



Intelligent Video Analysis



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COMPANY OVERVIEW

TVT Digital Technology Co., Ltd is a fast-growing CCTV equipment manufacturer, established in 1999. In the past years, we accumulated rich knowledge of know-how in video compression, hardware design and software development.

TVT has been growing up as a total solution developer and manufacturer, offering unique products including full range IP camera and NVR, HD SDI DVR and camera, DVR and cameras, mobile DVR, Accessories, software solutions such as CMS, cell phone applications, and browser applications. To keep the advantage in innovation and quality, TVT keeps reinvesting more than 10% of its sales turnover into R&D annually. We have 200 talented engineers, more than 60% of which with more than 3 years in TVT. We keep hearing the voice from our customers, and make customer's requirement true step by step by professional demand management and R&D planning management. So we are able to deliver customer the world's latest technology several months earlier than most of competitors with reasonable price and reliable quality.

TVT is committed to enhance the security and safety of people's life and assets. Till now, customers in more than 120 countries have been benefited by distributing, installing or using TVT's reliable CCTV products.



2004
The company is formed



20+
Domestic branches



1000+
On-the-job employees



80000
Production base area

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Installation Requirement

This series of network cameras support a lot of smart alarm function, such as object removal detection, exception detection, line crossing detection, region intrusion detection, crowd density detection, people intrusion detection and object counting.

For enabling the above-mentioned alarm function, please meet the following installation requirement.

- ① Cameras should be installed in settled places, lest too much shaking affects the accuracy of detection.
- ② Avoid the reflective surfaces (like shiny floors, mirrors, glass, lake surfaces and so on).
- ③ Avoid narrow or too much shadowing monitoring places.
- ④ Avoid such monitoring scenario - the object color is similar to the background color. For example, a person in white walks in the snow. This will bring poor monitoring effect.
- ⑤ The monitoring images shouldn't have large changes after enabling the smart alarms, or it will result in frequency alarm triggers (for example, the function of auto focus or automatic white balance is automatically enabled).
- ⑥ At any time of day or night, please make sure the image of cameras is clear and with adequate and even light, avoiding overexposure or too dark on both sides. See the following pictures.



1.uneven light,too dark on the left

2.even light

3.Sufficient light

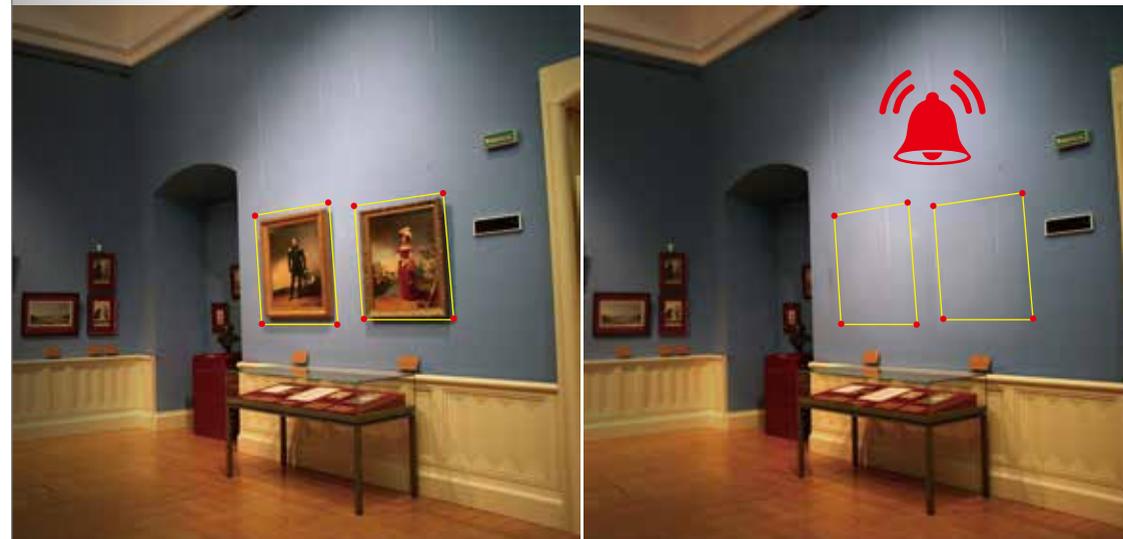
2

Smart Alarm Events

Object Removal Detection

The alarm will be triggered when detecting the objects removed from the pre-defined area.

- ① The range of the detection object occupies from 1/50 to 1/3 of the whole image.
- ② The detection time of objects in the camera shall be from 3 to 5 seconds.
- ③ The defined area cannot be covered frequently and continuously (like people and traffic flow).
- ④ It is necessary for object removal detection that the drawn frame must be very close to the margin of the object in enhancing the sensitivity and accuracy of the detection. See the following pictures.



Application Scenarios: object security, debris flow, illegal parking detection, illegal pasting, illegal doodle, etc.

Exception Detection

This function can detect the change of surveillance environment affected by the external factors and the blur and cast of the surveillance images and some certain actions can be taken when the alarm is triggered.

Detect the exception of the image in the whole surveillance scene, including six kinds of exception events- low light, excessive brightness, low definition, color cast, interference and scene change. See the following pictures.



- ① Low light
- ② Excessive brightness
- ③ Low definition
- ④ Color cast
- ⑤ Interference

Line Crossing/Intrusion Detection

The relevant alarms will be triggered if someone or something crosses the pre-defined alarm lines or areas.



Line Crossing: detect the objects in the visual field and the alarms will be triggered when crossing the alarm lines toward positive or negative direction or both directions.

Region Intrusion: the alarms will be triggered when the objects in the visual field enter or leave the boundary of the area.

Installation requirement

- ① Avoid the scenes with many trees or the scenes with many illumination changes (like many flashing headlights). The ambient brightness of the scenes shouldn't be too low, because dimly lighted scenes will decrease the accuracy of the alarm.
- ② Cameras should be mounted at a minimum of 2.8 meters.
- ③ The mounting view angle of the camera tries to keep about 45°.
- ④ The detected objects accounting for the proportion in the whole image should not be less than 1% and the largest sizes of the detected objects accounting for the proportion in the whole image should not be more than 1/8.
- ⑤ Make sure cameras can view objects for at least 2 seconds in the detected area for accurate detection.

Inapplicable Scenes

The accuracy of the intelligent video analysis is closely related to the complexity of the scenes. The following scenes are not applicable for intelligent video analysis, which will decrease the accuracy.

① There are many trees in the monitoring scene. This circumstance is complex. When it's windy, the swaying branches of trees will cause interference. As a result, smart alarm function is inapplicable.



② Scene with too low brightness



③ Scene with light changing frequently



④ Small mounting angle of depression (it is not available for line crossing and region intrusion detection)



Application Scenarios:

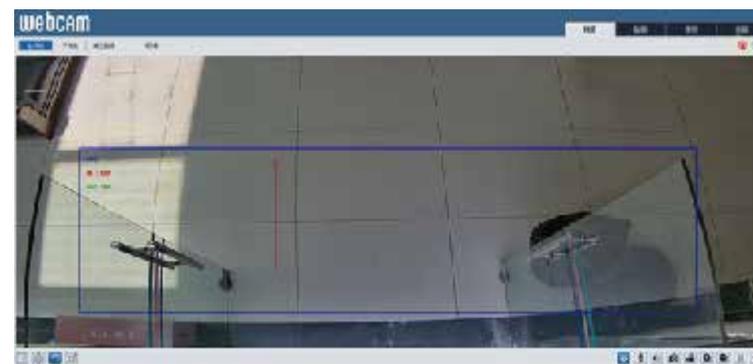
Region Intrusion: this function can be applicable to important supervision places, danger areas and prohibited areas, like military administrative zones, house breaking, scenic high danger areas, no man's areas, etc.

Line Crossing: it can be used in electronic fence, warning line of flood prevention, parking lots, traffic instruction, etc.

People Counting

1.Features

Count the quantities of the bidirectional people flow in the detected areas by detecting, tracking and counting the head shape of the people. The counting data includes the number of entering people, exiting people and remaining people. See the following picture.



Before start, you shall go to the WEB client of the camera (Config-Event-People Counting) to set the threshold value of entering people, exiting people and remaining people.

The alarm number of access	500
The alarm number of leaving	500
The alarm number of retention	500

Any pre-defined threshold value surpassed (the default value is 500; the maximum value is 655350), the alarm of the camera will be triggered.

When people pass the detected area with the flow, it will take 1 ~5 seconds to complete the detection of people counting due to different scenes.

2.Installation requirement

Location Requirement: Cameras must be installed in the area with stable and adequate light sources.

Background Requirement: The background color (like floor color) of the installation shall be light color.

Requirement of Installing Angle: The lens of the camera shall be adjusted straight down, allowed a little bit incline but the whole head must be captured. See the following picture.



Height Requirement: The camera height of installation depends on the actual focal length of the lens. The main hallway of the people flow (hereinafter referred to as “hallway”) shall take up over a half of the width of the whole picture and the head of the people shall be about 1/5 of the height of the whole picture. Reserving certain space on both sides makes the hallway lie in the center of the whole picture.

Refer to the following picture.



The recommending height of installation as shown below:

Lens	Mounting height
2.8mm	2.6 ~ 3.2m
3.3mm	3.0 ~ 4.0m
3.6mm	3.3 ~ 5.0m

3.Drawing Requirement of the Detection Area

The detected area must be larger than the width of the hallway, left a certain distance from the edge of the picture (the width of the undetected areas shall occupy 4%~10% of the whole picture). The direction of detection shall be conform to that of the hallway as shown in the picture above. The area drawn Blue box is a detection area. The head size of the figure (width or height) shall account for 1/5 ~ 1/2 of the drawn detection area. The direction of the red arrow is the direction of detection. The direction along with the red arrow is entrance direction and the opposite direction of the red arrow is exiting direction.

3.Inapplicable Scenes

- ① More than two directions of people flow
- ② There are many unstable light sources in the scene. Various changeable lights are easy to cause misinformation.



- ③ There are dark floors in the scene.

4.Effect Factors on the accuracy of counting

Light Conditions: various changeable lights will disturb the people counting and the darker scenes will reduce the accuracy of counting.

Height of Installation: If the camera is installed in a higher place, the head feature will not be traced completely due to too little proportion of the head of the figure in the picture.

Moving Speed of Figures: If the figure is moving at a high speed (passing the detected area within 2 seconds), it may result in detection failure. If the figure is moving at a low speed, staying more than 15 seconds in the detected area, the camera will give up tracing.

Cloth Color of Figures: if the cloth color of the people is similar with the color of the background, it may cause detection failure.

Headwears of Figures: More headwears probably conceal the head features, which will lead to detection failure.

Crowd Density Counting

1.Functions

This function detects the density of the walking people in a specified area (square, supermarket) and evaluates the level as shown below.



You shall set the threshold of density alarm beforehand by going to web client-Config-Event-Crowd Density detection.



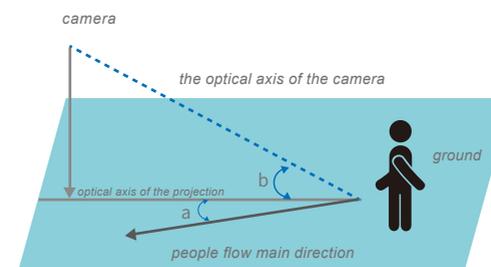
When the level of density exceeds the pre-defined threshold, the alarm will be triggered and some measures will be taken.

People moving in the detected area, the camera will evaluate the level of people density within 1 to 2 second(s).

2.Installation Requirement

Scene Requirement: There are stable and adequate light sources and visible people in the scene. Low contrast and dark environment will cause counting deviation. Various changeable lights can also give rise to more false detection.

Requirement of Installing Angle: The lens direction of the camera shall be the same with the direction of people flow, allowed a little bit incline. The direction of the people flow shall be less than 45° (a) from the horizontal. It is recommended that the angle between the lens of the camera and the floor shall be between 30° and 60° (b) as shown below.



Height Requirement: The size of a single person of the people flow shall take up between 1% and 5% of the whole picture. Now, the height of the figure occupies from 1/5 to 1/2 of the whole picture.

3.Inapplicable Scenes

① There are lots of trees and billboards in the detected area.



② There are various changeable light sources.

③ There are many moving objects except human shape, like moving car.

Note: This function cannot calculate the crowd density accurately. It just can roughly detect and evaluate figures in the detected area.



People Intrusion Detection

1.Function

This function is specially designed for the use of indoor scenes. It is mainly used to detect whether someone breaks into the scenes that should have no people. To prevent someone from intruding indoor to endanger the family security, the alarm will be triggered if someone enters into the detection area in 3~5s.



2.Installation requirement

- 1.The detection area should have stable light and adequate lighting with less illumination changing.
- 2.For detecting moving people or objects in the whole detection area, the height of the installation had better be 1~3m.
- 3.To make sure the camera shoots all the indoor scenes, the camera lens should be to the detected direction and the camera had better be installed in the corner.
- 4.The proportion of the detection people occupies from 1/5 to 1/2 of the whole picture.

3.Inapplicable Scenes

- ① The false alarm will be triggered if the indoor scenes have cluttered and frequently changing lights.
- ② With family members in the house, it is no need to enable this function.
- ③ Outdoor scenes