

Presenter

Rami Segal

Company

Dr. Frucht Systems Ltd.

Expertise

Outdoor video analytics

Video Solutions

Analog & IP Cameras

Perimeter Sensors

Command & Control

Integration

Experience

Mr. Segal was the head of the video division in Magal Security Systems Ltd. Along the years I became an expert in outdoor perimeter protection. And especially in Video analytics. My regular activities was to combine between fence sensors and video sensors for outdoor perimeter site protections.

Why Thermal Cameras & Video analytics are not suitable for High end Perimeter Security Applications

Abstract

Video Analytics enhances video surveillance systems by performing the tasks of real-time event detection, post-event analysis and extraction of statistical data while saving manpower costs and increasing the effectiveness of the surveillance system operation.

The automatic detection by day/night or thermal cameras (Video Motion Detection – VMD or Intelligent Video analytics - IVA) can do the job for most of the time but it can be easily penetrated by a well-trained intruders during specific daytime and seasons.

Thermal cameras are a very useful device for surveillance when there is a man in the loop. An Automatic detection system should not rely on staring thermal cameras because of their build-in blind situations.

Inherent Video analytics issues

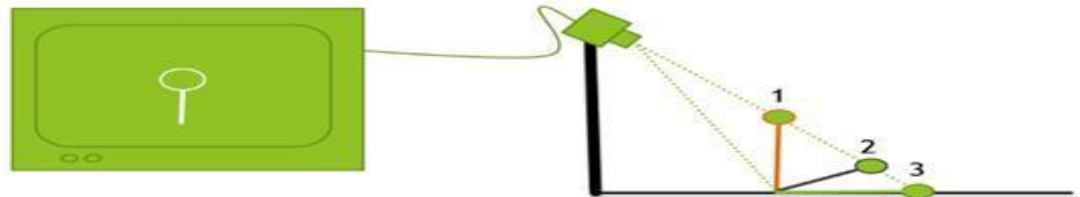
The automatic detection by day/night or thermal cameras (Video Motion Detection – VMD or Intelligent Video analytics - IVA) is based on analyzing the picture of the environment.

The classical VMD is very sensitive to car lights, shadows and clouds because the process is based on 2D picture while the world is 3D. There for the VMD can't distinguish between shadows and persons.

Obviously, this two dimensional picture do not represent properly the three dimensional world but only its projection on a plane. The “compression” of the three-dimensional world to a two-dimensional one does not allow assessing the depth of the object. This can cause, for example, that a fly on the camera lens, to appear on the picture plane, as a target.

Another major problem is that VMD cannot truly restricts detections to its Region of Interest (ROI). When an object move outside the ROI but its shadow is inside the ROI the VMD generate false alarm.

VMD - Shadow and Target detection



ROI

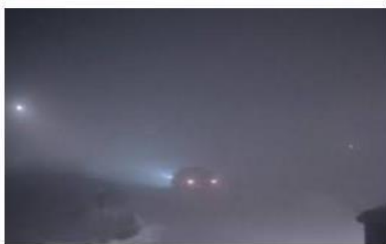


Cameras in general suffer from poor visibility during bad weather conditions. This fact reduce dramatically the VMD probability of detection. This fact help to the sophisticate intruder to take advantage on it and to try to penetrate especially during those times.

Weather conditions



Rain



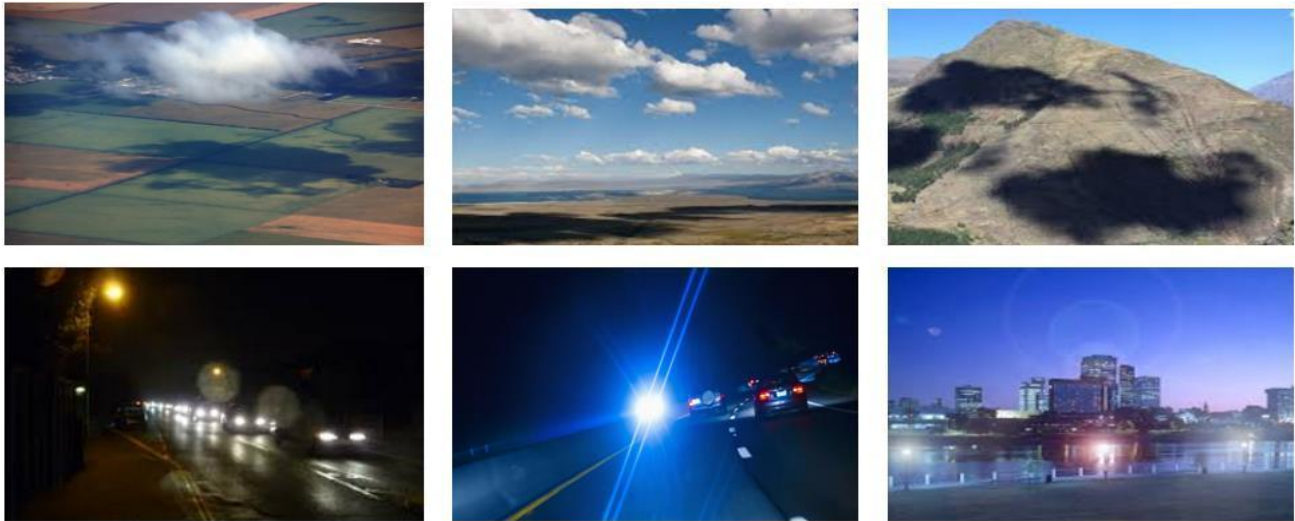
Fog



Snow

An additional VMD drawback is that changes in the illumination due to clouds, moving shadows can be taken as targets.

Clouds Shadows and Cars lights



For example let's examine a very common scenario. Let's assume the task of securing a fence of a plant which is in the vicinity of a road. Along the road there are various objects such as trees, pools etc. During night the lights of the vehicles moving on the road create moving shadows of the trees, pools etc. On the picture plane those moving shadows will be taken as intruders, thus generate false alarms. If the Detection Algorithm will discriminate the moving shadow, it will not be able to detect human intruder. This typical scenario brings up one of the VMD inherent impediments.

Misleading Thermal Cameras solution

Some of the above effects can be reduced by using the Thermal Cameras. Those cameras detect the difference in the temperature between the target and the environment. During most of the day the difference between the temperatures are significant.

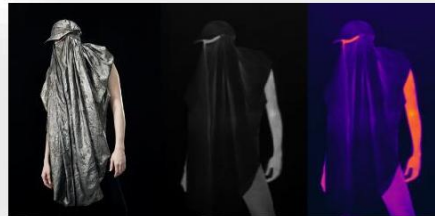
The picture which is produced by thermal cameras is different and of a lower quality than those of the day/night cameras and they request a well-trained operator to operate them 24/7 in all whether and changing environment conditions.



Sunset and Sunrise

However, there are times, typically, close to midnight or noon time, when the environment and the objects are almost of the same temperature and the Thermal Camera is not able to differentiate between the target and the environment.

Moreover, if intentionally, any intruder will decide to penetrate he can easily do it by causing artificially that his body temperature become close to the environment. For example, during rain, wait until his clothing is wet enough.



In a similar way he can defeat the Thermal Camera Automatic detection during the hot time. Therefore, this weakness of the thermal cameras provides the intruder with a “key” which enables the penetration.



With thermal cover

Exposing the thermal cover

Various weather conditions, such as fog or heavy rain will diminish the quality of the video and reduce the detection range or create false alarms.



Thermal camera during snow

Thermal camera after rain during sunset