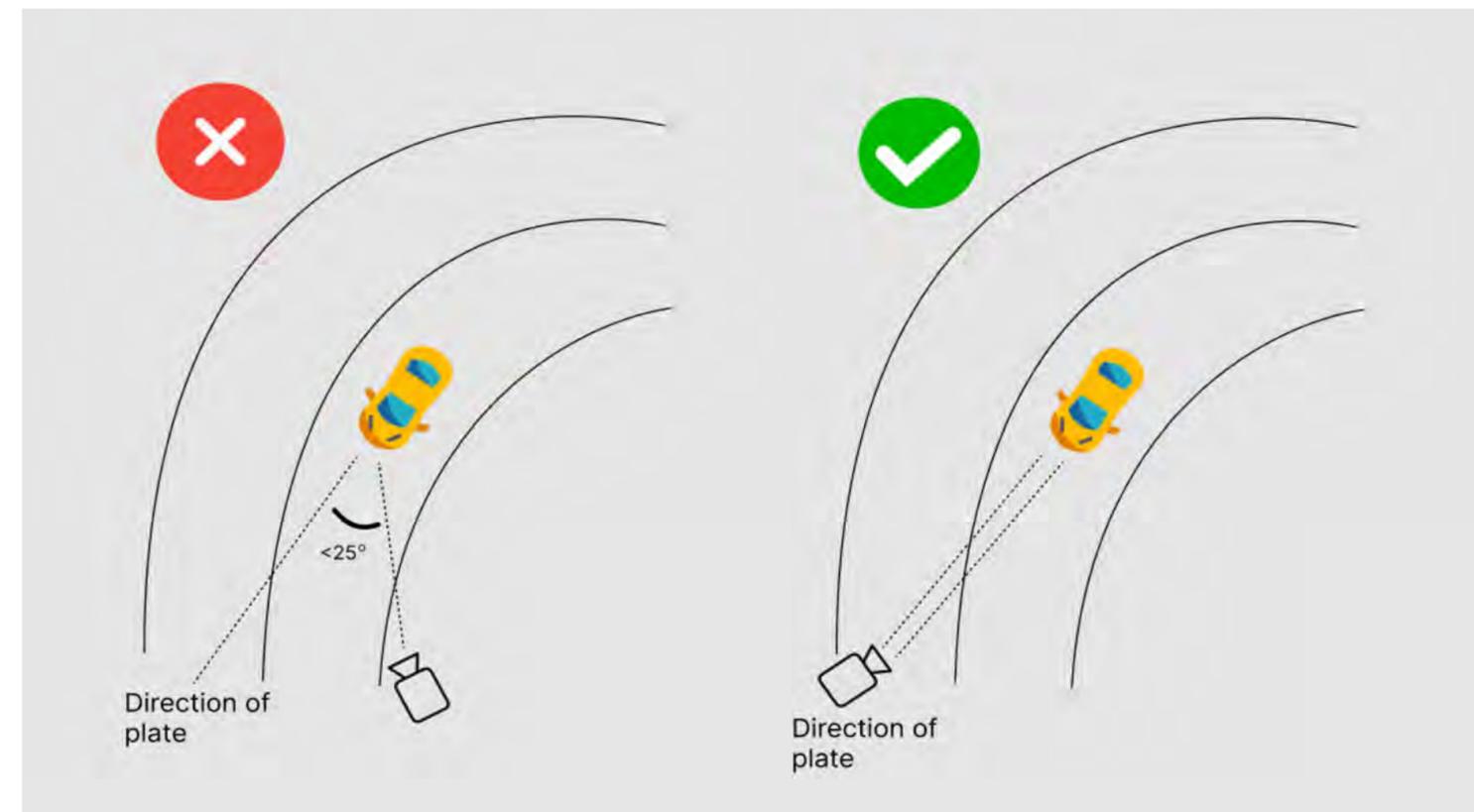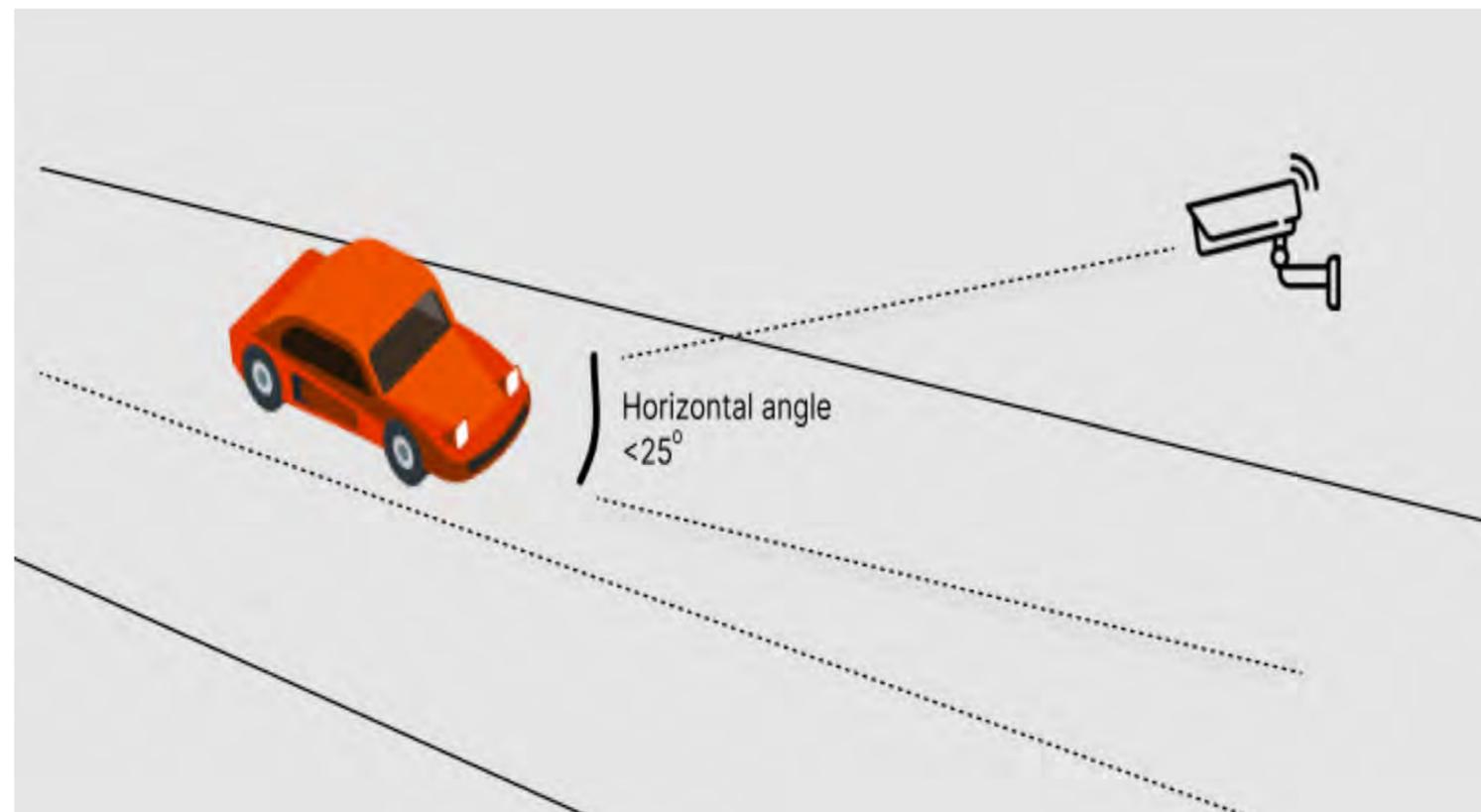Camera is placed at an angle as close to license plate level as possible
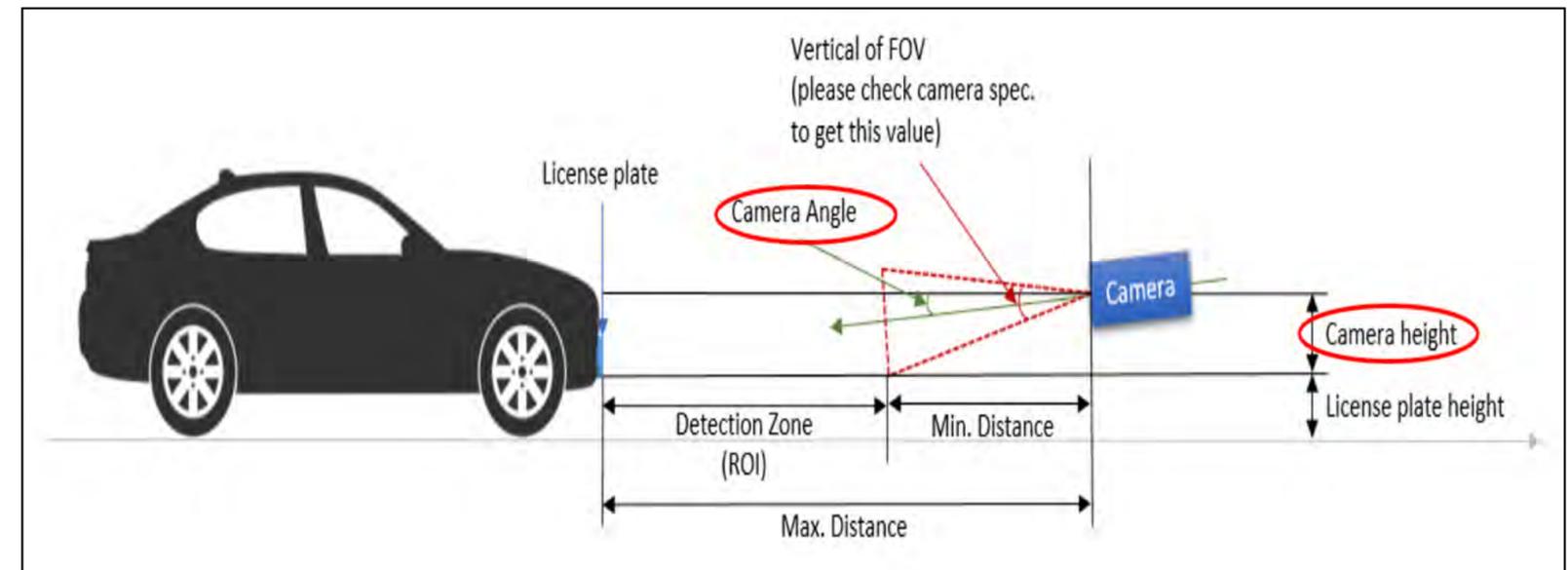
Focal Length	f = 2.8 ~ 12 mm
Aperture	F1.4 ~ F2.8
Auto-iris	P-iris
Field of View	32° ~ 93° (Horizontal)
	18° ~ 50° (Vertical)
	37° ~ 110° (Diagonal)

Example of camera specification

Return to License Plate Recognition

CAMERA PLACEMENT AND SETTING (CONT.)

Camera placement for best LPR results:
1. Horizontal angle < 25°, i.e., angle between the line of sight (straight line from license plate to camera) and the ground.
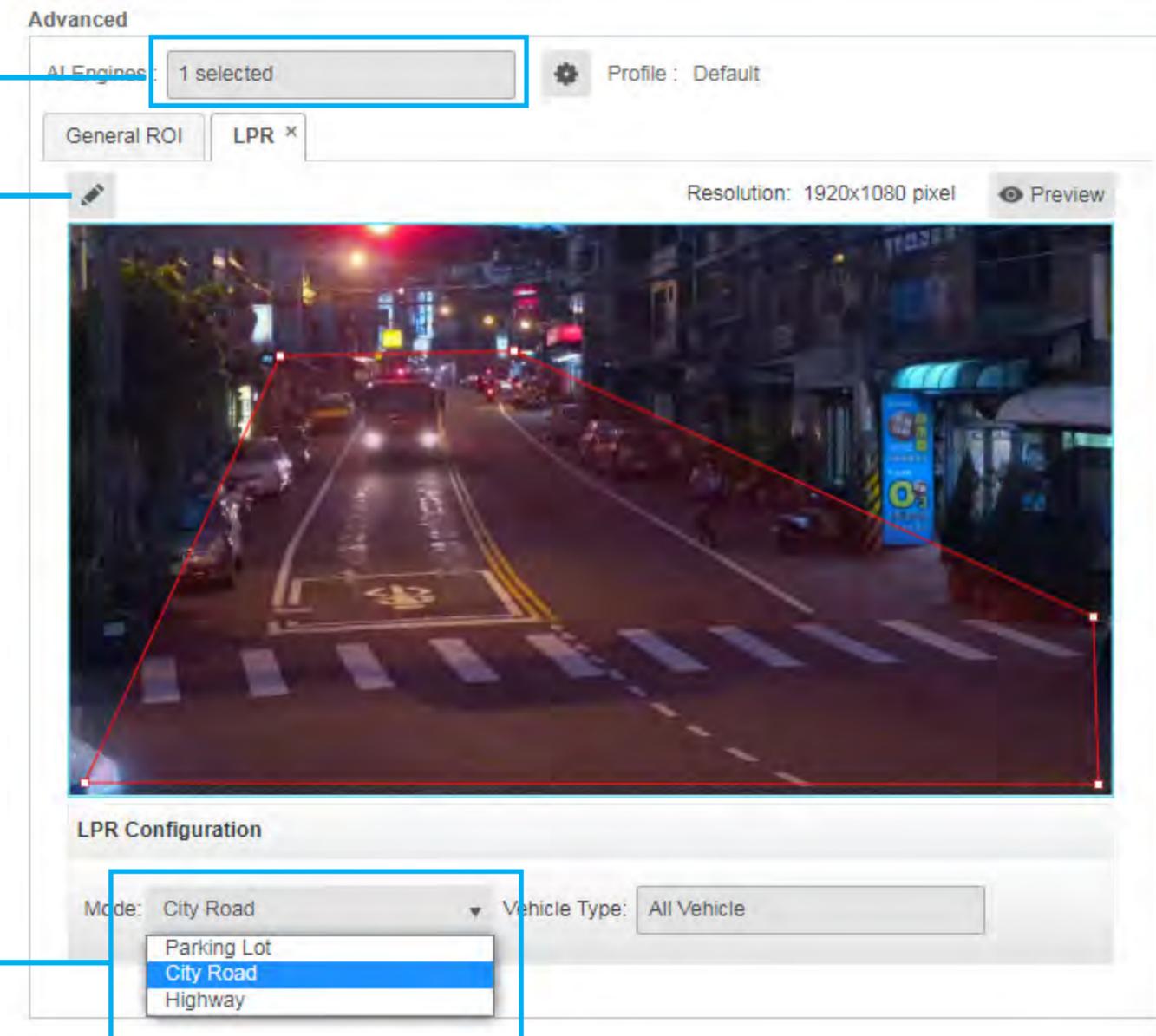2. Side angle < 25°, i.e., angle between the line of sight and the vehicle's direction of movement.

ROI SETUP

In **Camera Setting**, activate the **License Plate Recognition** AI Engine

Click on Pencil icon in LPR tab to draw the LPR region of interest (ROI). The ROI can be of any shape.

To optimize the performance and resource usage, LPR has 3 modes for different applications.

Parking Lot	City Road (Default)	Highway
Car speed < 5 miles/hour	Car speed within 40 miles/hour	Car speed > 40 miles/hour
Max 8 ch can be supported in VSB-110	Max 4 ch can be supported in VSB-110	Max 2 ch can be supported in VSB-110

ROI SETUP (CONT.)

- ☐ Set min/max width & height for dimensions of the license plate
- ☐ Vehicle license plate detection uses 100% confidence inside the LPR ROI
- ☐ To set width & height of the license plate object, choose the desired **Camera** with LPR > **Edit Camera** > **Profile** > Select the **LPR** tab > Select **width/height**

VEHICLE TYPE

☐ Enable specific vehicle objects to display on the LPR page for license plate search

    ☐ Unselect uncommon vehicle types or those without a license plate to declutter the results

☐ **System > Setting** > scroll to **License Plate Recognition** > Enable desired vehicle type(s) to display on the LPR page

CREATE LICENSE PLATE LIST

Add License Plate, input the license plate (can use alphanumerical and special characters) and choose the correct List. Add more information if needed.

Edit List to modify the name of an existing list. Click **New List** to create a new list.

Return to License Plate Recognition

LICENSE PLATE RECOGNITION – DASHBOARD

Recommended setup: the camera should be <10 ft high, and the plate is tilted to <25° from face-on. Make sure that the plate size is at least 100 px wide to detect the characters with high accuracy.

Detect License Plate, Vehicle Type, Color, and Make & Model

Return to License Plate Recognition

LICENSE PLATE RECOGNITION – HISTORY

In the **History** tab, the user can select the specific type, color, make and model, & state, and input partial license plate number (alphanumerical and special characters are okay) to narrow down the search results.
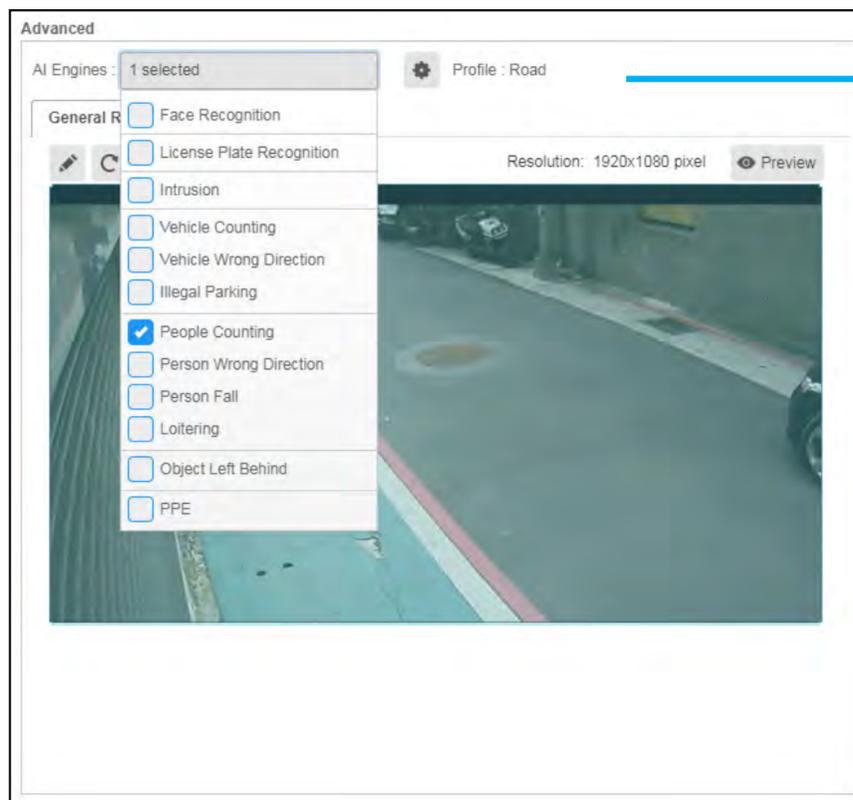
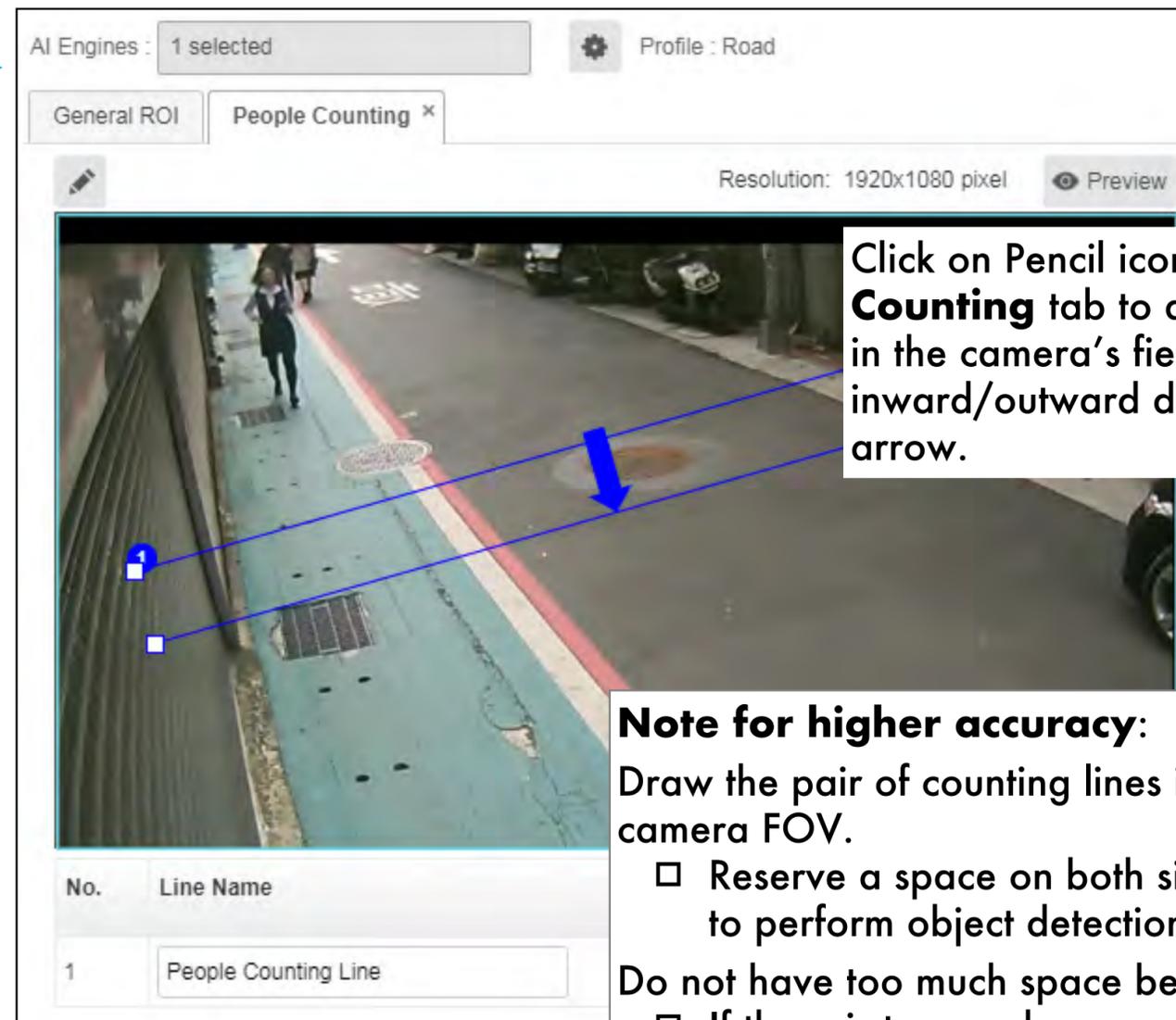Return to License Plate Recognition

PEOPLE/VEHICLE COUNTING

COUNTING LINE CONFIGURATION

In **Camera Setting**, activate
People/Vehicle Counting AI Engine

Click on Pencil icon ✏ in **People/Vehicle Counting** tab to draw the **Counting Line** in the camera's field of view, and define the inward/outward directions by clicking on the arrow.

Note for higher accuracy:

Draw the pair of counting lines in the middle of the camera FOV.
- ☐ Reserve a space on both sides of the line for Vaidio to perform object detection.

Do not have too much space between the two lines.
- ☐ If there is too much space, it may cause Vaidio to lose track of the object.
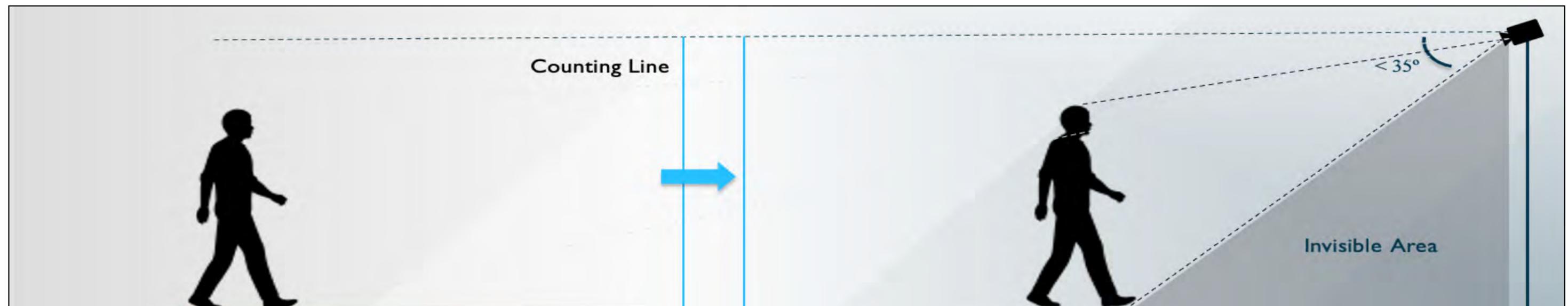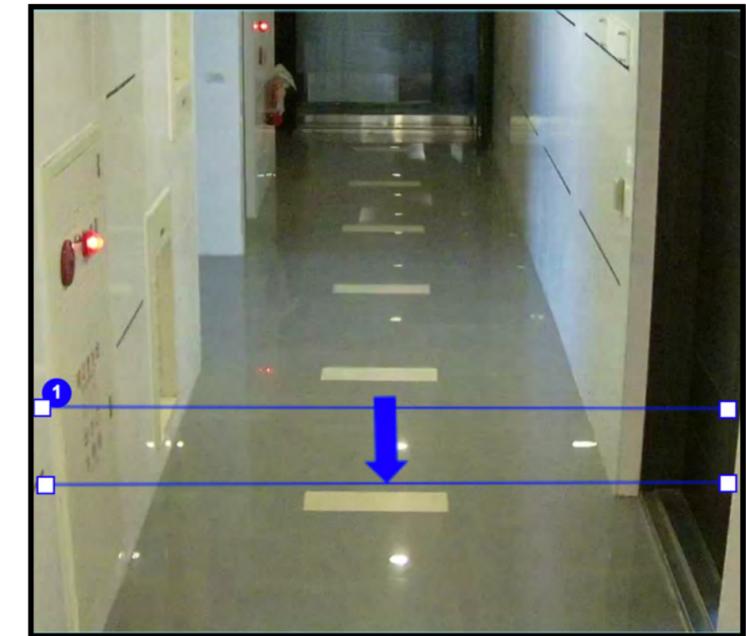- ☐ The object cannot be counted when the tracking is lost.

PEOPLE COUNTING – CONFIGURATION

For better accuracy of **People Counting**, the following configuration is recommended:

1. The angle of the camera should be < 35° in the recognition zone.

2. Object type configuration should be as follows:

Object Type	Confidence Suggested Value (0.1 ~ 1.0)	Minimum Size (px)
Person	0.80	**30**

[Return to People/Vehicle Counting](#)

PEOPLE COUNTING – DASHBOARD

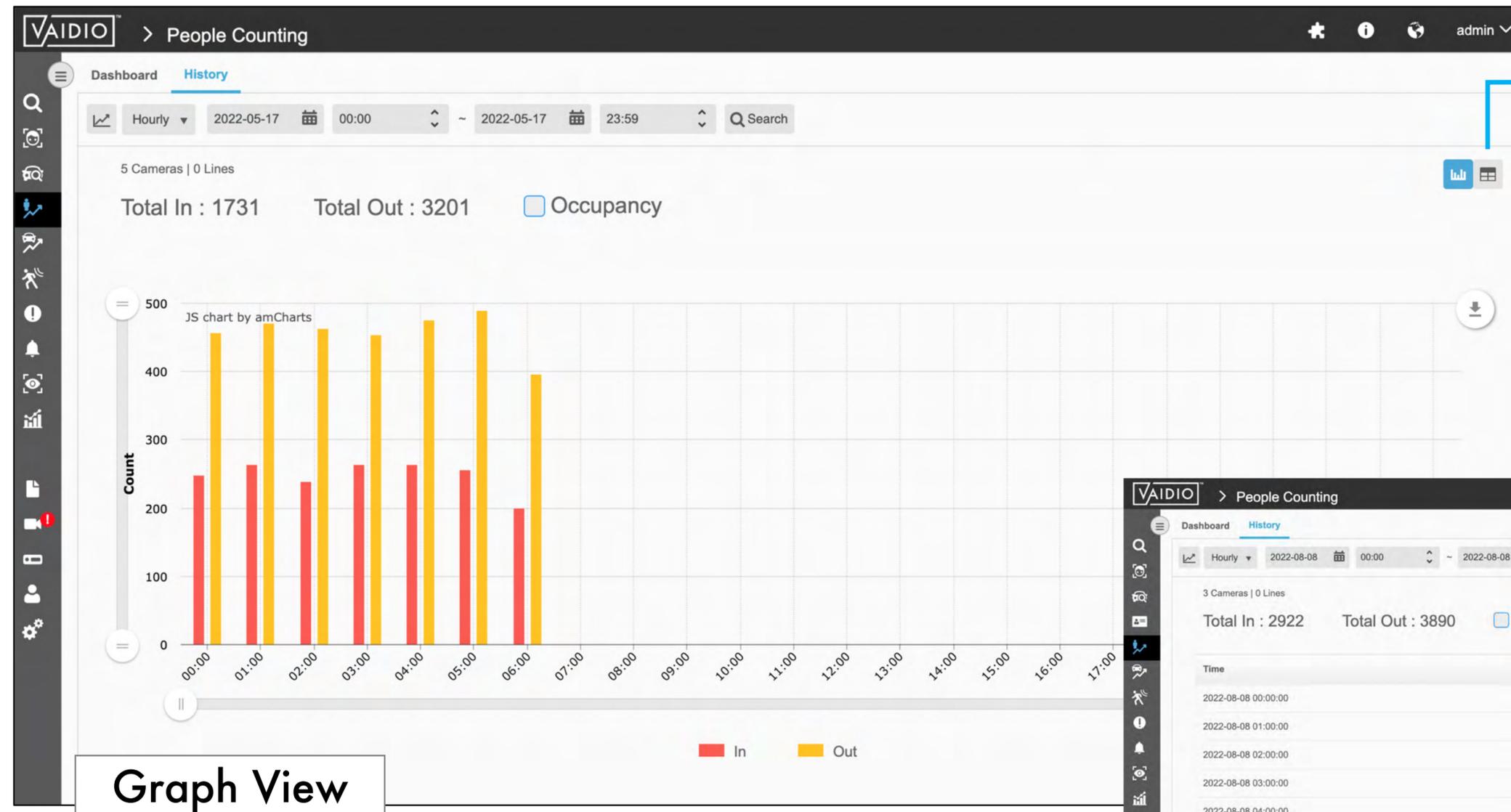Select Camera to see the live view & live count

Select the counting line

PEOPLE COUNTING – HISTORY

Click to export to Excel file

Graph View

List View

Return to People/Vehicle Counting

PEOPLE COUNTING – HISTORY (CONT.)
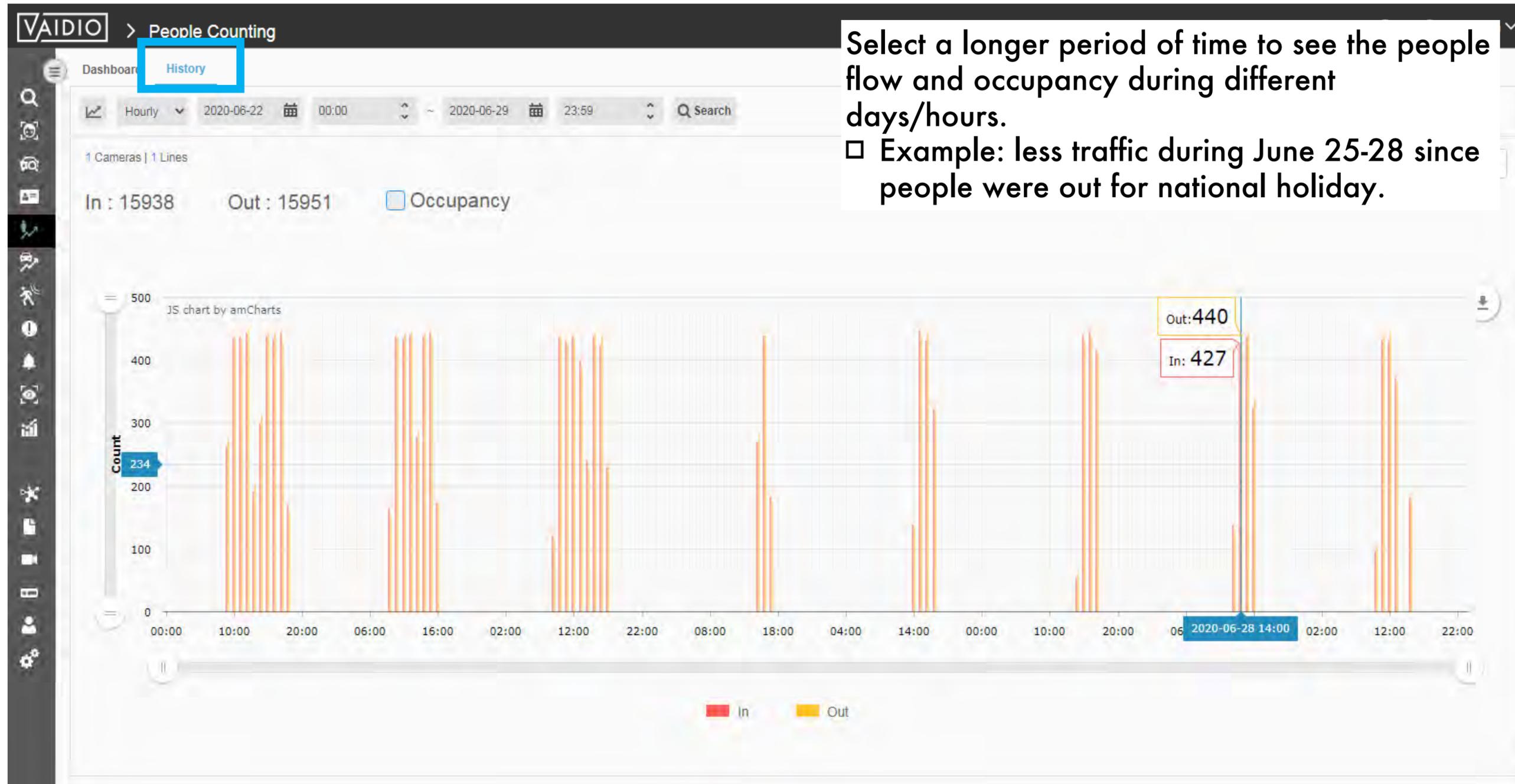
Select a longer period of time to see the people flow and occupancy during different days/hours.
- ☐ Example: less traffic during June 25-28 since people were out for national holiday.

VEHICLE COUNTING – CONFIGURATION

For better accuracy of Vehicle Counting, the following configuration is recommended:

1. The angle of the camera should be < 35° in the recognition zone.

2. Every vehicle to be counted should be fully visible. Vehicle may be missed if it is hidden by another vehicle.

3. Object type configuration should be as follows:

Object Type	Confidence Suggested Value (0.1 ~ 1.0)	Minimum Size (pxl)
Car	0.55	40
Bus	0.55	40
Truck	0.55	40
Motorcycle	0.55	40
Bicycle	0.55	40

Ideal camera perspective

< 35°

Invisible Area
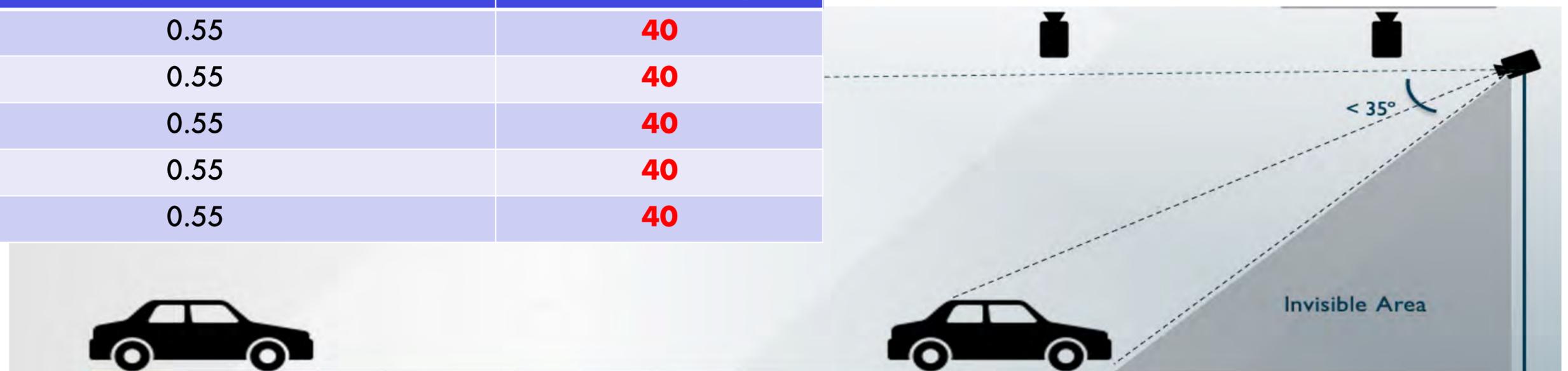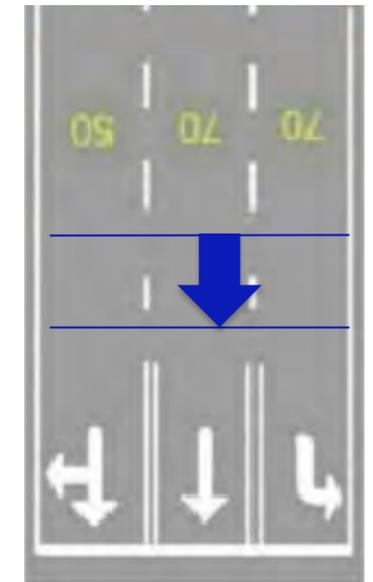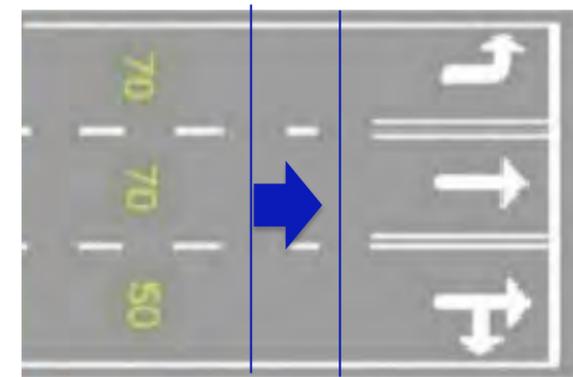
Recognition Zone

Return to People/Vehicle Counting

VEHICLE COUNTING – DASHBOARD

Select camera to see the live view

See live counting with inbound and outbound numbers per minute, and the numbers of different types of vehicle.
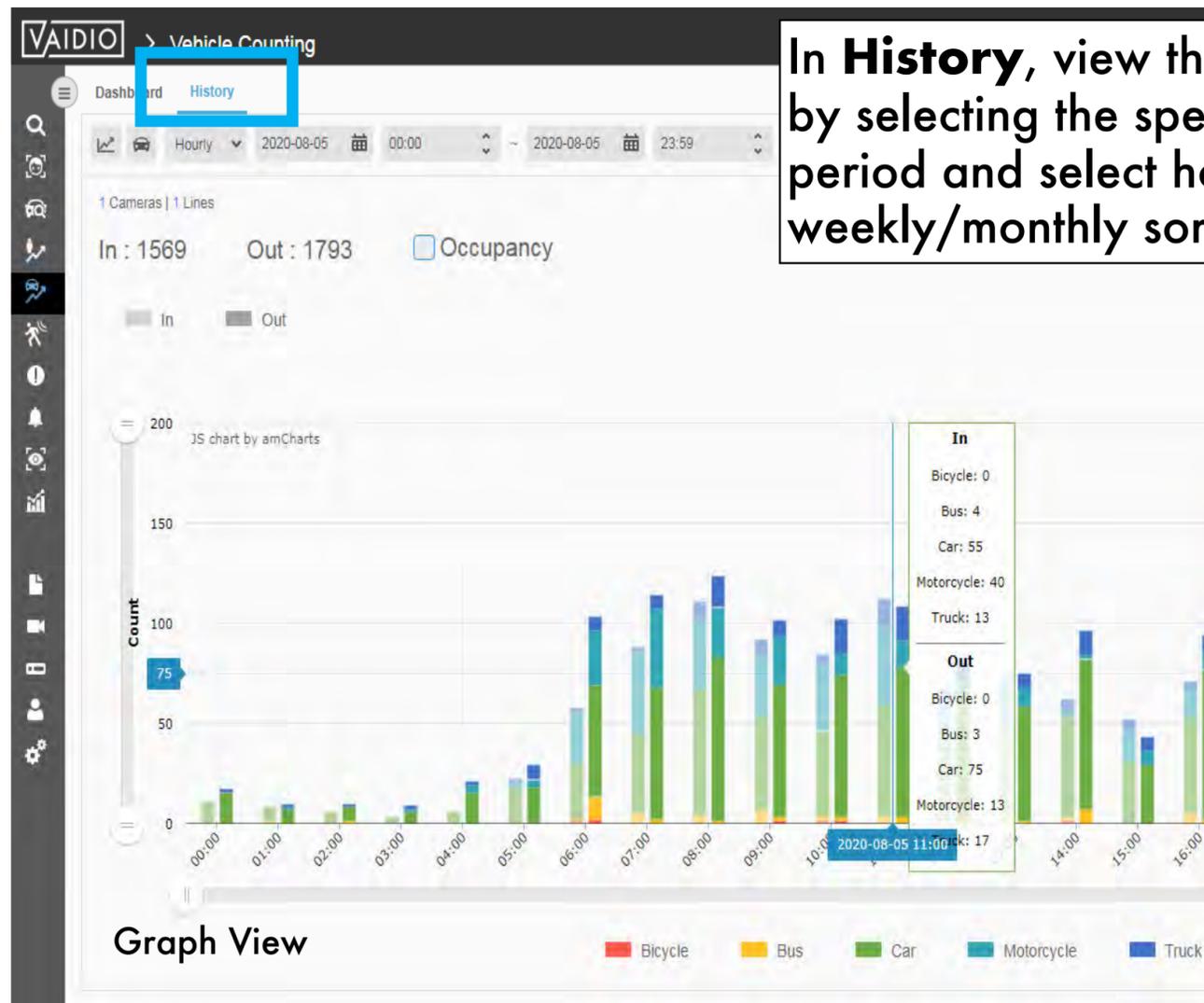
Return to People/Vehicle Counting

VEHICLE COUNTING – HISTORY

In **History**, view the vehicle flow by selecting the specific time period and select hourly/daily/weekly/monthly sorting

Click to export the result to an Excel file

Graph View

VEHICLE COUNTING – HISTORY

Select the vehicle types to view their counts.
Default: the total count of all vehicle types is displayed
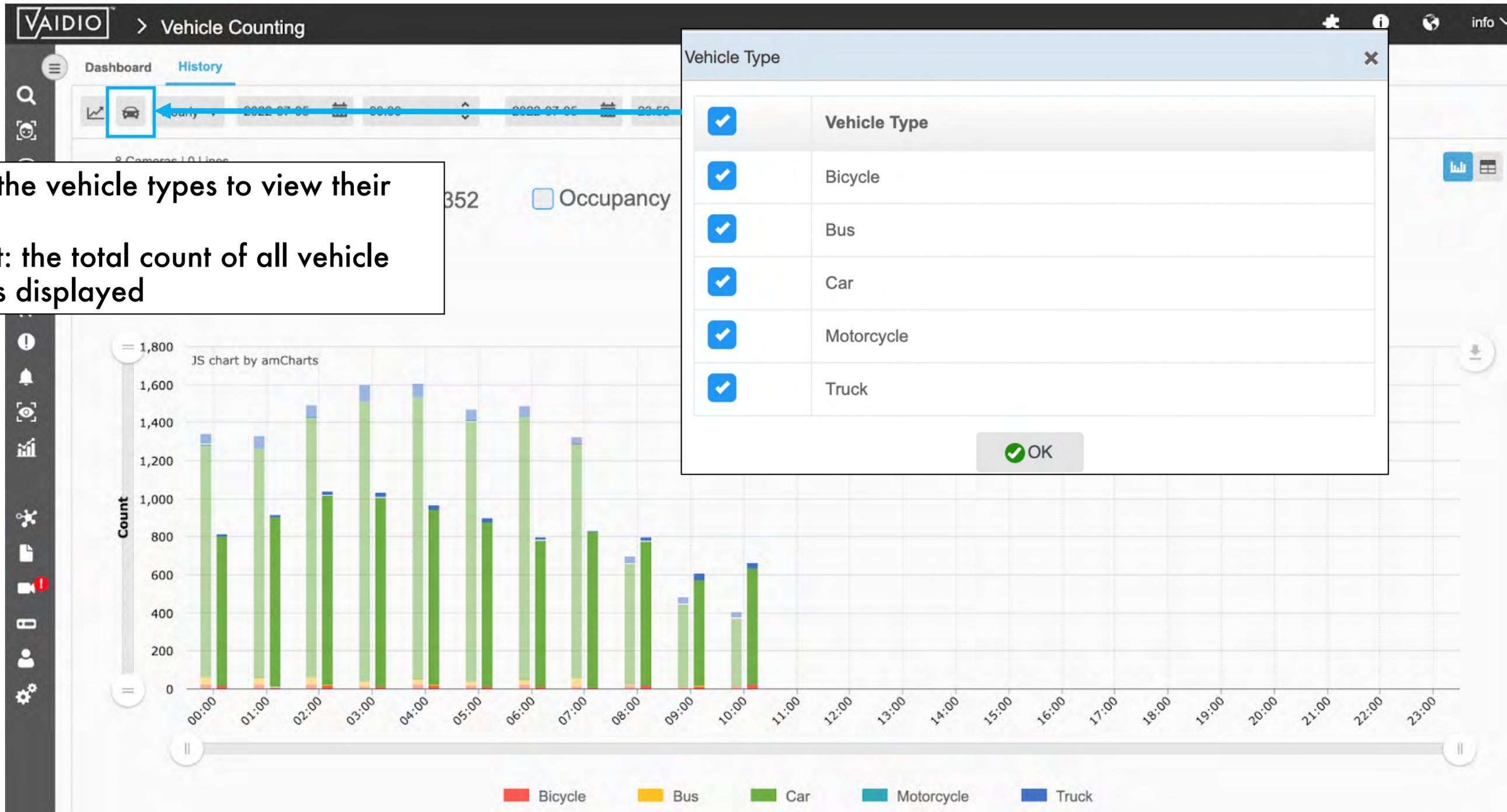
COUNTING ALERT

☐ For both People & Vehicle Counting, set occupancy alerts in **Alert** > **Alert Rule** > **Add Alert** > **Alert Type**: **People Counting** *or* **Vehicle Counting** after the counting lines have been configured

☐ Options available: (all count values take into account the counts of all selected cameras and counting lines)

    ☐ **Occupancy**: current number of people/vehicles in the area

    ☐ **In**: current number of people/vehicles moving into the area

    ☐ **Out**: current number of people/vehicles moving out of the area

    ☐ **>/<:** more than / fewer than a certain value of people/vehicles

☐ Toggle ON **Duplicate Event** to keep sending the alert as long as the count still satisfies the alert criteria

    ☐ The period between successive alerts is the **Duplicate Threshold**

    ☐ Example: an alert for Occupancy > 100 with a Duplicate Threshold of 5 minutes will be triggered as soon as there are 101 people in the area and continue every 5 minutes until the count becomes 100 or less.

# ABNORMAL

- Person Wrong Direction
- Person Fall
- Person Loitering
- Person Without Object
- Object Left Behind

- Vehicle Wrong Direction
- Illegal Parking
- Speeding Detection
  - Abnormal Speed Alert
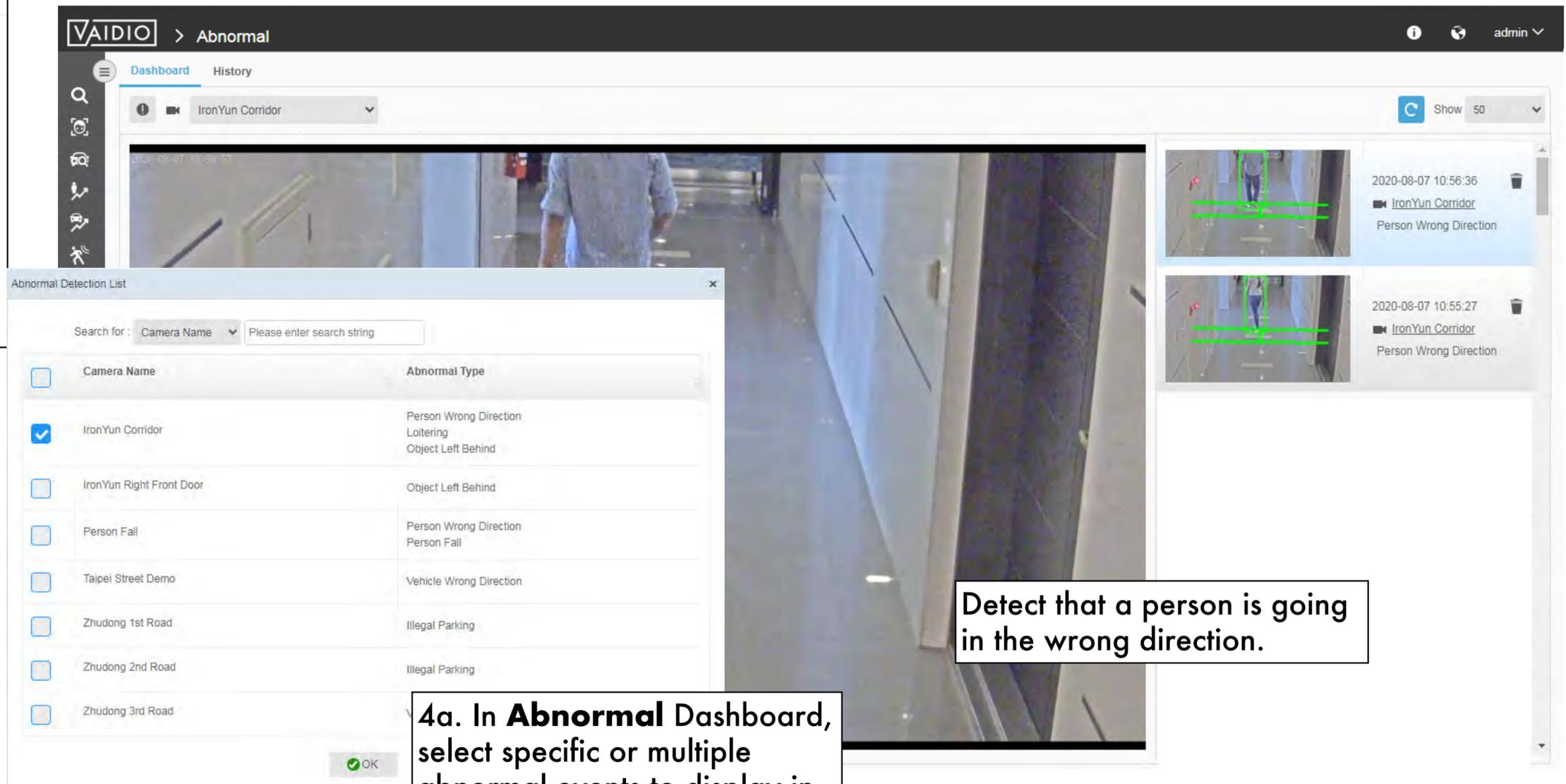
PERSON WRONG DIRECTION

4b. Real-time Alert:
When defining the alert rule, select **Person Wrong Direction** alert type and choose the preconfigured line to get real-time notifications when the event happens.
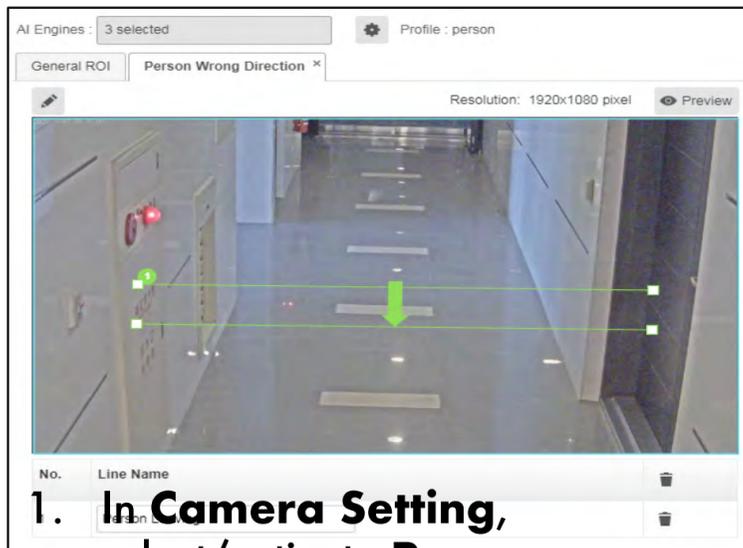
1. In **Camera Setting**, select/activate **Person Wrong Direction** from the dropdown list of **AI Engines**
2. Draw the line
3. Define the direction by click on the arrow (the direction of the arrow is the correct direction, the opposite direction is the wrong direction to trigger an event)
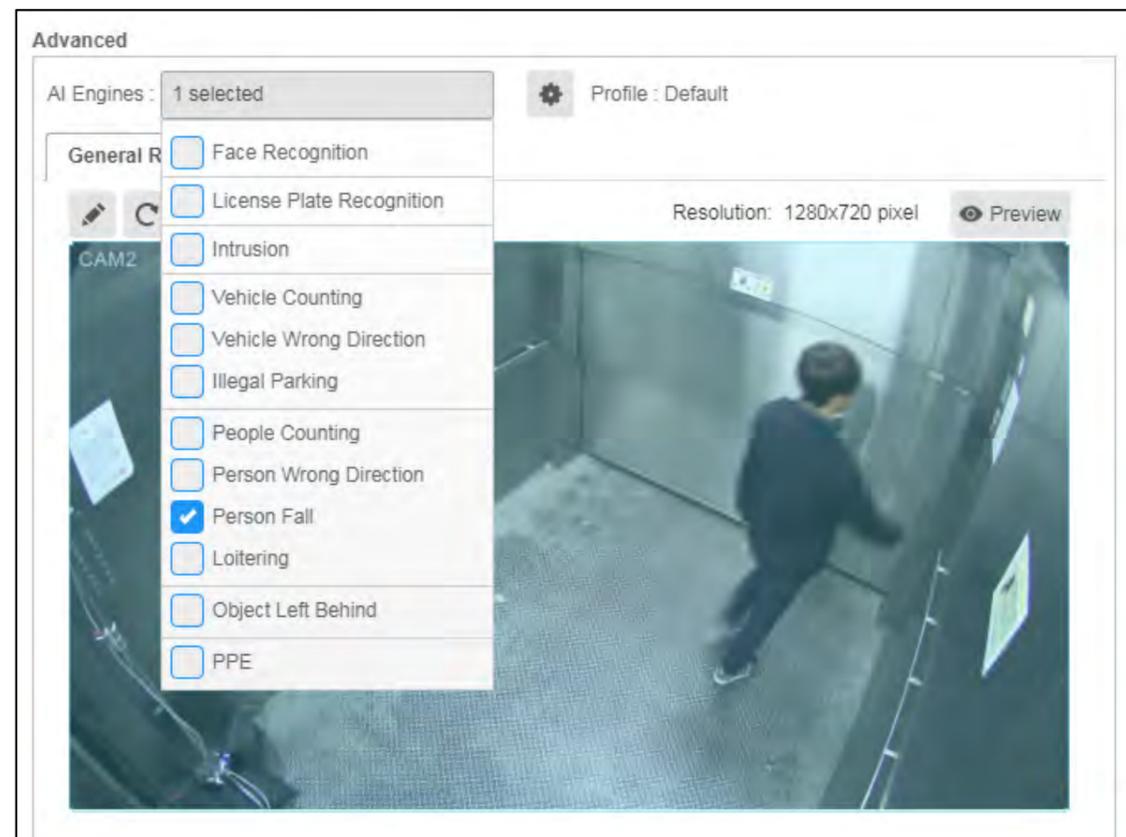
Detect that a person is going in the wrong direction.

4a. In **Abnormal** Dashboard, select specific or multiple abnormal events to display in the dashboard.

PERSON FALL

In **Camera Setting**, select/activate **Person Fall** from the dropdown list of **AI Engines**

Camera placement: should show the full body, not directly overhead

Real-time Alert:
- ☐ When defining the alert rule, select **Person Fall** alert type to get real-time notifications when the event happens.
- ☐ Alert for person falling is only triggered after the person fell and remained on the ground for more than 10 seconds. Hence, the delay is 10s. Reasoning: if one can stand up and walk away shortly after falling, the fall typically did not cause serious injury and does not require attention.

Detect person fall down in the camera's field of view
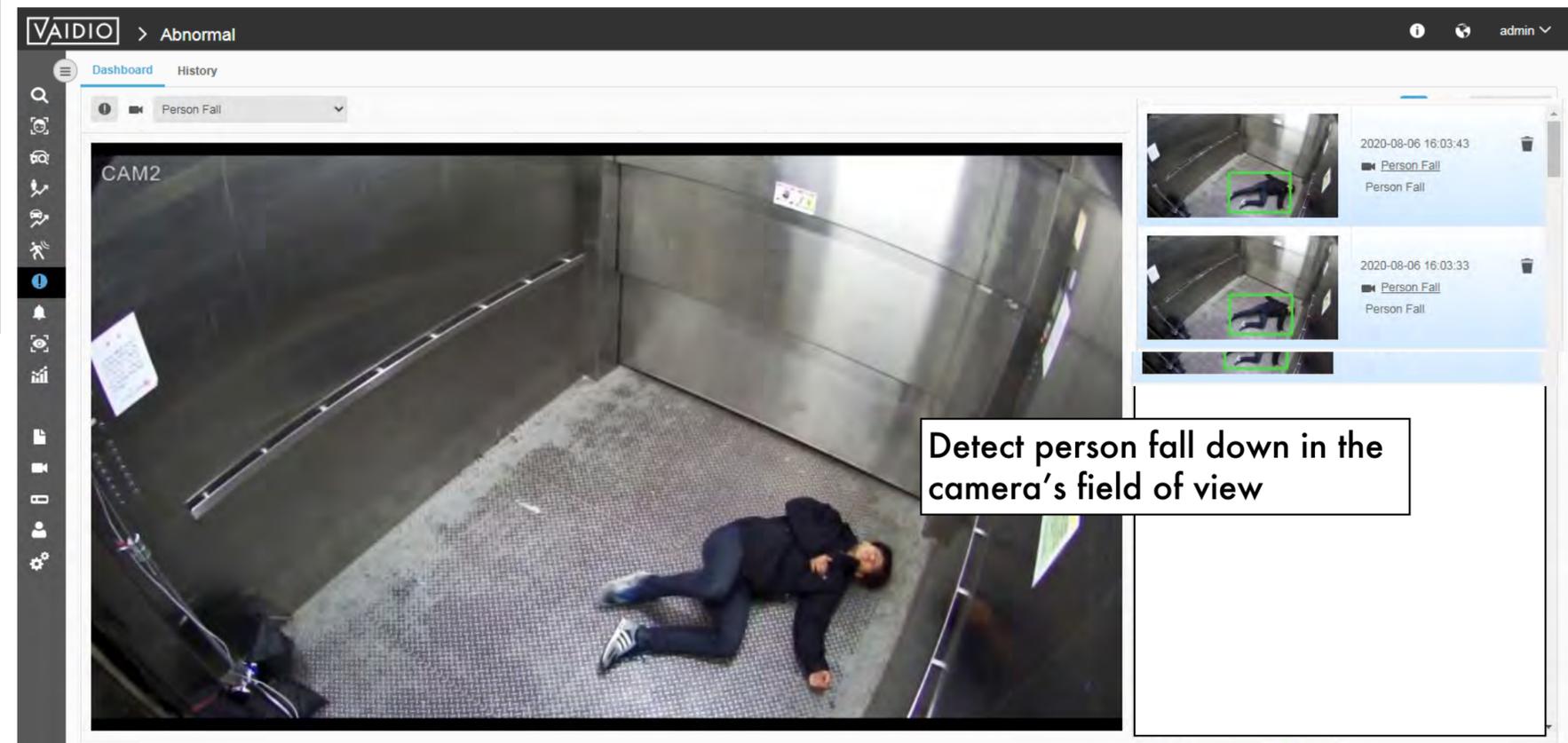
PERSON LOITERING

Real-time Alert:
When defining the alert rule, select the **Person Loitering** alert type and choose the ROI to get the real-time notification when the event happens.
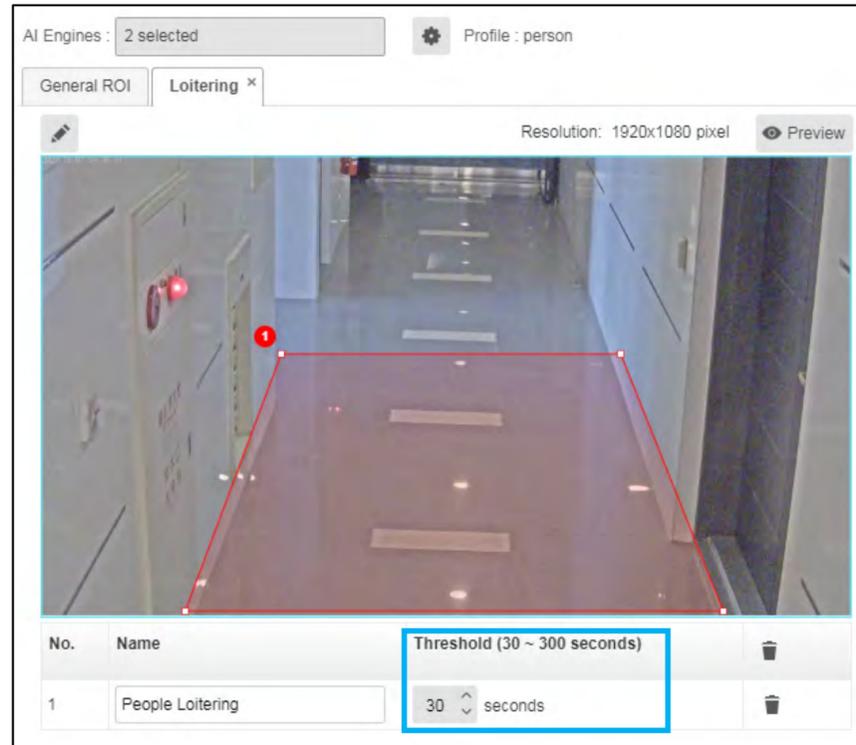
In **Camera Setting**, select/activate **Loitering** from the dropdown list of **AI Engines**
Draw the ROI (region of interest) to detect a person loitering in the specific area.
Define the time threshold of the period to trigger the loitering alert.
☐ Max threshold is 300 s for best performance. To have longer thresholds, contact Aicuda technical support team to discuss
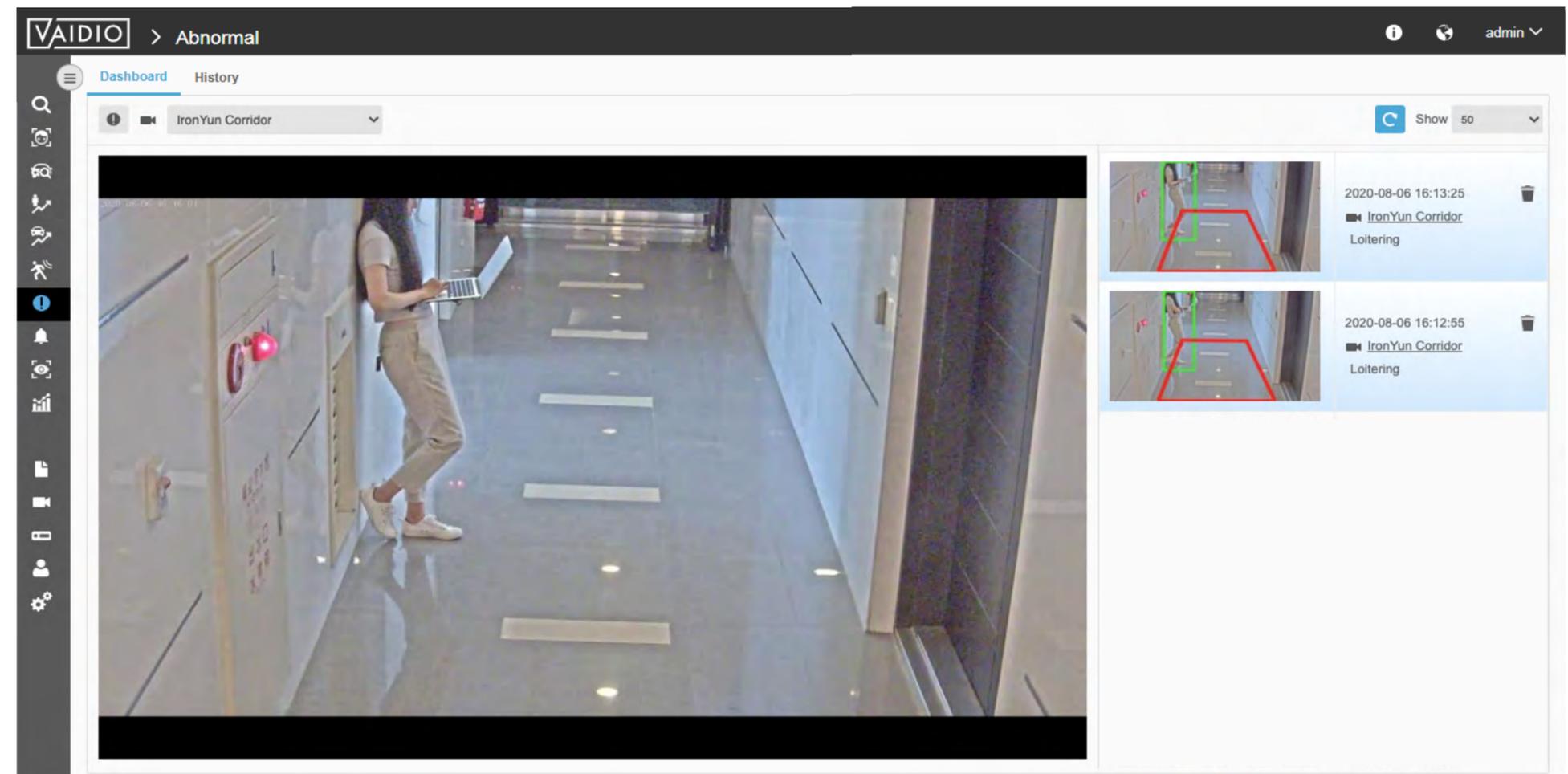
PERSON WITHOUT OBJECT

- Trigger an alert if a person is not wearing/carrying/in physical contact with an object of interest

- **Alert** > **Alert Rule** > **Add Alert** > Select **Alert Type** > **Person** > click on the dropdown list for **Without Object** > type in the object(s) of interest
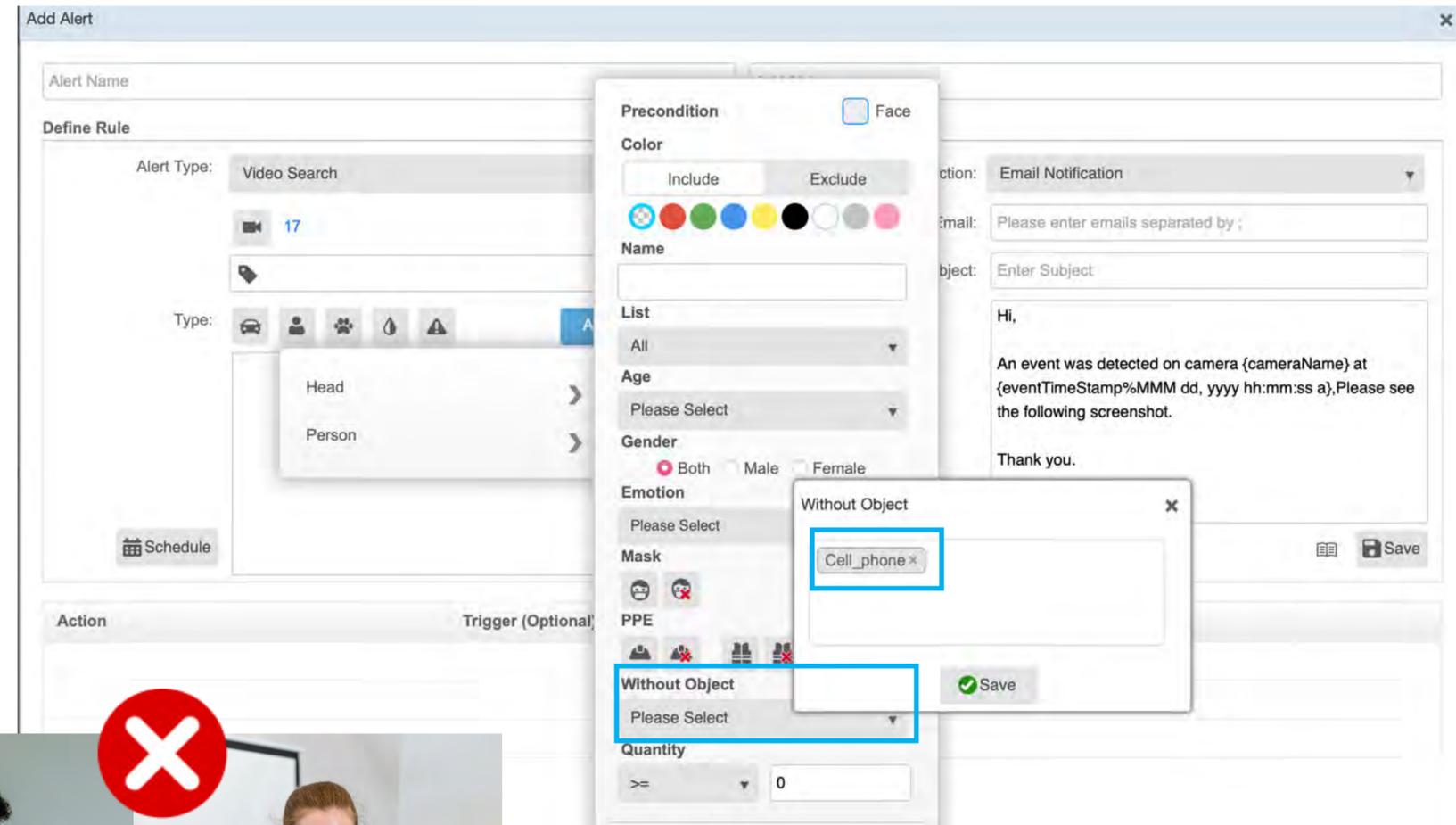
Note:
- Objects selected here must also be activated in Camera > Profile > Object Type
- If more than 1 object is selected, i.e., the alert is for a person w/o multiple objects, the rule is AND - the alert is triggered if any of the multiple objects is NOT detected.

PERSON WITHOUT OBJECT (EXAMPLES)

No Alert: Object of interest (**helmet**) is on the person

Alert Triggered: Detected person is not overlapped with the object of interest (helmet)
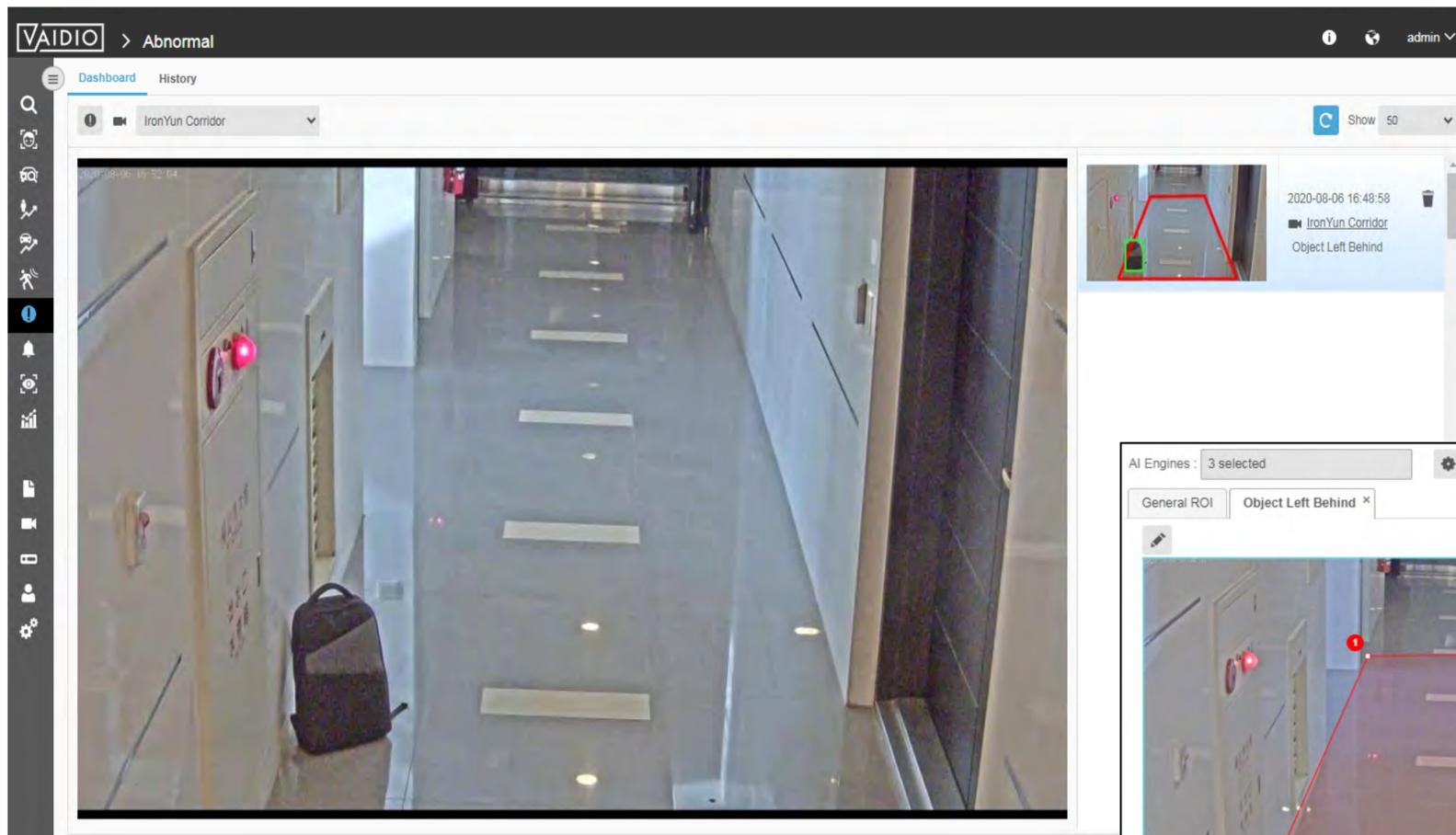

No Alert: Object of interest (**helmet**) is on/carried by/in contact with the person, even when it is not being worn

Alert Triggered: Person on the left is not in contact with the object of interest (helmet)
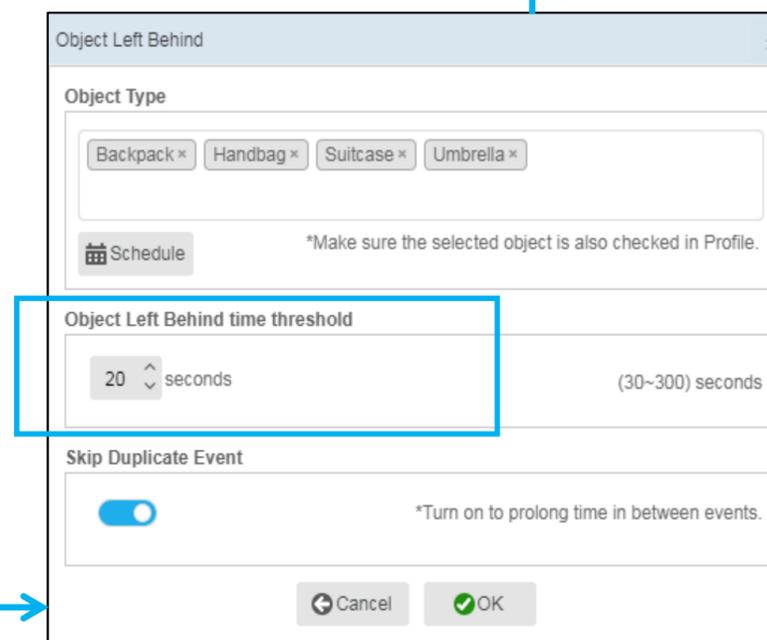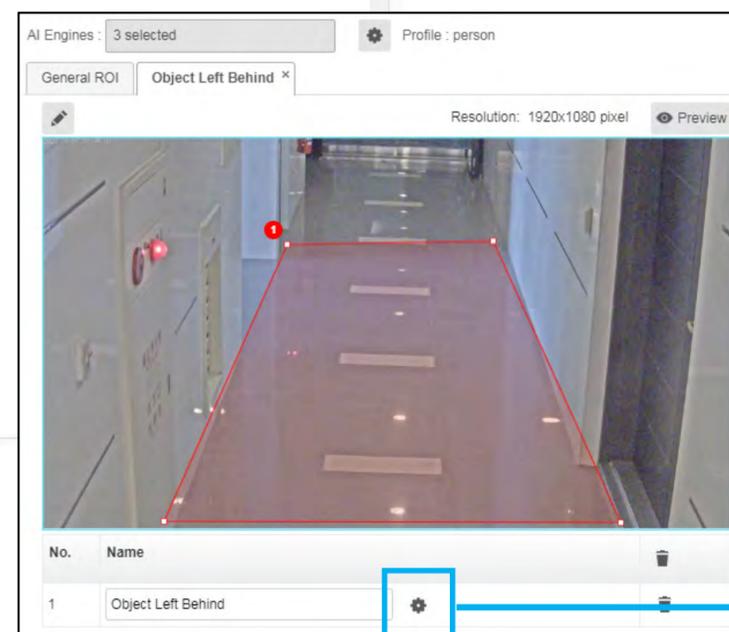
Return to Abnormal

OBJECT LEFT BEHIND

In **Camera Setting**, select/activate the **Object Left Behind**.
The users can select the specific object type to be detected when the object is left in the ROI (region of interest).

☐ Adjust the threshold (30 - 300 secs) for the time period of the object being left and no one passing by to define as object left behind.

Real-time Alert:
When defining the alert rule, select **Object Left Behind** alert type and choose the ROI to get the real-time notification when the event happens.

VEHICLE WRONG DIRECTION

1. In **Camera Setting**, select/activate **Vehicle Wrong Direction** from the dropdown list of **AI Engines**
2. Draw the line
3. Define the direction by click on the arrow (the direction of the arrow is the correct direction, the opposite direction is the wrong direction to trigger an event)

Detect vehicles that travel in the wrong direction.

Real-time Alert:
When defining the alert rule, select **Vehicle Wrong Direction** alert type, and choose the preconfigured line to get real-time notifications when the event happens.

Adjust the **Profile** to detect all vehicles traveling in the wrong direction, or select a specific vehicle type.

Return to Abnormal

ILLEGAL PARKING

When a vehicle stays in the ROI longer than the defined period, the event is classified as illegal parking.

Real-time Alert:
When defining the alert rule, select **Illegal Parking** alert type and choose the ROI to get real-time notifications when the event happens.

In **Camera Setting**, select/activate **Illegal Parking** from the dropdown list of **AI Engines**

Draw the ROI (region of interest) in the non-parking area.

Define the specific vehicle type and time threshold of the vehicle stay

☐ Max threshold is 300s for best performance. To have a longer time threshold, contact Aicuda technical support team to discuss

ABNORMAL-SPEED DETECTION

- Speeding detection: estimate the speed of vehicles and classify whether a vehicle is traveling at a higher, equal, or lower speed compared to the average traffic in the camera FOV

- Subfunction of the AI engine **Vehicle Counting**

- Do not provide numerical speed values

- Limit:
  - 1 line to evaluate speed per camera FOV
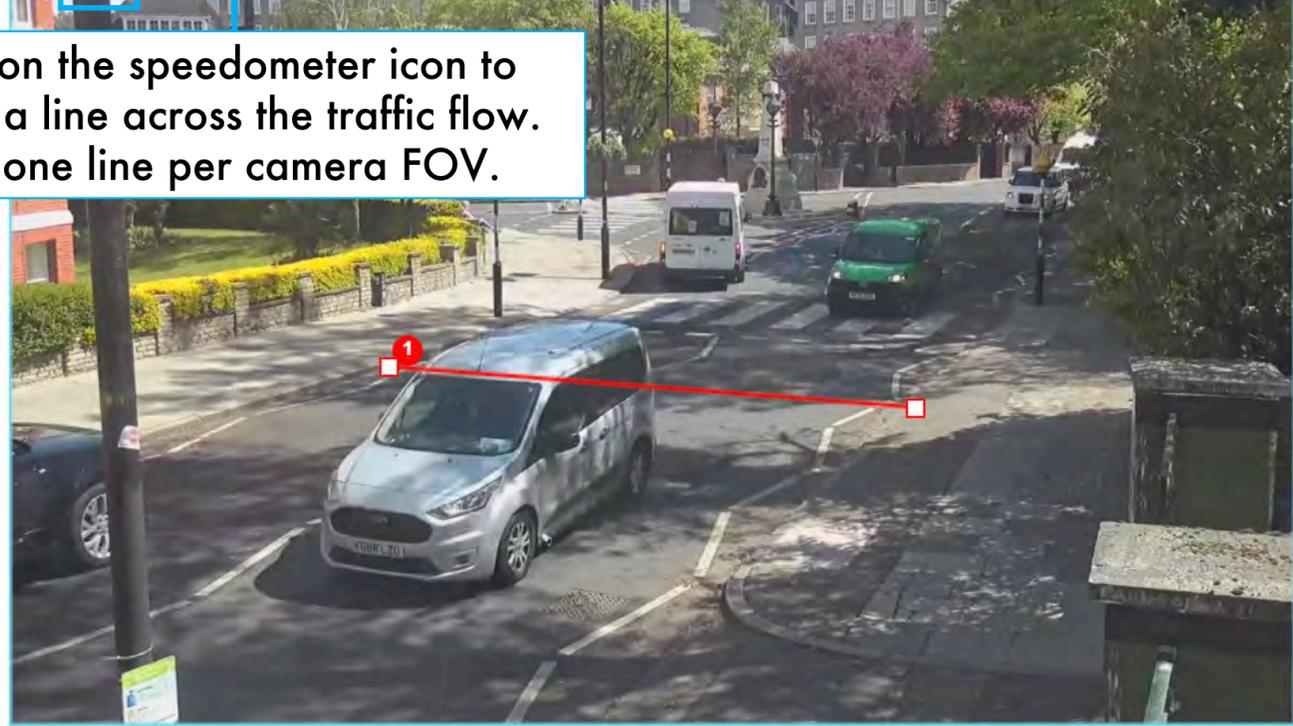 - Low-traffic areas only (neighborhood streets, no freeway)

Return to Abnormal

ABNORMAL-SPEED ALERT

☐ To set an alert for vehicles traveling at higher/lower speed than average traffic, select the Alert Type **Video Search**

☐ Select a vehicle type, e.g., **Car** > **Speed** > **Above Average/Average/Below Average**

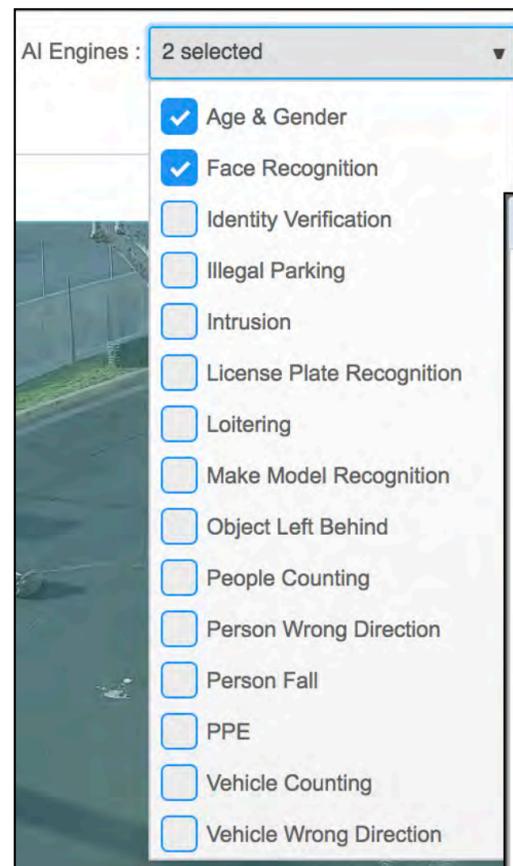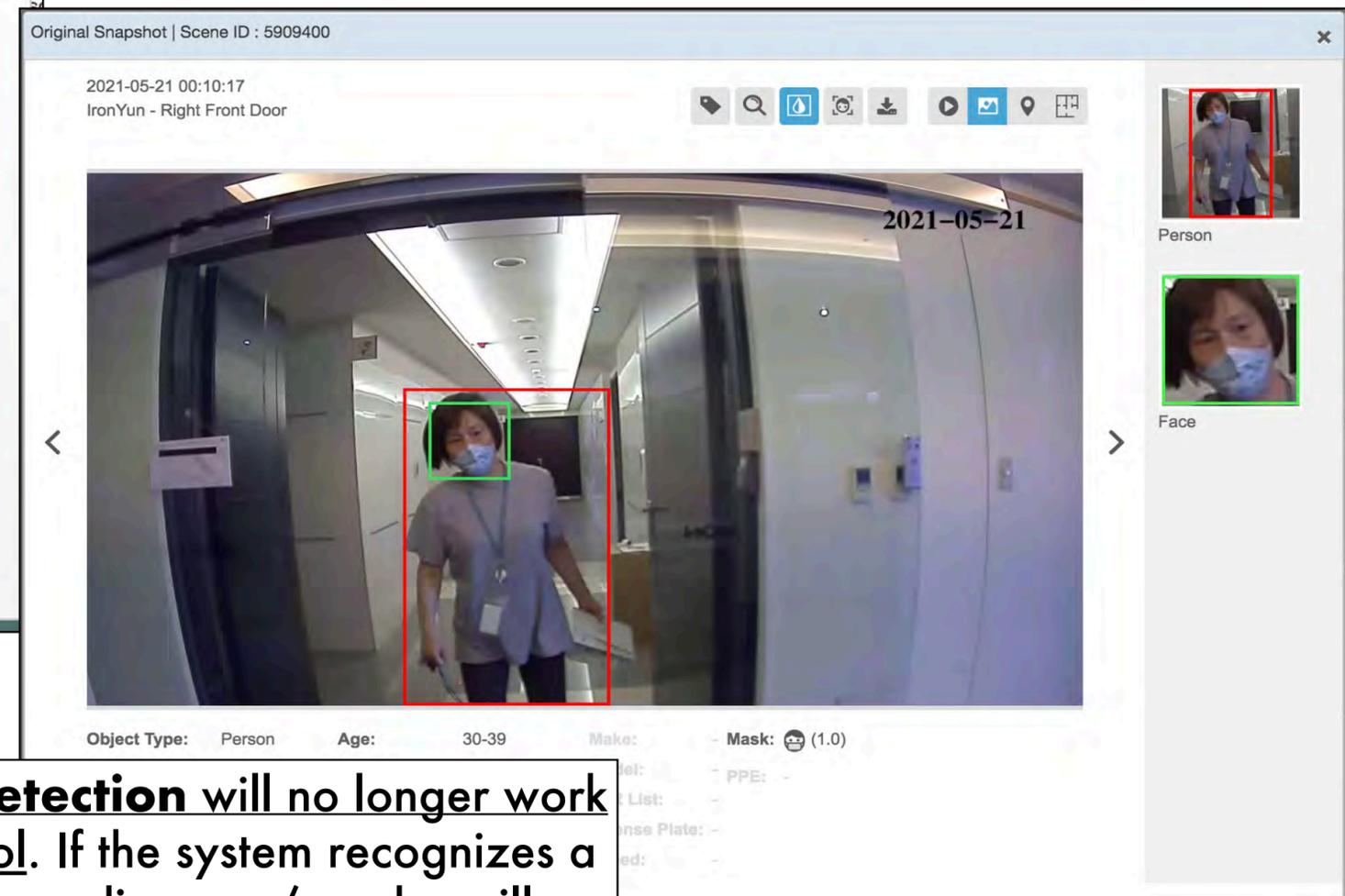# AGE & GENDER DETECTION

□ [Activate Age & Gender Detection](#)

ACTIVATE AGE & GENDER ENGINE

☐ In Vaidio 5.1.0, **Age & Gender** is separated from **Face Recognition** to address privacy concerns and save computing resource

☐ For enhanced accuracy, **Age & Gender** should be activated **with Face Recognition**

☐ To search for a person by age group and/or gender, go to **Search > Person >** select Age group and gender in the dropdown menu

☐ To see the collective demographic statistics of the cameras with **Age & Gender**, go to **Statistics > Demographic**

When adding the camera, activate both **Face Recognition** and **PPE** AI Engines for enhanced accuracy.

AI Engines : | 2 selected ▼

- ☑ Age & Gender
- ☑ Face Recognition
- ☐ Identity Verification
- ☐ Illegal Parking
- ☐ Intrusion
- ☐ License Plate Recognition
- ☐ Loitering
- ☐ Make Model Recognition
- ☐ Object Left Behind
- ☐ People Counting
- ☐ Person Wrong Direction
- ☐ Person Fall
- ☐ PPE
- ☑ Vehicle Counting
- ☐ Vehicle Wrong Direction

Original Snapshot | Scene ID : 5909400

2021-05-21 00:10:17
IronYun - Right Front Door

2021-05-21

Person

Face

| Object Type: | Person | Age: | 30-39 | Make: | | Mask: 😷 (1.0) |

Note: <u>In 6.0, **Age & Gender Detection** will no longer work with masks to ensure quality control</u>. If the system recognizes a person wearing a mask, the corresponding age/gender will no longer appear as it does in this screenshot. This will ensure improved accuracy in age & gender detection.
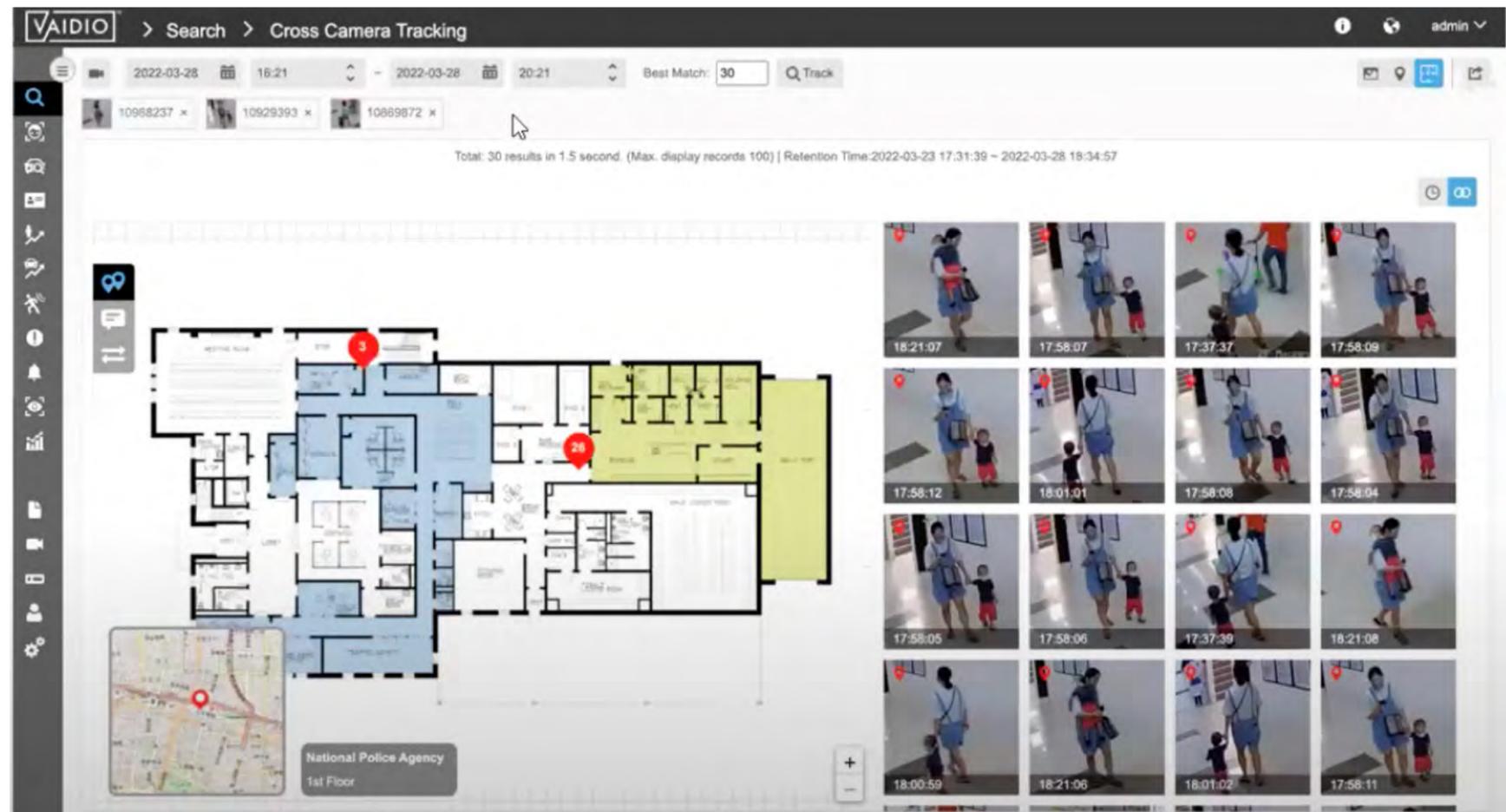
CROSS CAMERA TRACKING

- ☐ [Dashboard](#)
- ☐ [Select target](#)
- ☐ [Refine results](#)
- ☐ [Map view](#)

DASHBOARD

- ☐ Select and track a person through multiple cameras based on the **shape or pattern** of their clothing and wearable objects (e.g., backpack)
- ☐ View the person's path in map view (GPS and indoor floor plan)
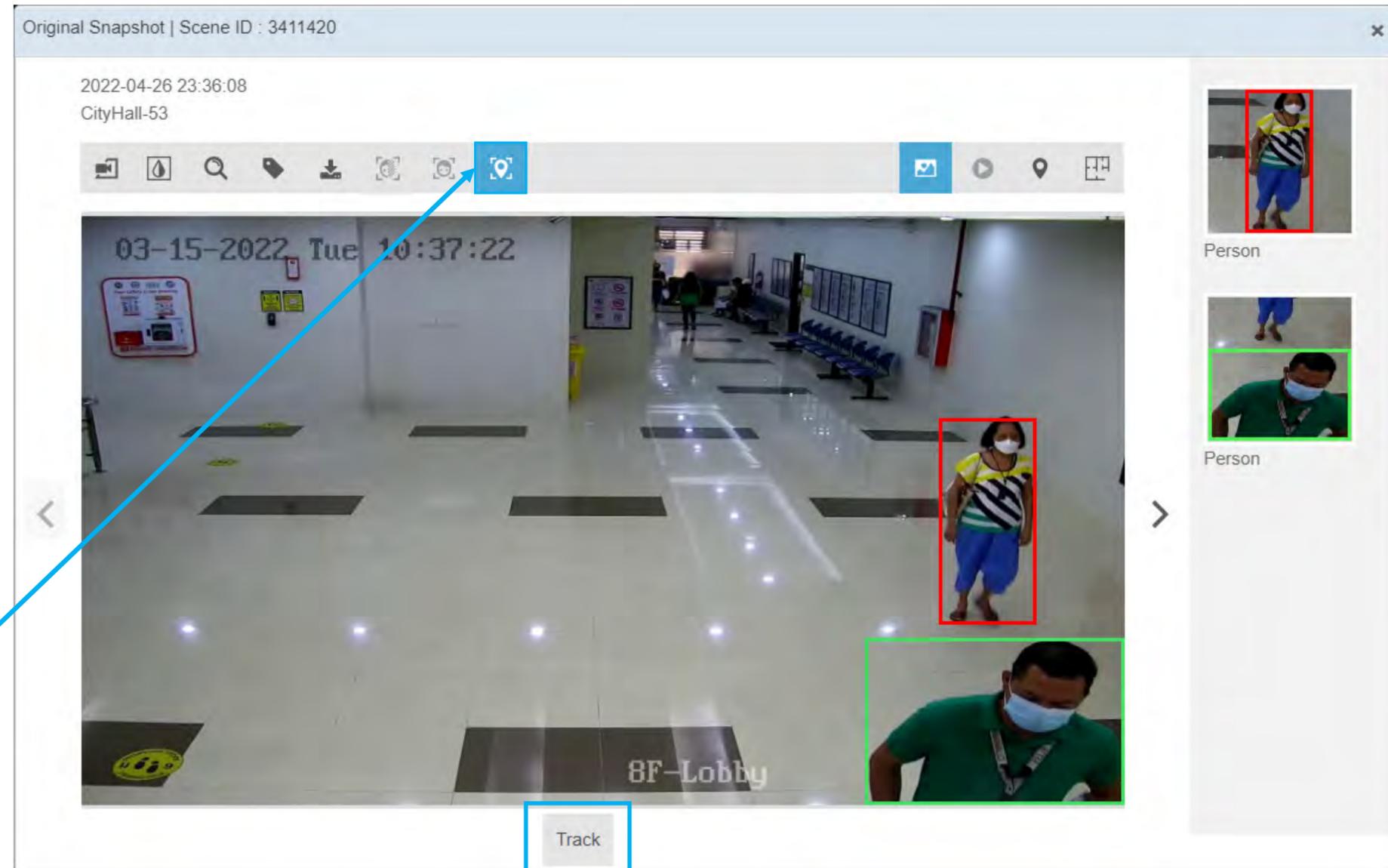
Return to Cross Camera Tracking

SELECT TARGET

Begin the **Cross Camera Tracking** (CCT) process by conducting a person search; e.g., person wearing blue and yellow.

<u>Note</u>: CCT is for person tracking and based on shape & pattern only. Do NOT add other attributes (age, gender, etc.) or object types (backpack, bicycle, etc.)

Once you have identified the person you want to track, click on

Then, click the **Track** button that appears at the bottom of the page to open the **Cross Camera Tracking** dashboard.

Original Snapshot | Scene ID : 3411420

2022-04-26 23:36:08
CityHall-53

03-15-2022 Tue 10:37:22

8F-Lobby

Person

Person

Track

<u>Return to Cross Camera Tracking</u>

SELECT TARGET (CONT.)

When conducting **Cross Camera Tracking**, make sure to reset the search timeframe parameters at the top to ensure that the dates/time range of the search matches your initial search.

Best Match provides images that most closely match the appearance of the person in the initial search snapshot. The default amount is set to 30; i.e., 30 most similar images will be displayed. Adjust the number as needed.

Click **Track** to sync the search results with the desired timeframe (if the timeframe is already accurate, follow the steps in the next slide).

[Return to Cross Camera Tracking](#)

REFINE RESULTS

Refine Cross Camera Tracking results by removing all images that do not correspond to the person whom you want to track by clicking the Trashcan icon, which appears when you hover over the snapshot.
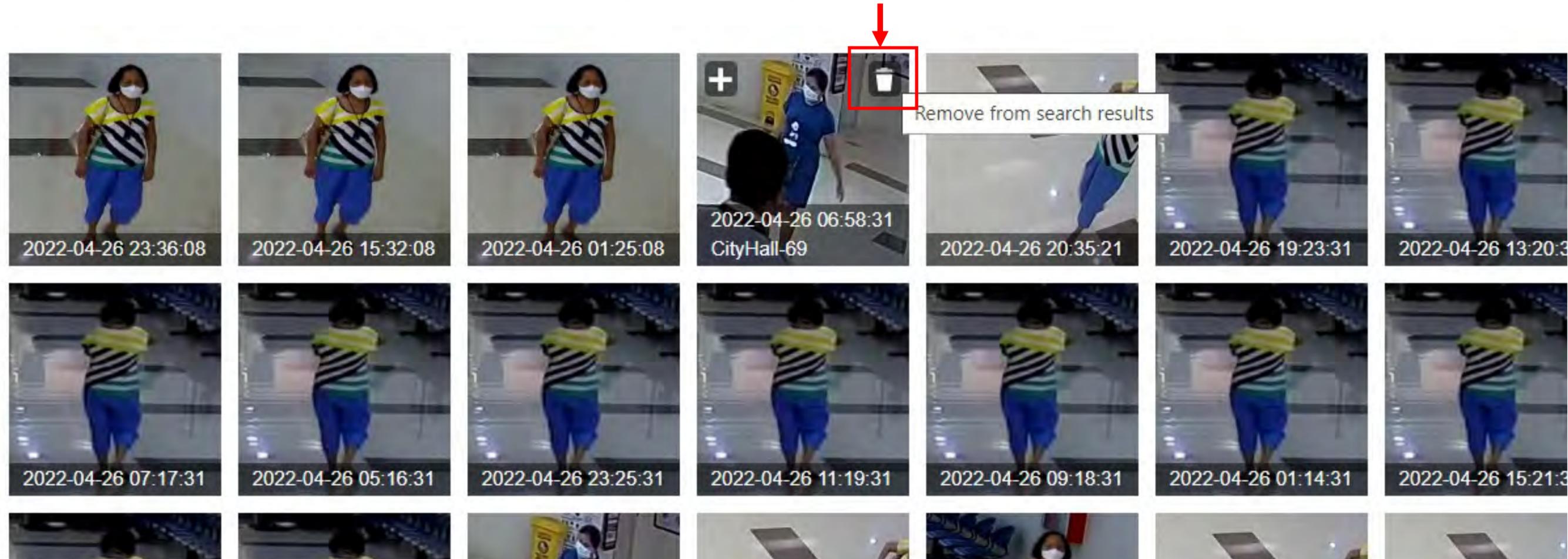
REFINE RESULTS

Refine Cross Camera Tracking results by adding different images of the person whom you would like to track by clicking the Plus (+) icon that appears when you hover over the snapshot. You can add up to 4 images to refine your search (5 total in addition to the original search image).
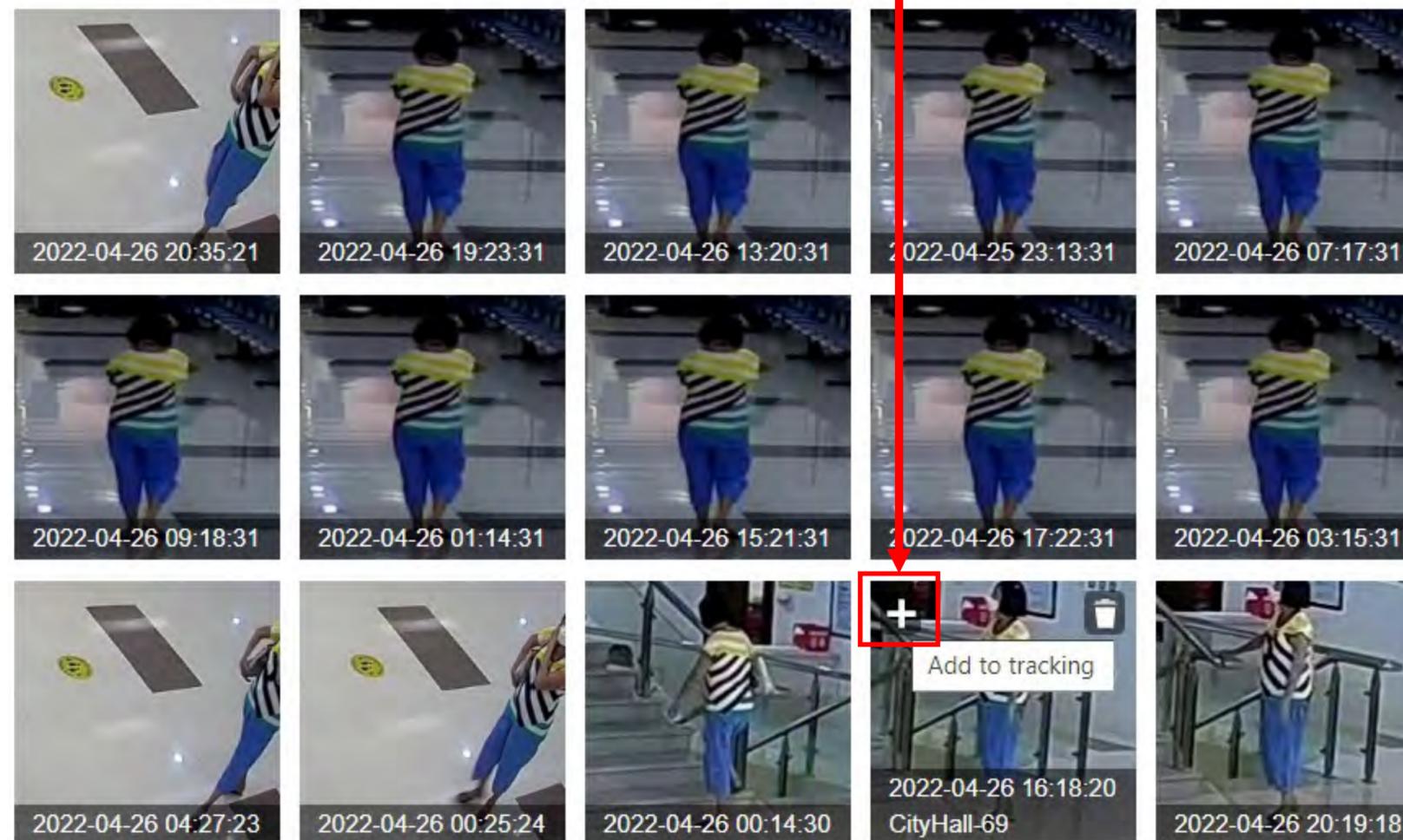
Return to Cross Camera Tracking

REFINE RESULTS

Click on **Track** (magnifying glass icon) once you have your image selections to receive a list of refined results.

Up to **5** images can be selected

Search Results

Return to Cross Camera Tracking

MAP VIEW

Cross Camera Tracking can display the locations of a person via GPS or indoor floor plan. Click on the map view to show the path.

Return to Cross Camera Tracking
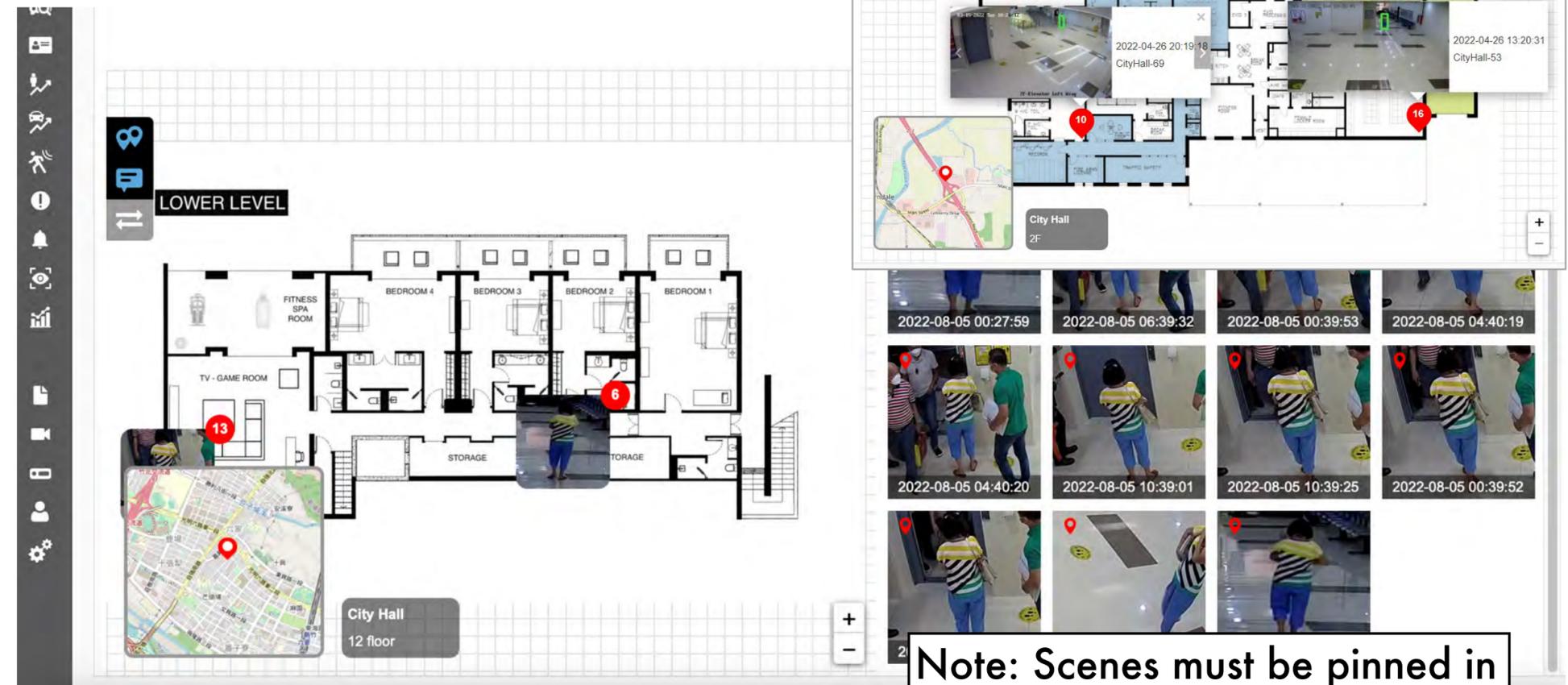
MAP VIEW

Click the map logo to see the locations of the snapshots and number of snapshots at each location

Click on the **Path** icon to trace the path of the person selected.

Click the **Map Pin All** button to bring up thumbnails of the snapshot. The user can scroll through these images using the right and left arrows that appear when hovering over the image

Note: Scenes must be pinned in order to receive results in the result display

Return to Cross Camera Tracking

IDENTITY VERIFICATION

IDV MATCHING CRITERIA

- Starting from Vaidio 5.1.0:

- Identity Verification (IDV) considers a detection is a match result only if:
  - The real person's face matches a target in a list in the FR database, AND
  - The driver license number matches the driver license number associated with that target in the list

- IDV only applies to driver licenses of one state at a time. User needs to specify the state and Aicuda Sales Engineering team will configure the format in the software license. For other forms of identification cards, please contact your Aicuda representative.

- IDV uses and requires a user-input Face Recognition database with face images and associated driver license numbers of the targets. The database resides in the Vaidio server inside the user's local network and is not shared with Aicuda or any other 3rd party without the user's permission.

- IDV does not match the real person's face with the face image on the driver license/ identification card.

IDV CAMERA CONFIGURATION

Identity Verification engine must be activated with the **Face Recognition** engine.

Drag and locate the Card ROI in the camera's field of view. The ID card must be placed and recognized within the Card ROI

Sample

In Vaidio 5.1.0, once the ID number is recognized, the system will match the detected face (real face, not the profile image on the ID card) with the corresponding face in the face database.
Access is granted when the faces are matched.

ADD ID NUMBER TO THE TARGET FACE

1. Go to the "**List**" tab under **Face Recognition**.
2. Add **Target**
3. input the **ID number**.

DASHBOARD – REAL-TIME DETECTION

The result will appear on the dashboard in real time.
- **Access Granted**: The detected face and ID number match the target in the database.
- **Access Denied**: The detected face or ID number does not match the target in the database.

Return to Identity Verification

DASHBOARD – REAL-TIME DETECTION (CONT.)

In **History**, select and input specific criteria to get the target results.

Return to Identity Verification

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- ☐ PPE Detection
- ☐ PPE Detection with Intrusion Detection
- ☐ Alert Setups

PPE DETECTION

Select to detect and search person with/without helmet (hardhat) or safety vest

Return to PPE

PPE DETECTION WITH INTRUSION DETECTION

For higher accuracy, in **Camera > Edit > Advanced > AI Engines**, activate both **Intrusion** and **PPE** AI Engines and define the object type to be detected. In this case, select Person without mask, hard helmet, or/and safety vest.
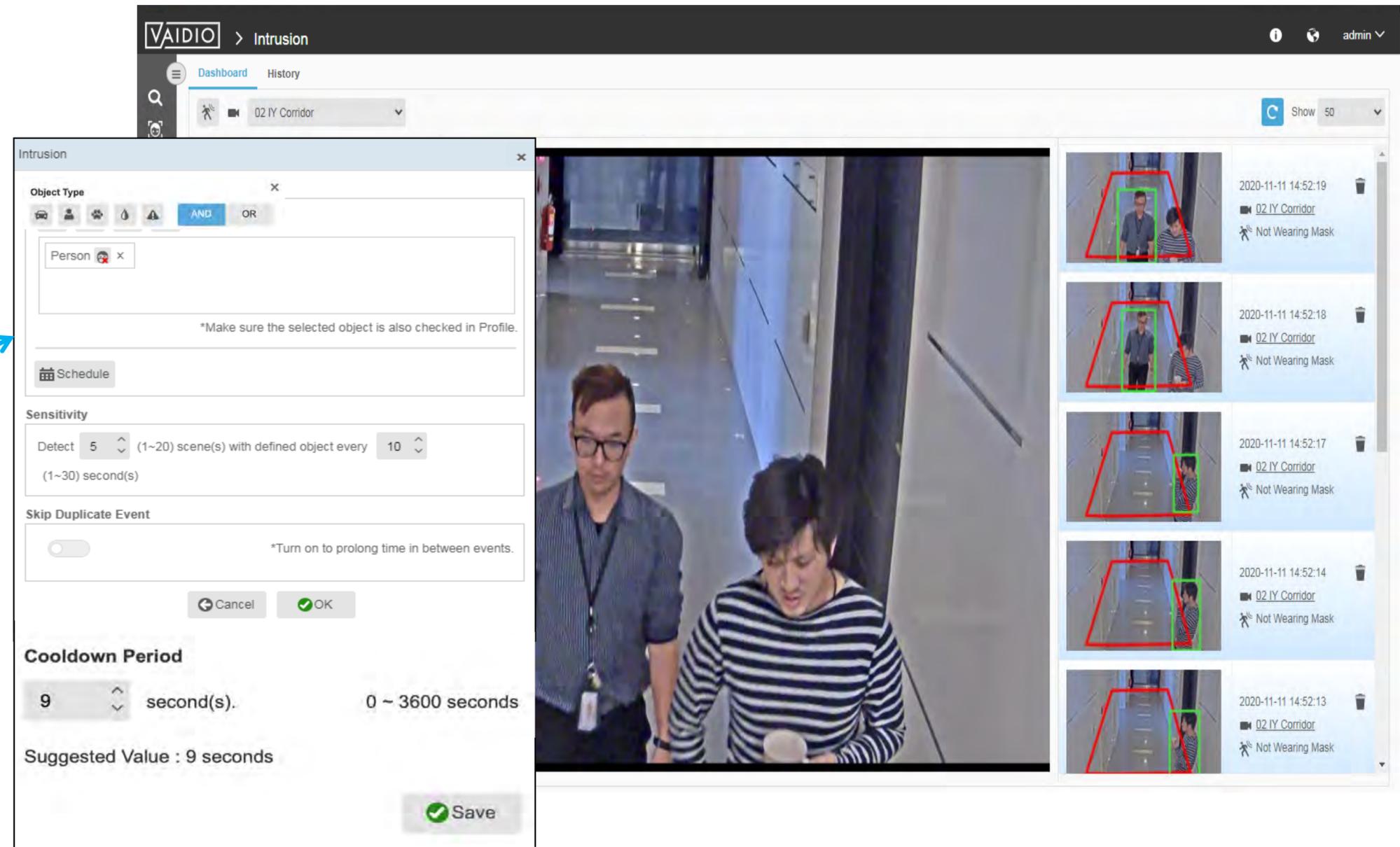
ALERT SETUPS

1. PPE Alert using **Intrusion Detection**

When adding the alert rule, select **Intrusion** as the alert type, then select the preconfigured ROI for PPE detection.

2. PPE Alert using **Video Search**

Select **Video Search** as the alert type, then define the specific scenarios for PPE detection.

Note:
To have more accurate result of PPE detection, setup PPE detection with **Intrusion Detection**.
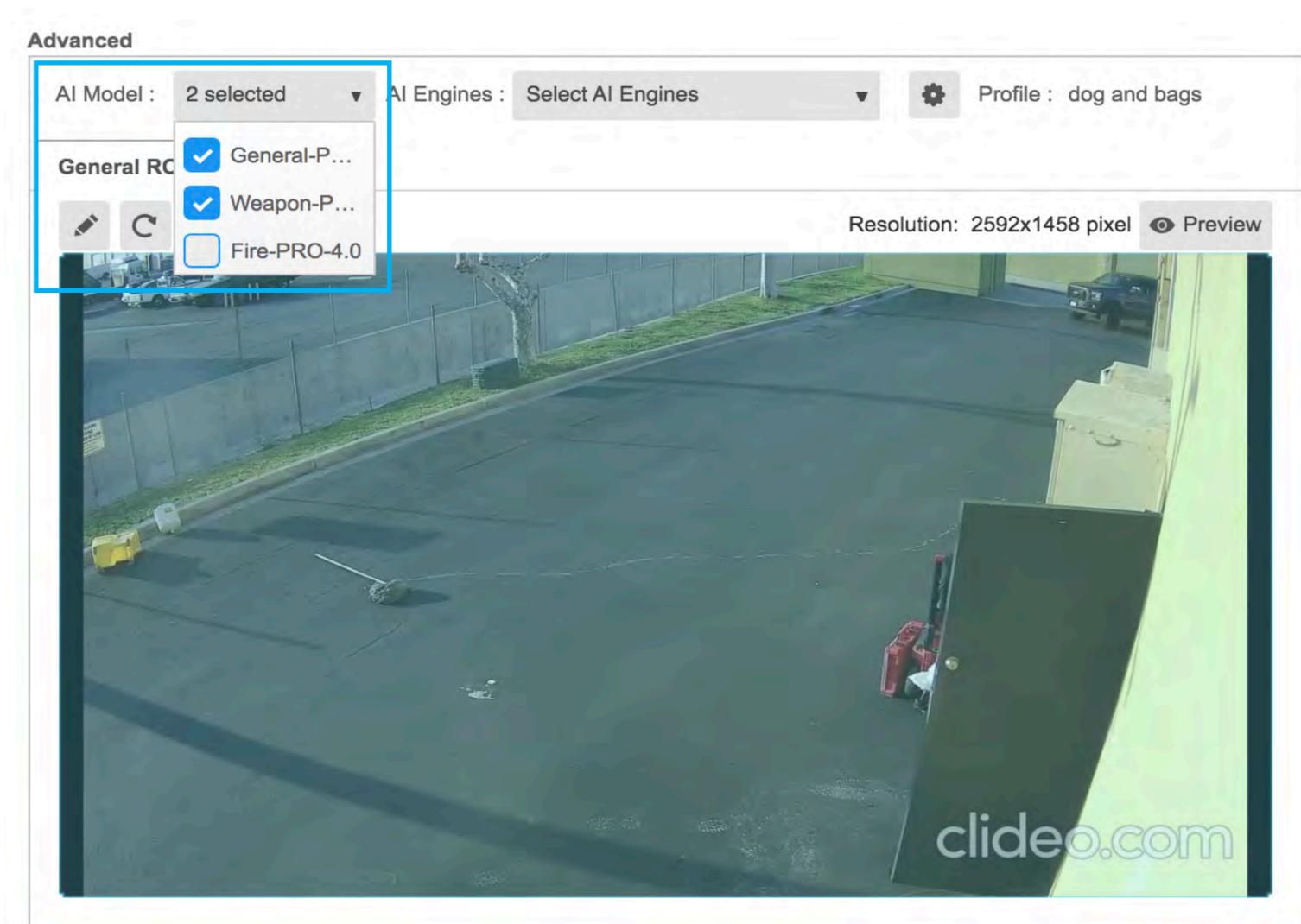
Return to PPE

WEAPON & FIRE DETECTION

- ☐ [Activate AI Model](#)
- ☐ [Weapon Detection Results](#)
- ☐ [Fire Detection Results](#)

ACTIVATE AI MODEL

Weapon/Smoke & Fire Detection

1. In **System > AI Model,** activate the correct AI model: **Weapon, Fire**, or **Power Model** (make sure to verify that the model has the object types "handgun", "rifle" for weapon and/or "smoke", "fire" for fire detection – refer to the Setup Guide to see how)

2. In **Camera > Edit > Advanced > AI Model,** select the correct model from the dropdown menu

3. For Weapon, in **Camera > Edit > Profile > Object Type,** increase the Confidence level for "handgun" and "rifle" object types to above 90% and min size to above 100 px for best results

WEAPON DETECTION
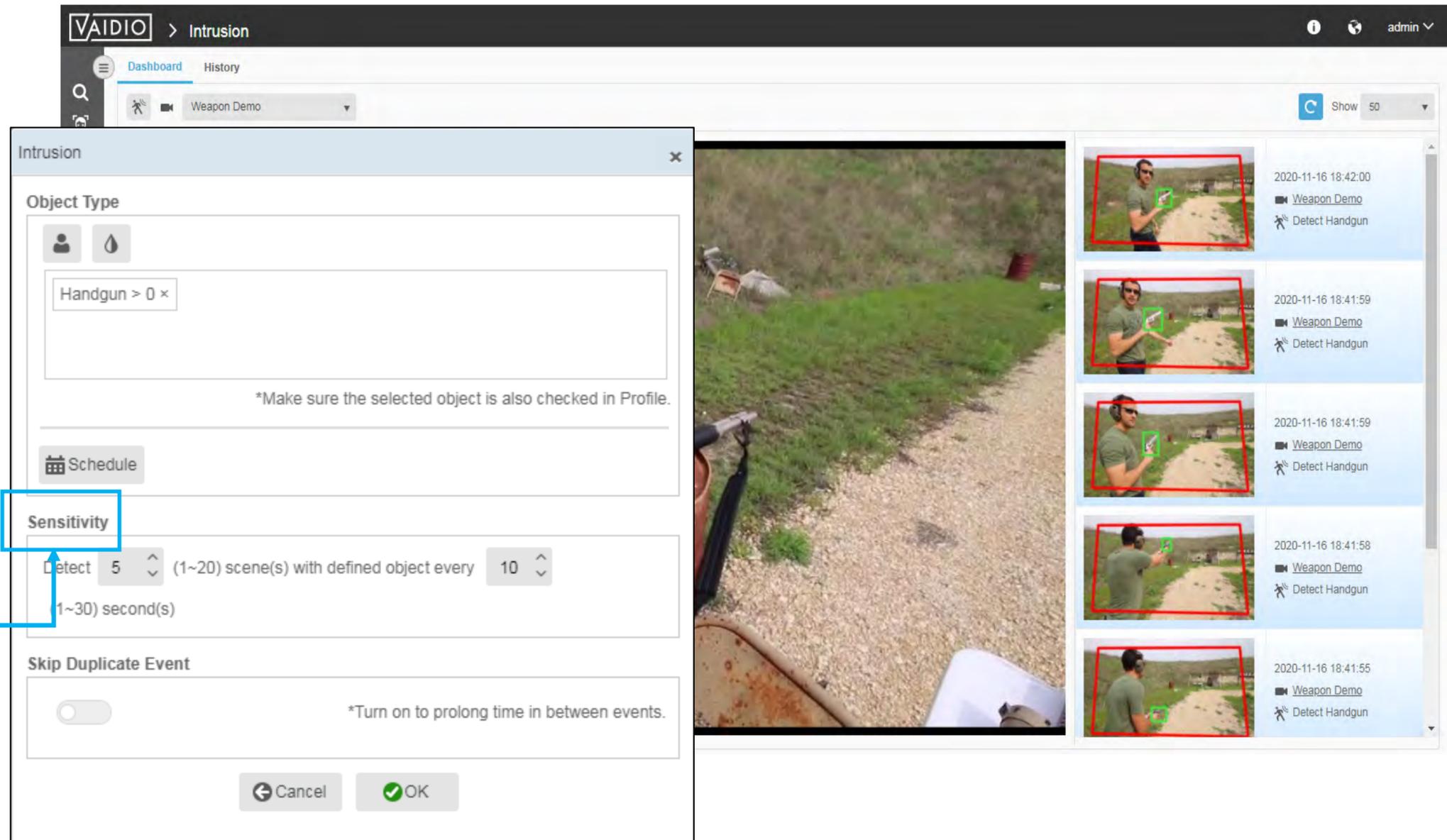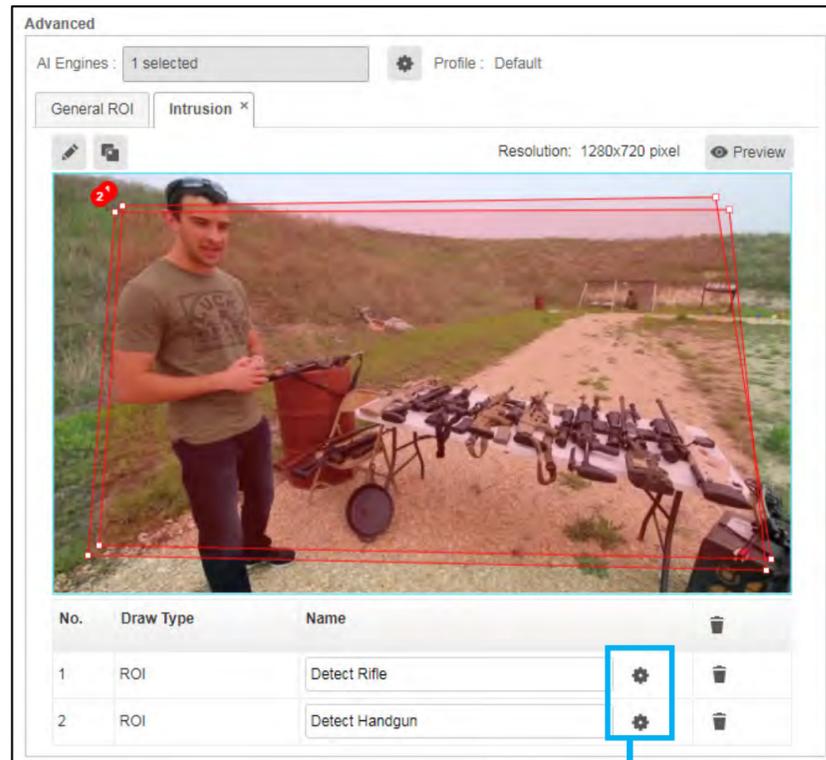
In **Camera > Edit > Advanced**, activate the **Intrusion** AI Engine, then draw the ROI in the camera's field of view and define the intrusion rule by selecting **Handgun/Rifle** as the object type.

☐ Set the **Sensitivity** to 3 frames every 3 seconds

Return to Weapon & Fire Detection

FIRE DETECTION

When a fire is detected in the preconfigured ROI, the event appears in the Intrusion dashboard in real time.

In **Camera Setting**, activate **Intrusion** AI Engine, then draw the ROI in the camera's field of view and define the intrusion rule by selecting **Fire/Smoke** as the object type.

Return to Weapon & Fire Detection

LIVE VIEW
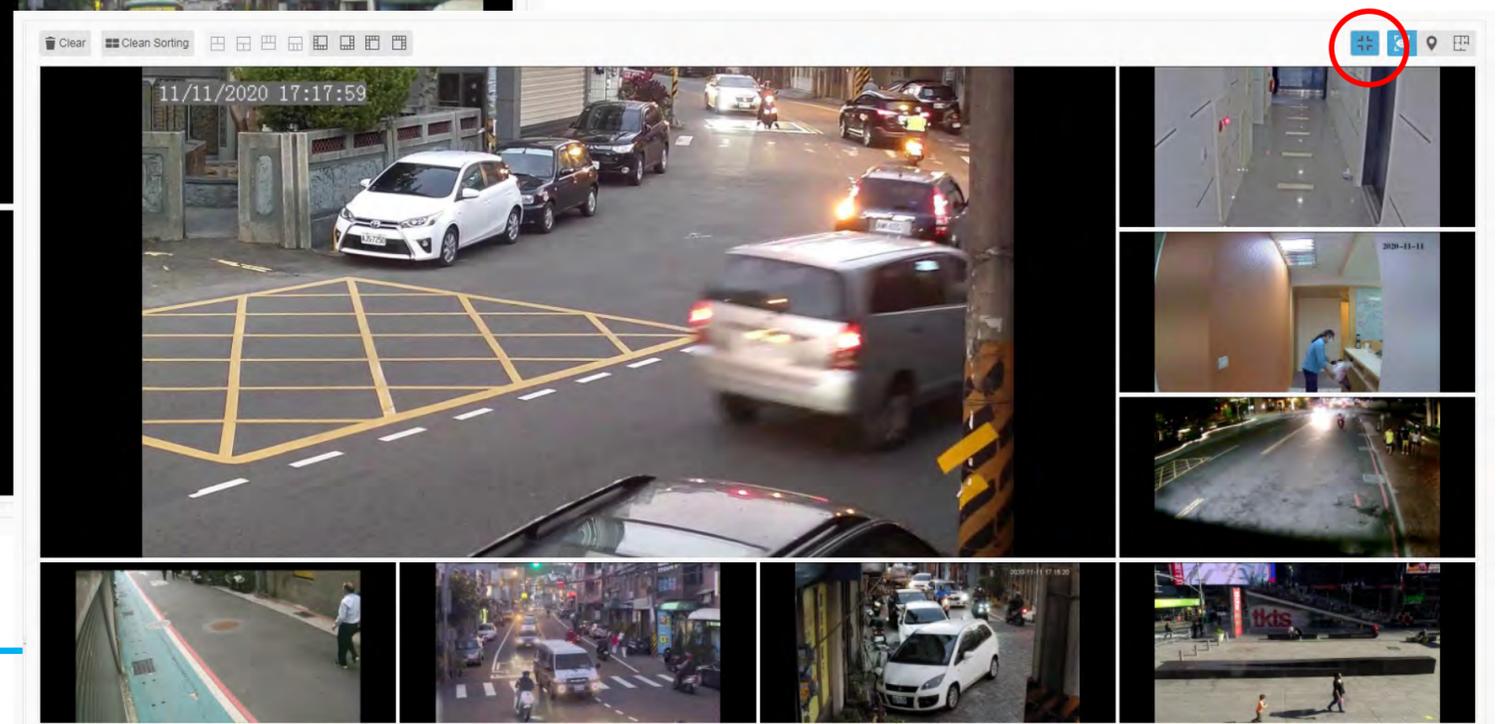
- ☐ [Live View as Video Wall](#)
- ☐ [AI Tracking](#)

LIVE VIEW AS VIDEO WALL
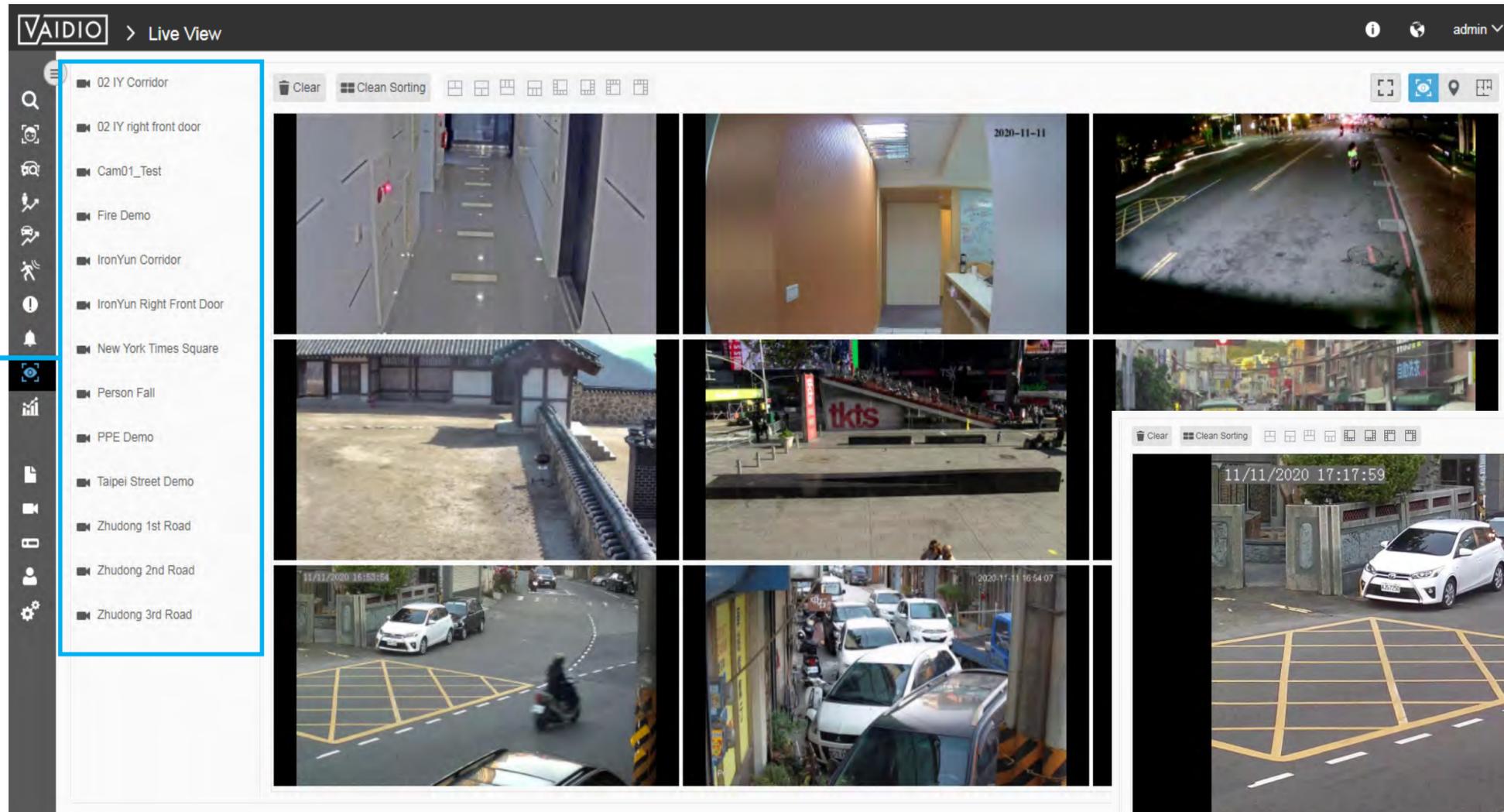
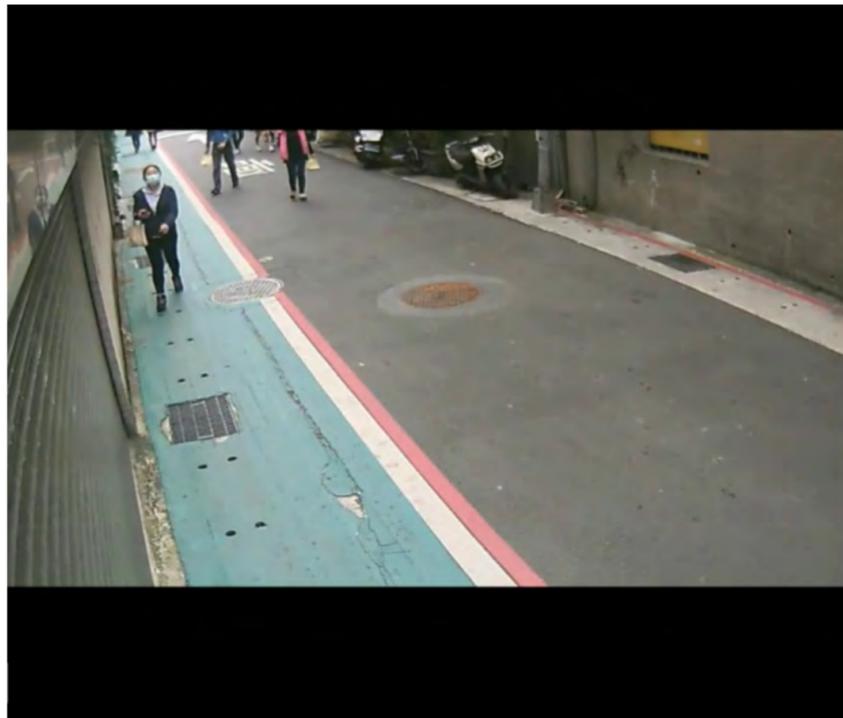Click the "Full Screen" icon to view live cameras in a video wall

Add multiple cameras and monitor the events live on the same screen. The user can adjust the size and location of the scenes to create the preferred viewing layout or apply the pre-set format for the live view.

Return to Live View

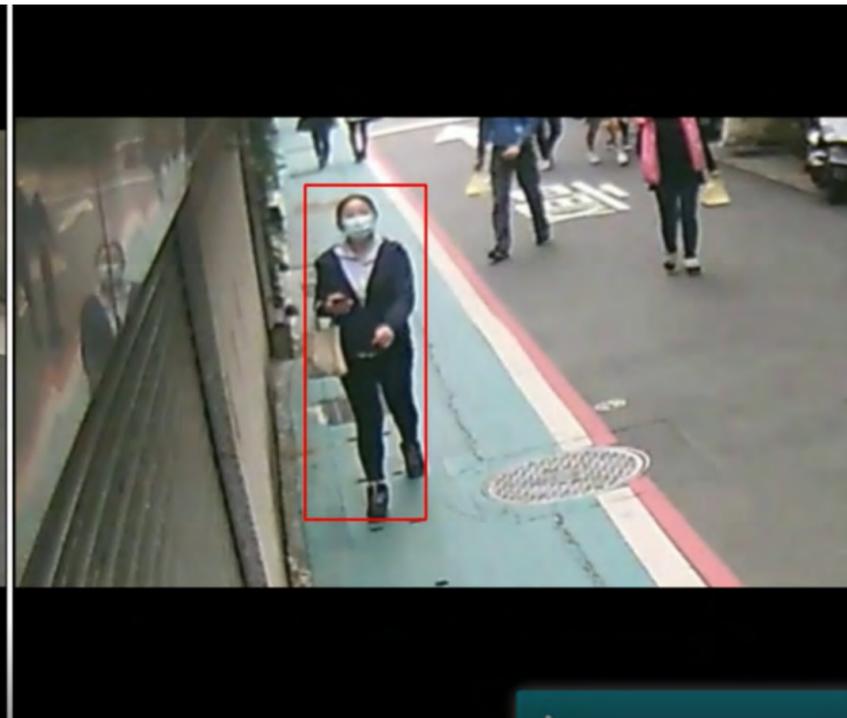# AI TRACKING

AI Tracking OFF
(normal view)

AI Tracking ON
(zoom-in view)

Enabled for cameras with **People/Vehicle Counting**
Live View: toggle **AI Tracking** on/off at the top right corner of each camera view

- ☐ AI-software based virtual PTZ track and zoom

- ☐ Streaming rotation on tracked target

- ☐ User-selectable target

- ☐ Facilitate tracking with auto-zoom

Return to Live View

AI TRACKING (CONT.)

AI Tracking Screen:

1. Add the same camera twice and click the "AI Tracking" icon on one of the scenes to enable **AI Tracking**.
2. When motion is detected, the bounding box will appear in the zoom-in view and track the detected object automatically.
3. Compare and see two scenes at the same time to implement object tracking and predict its next movement.

Return to Live View

STATISTICS

- ☐ [Heatmap](#)
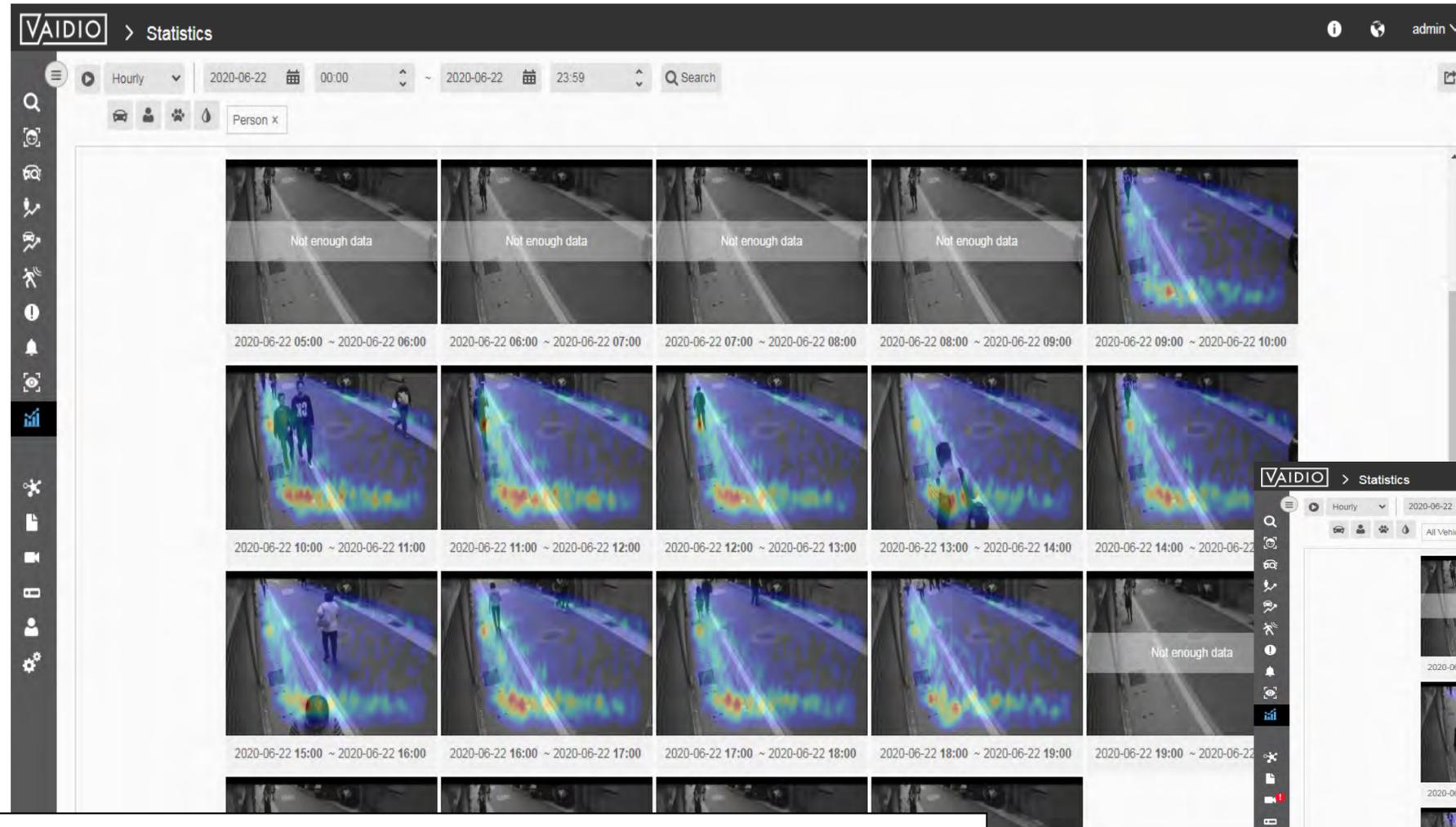- ☐ [Demographics: Age & Gender](#)

HEATMAP

Heatmap for Person

The **Heatmap** function can generate heatmaps for any combination of object types in a 24-hour period. The results are displayed in the **Hourly** or **Aggregated** mode (1 image of the entire 24-hour period).

Heatmap for All Vehicles

Note:
- One video source per heatmap search, e.g., the real-time stream from a camera or an uploaded video.
- To have meaningful results to compare the activity in different hours, the video source should be longer than 1 hour.
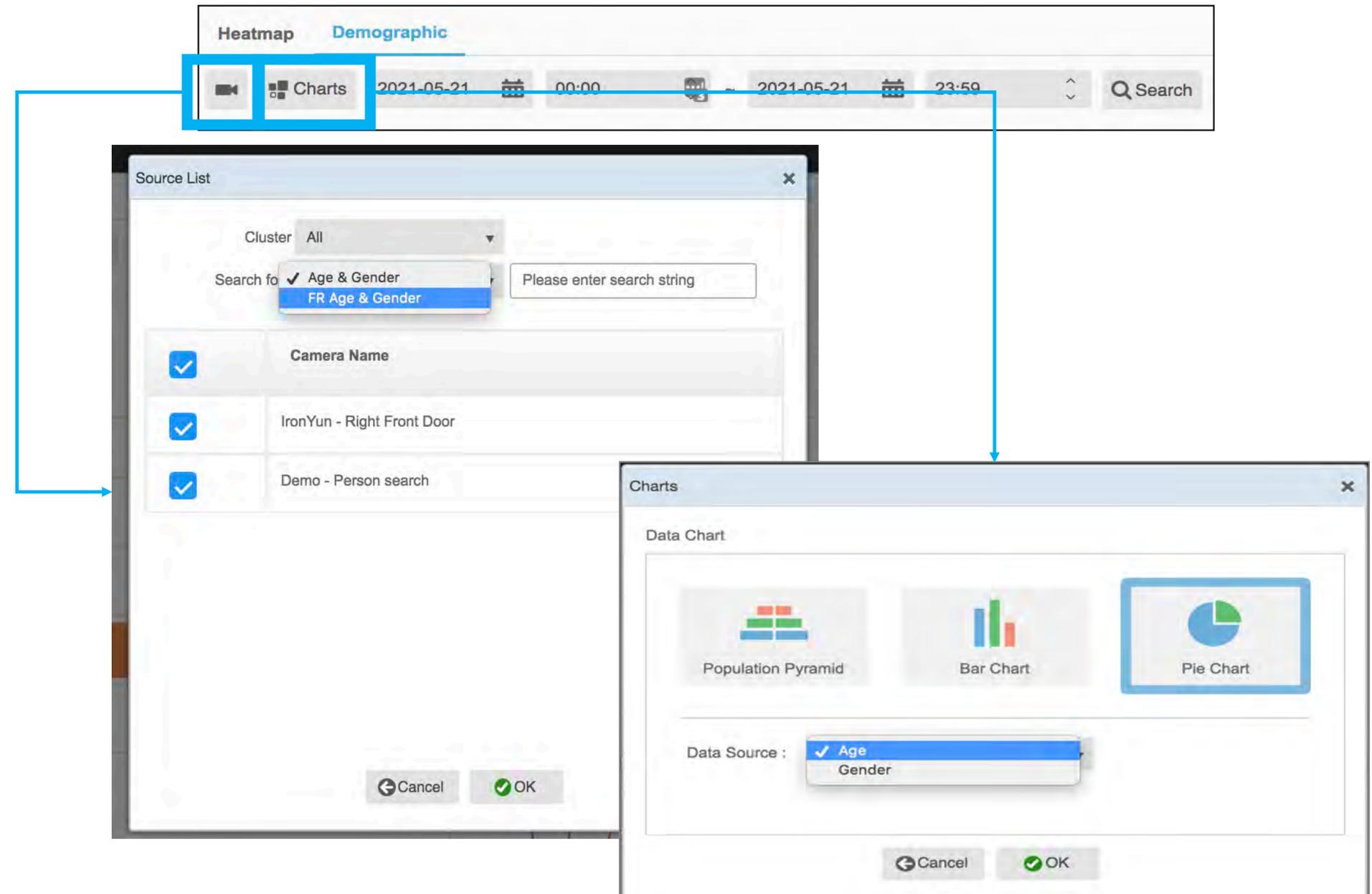
Return to Statistics

DEMOGRAPHIC

- In **Statistics > Demographic**, select the Camera icon to select the video source(s)
  - Cluster: select the Vaidio server(s) in the network. Default: all Vaidio servers.
  - **Age & Gender**: display all cameras that have **Age & Gender** activated
  - **FR Age & Gender**: display only cameras that have both **Face Recognition** and **Age & Gender**

- **Age & Gender** statistics without **FR**: more duplicates; i.e., the same person that appears in several frames will be counted several times

- **Age & Gender** statistics with **FR**: fewer duplicates.
  - Current time threshold for **FR** deduplication: 10 seconds. If user needs longer deduplication threshold, please contact the regional Aicuda representative.
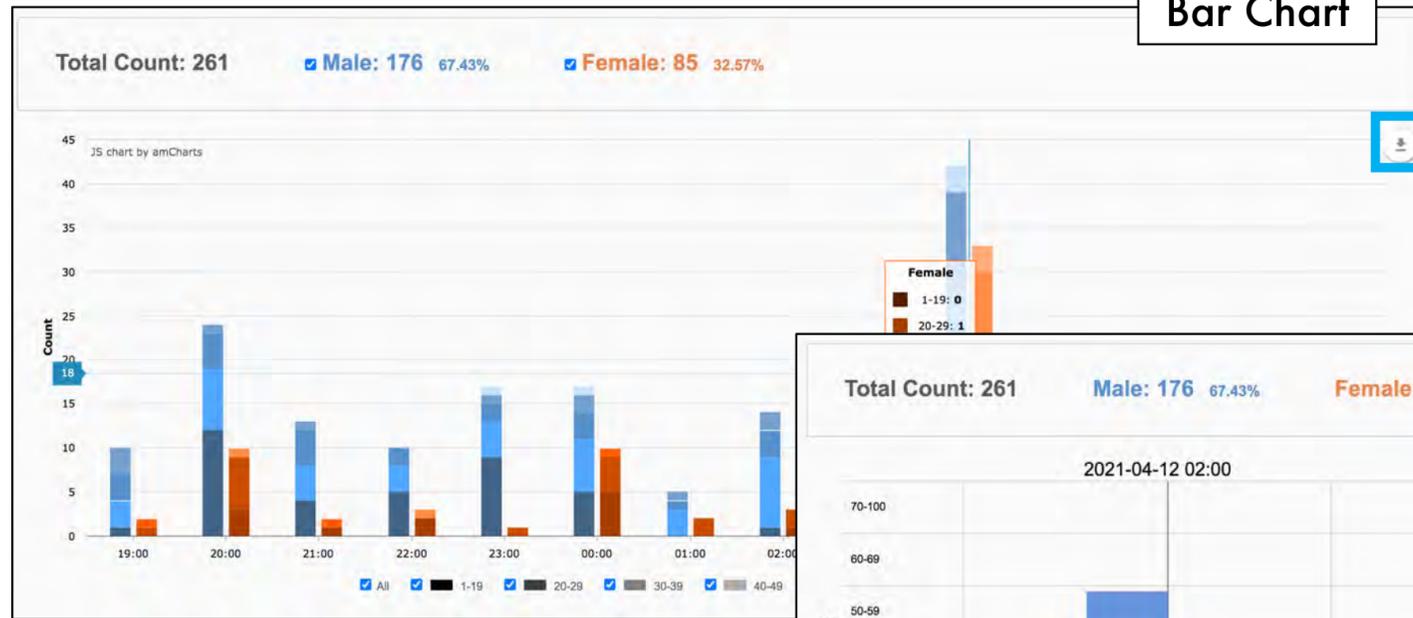
Note: NO demographic statistics is free from duplicates unless the deployment is at a choke point (e.g., check-in kiosk) and integrated with a customized check-in software

DEMOGRAPHIC CHART TYPES

Bar Chart
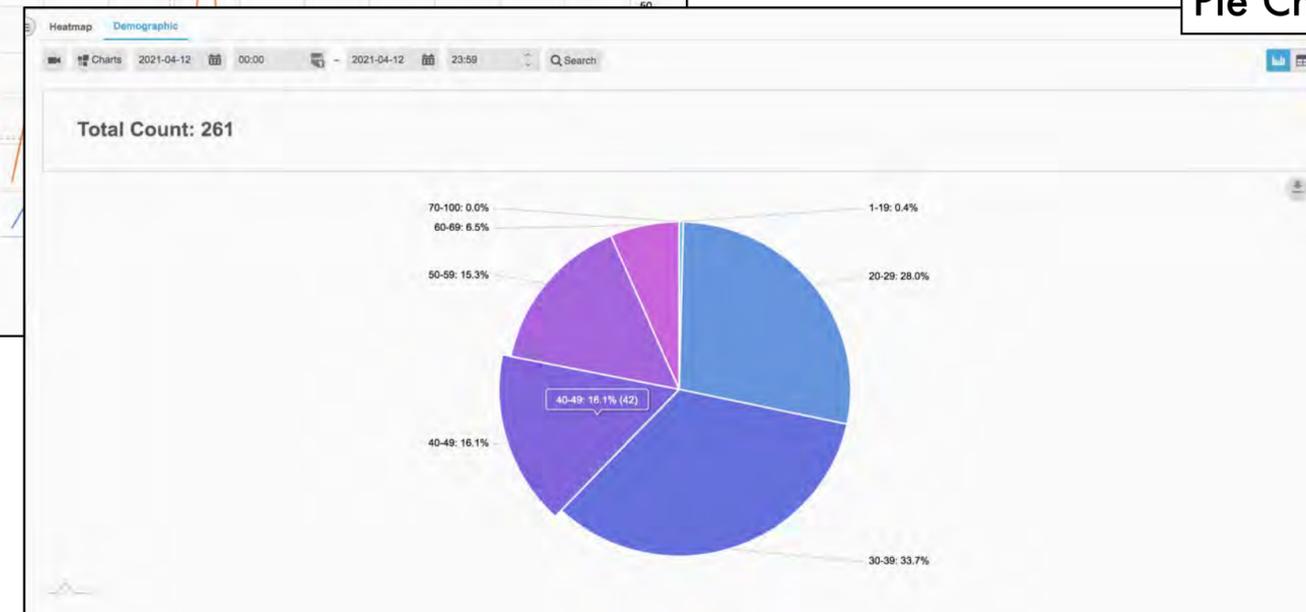
Click to download in .png or .pdf format

Pyramid Chart

Pie Chart

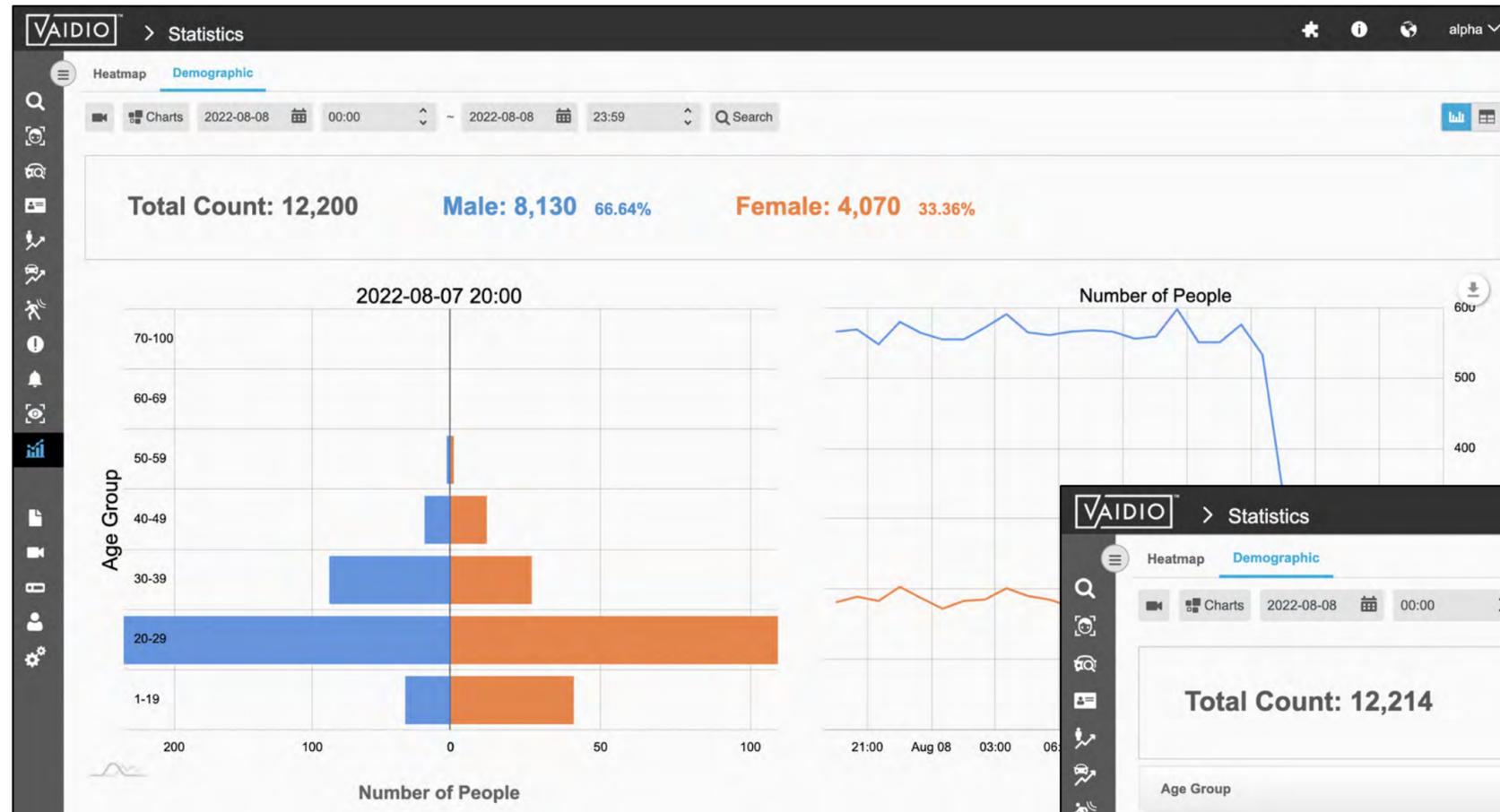Return to Statistics

DEMOGRAPHIC CHART TYPES

Click to display data as a list

Click to export data in .xlsx format

![AICUDA TECHNOLOGY logo]

THANK YOU

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