Installing Analytics in the Real World

System integrators agree that deploying video analytics varies project-by-project, requiring careful scrutiny of each site for optimum performance. Outdoor and indoor considerations are case-specific, often mandating nonstandard operating procedures to achieve a working solution.

BY ROSA CHEN

Analytics deployments face common challenges. First, users must specify what rules to apply to which cameras and if the rules are compatible with the camera type and placement. Second, depending on the algorithms chosen, outdoor and indoor considerations must be factored in.

CAMERA CONSIDERATIONS

It is not uncommon for users to request several rules on the same camera, which can result in poor performance, said Daniel Horan, Integrated Systems Specialist, SimplexGrinnell (a division of Tyco Fire & Security). The type of camera and where it is positioned can affect the performance of video content analysis (VCA).

For example, certain algorithms for motion tracking are better positioned at elevated heights, roughly 6 meters. Algorithms for detecting object removal or left behind are better deployed at lower heights, where the object will be larger in pixels. Combining the two on one camera can be a problem, said Justin Schorn, VP of Product Development at Aimetis.

For people counting algorithms, overhead or high angles are important. However real-world users are reluctant to move existing cameras for better angles, due to cost. "We have deployed more advanced loitering and crowd management analytics that were able to function at 75- to 90-percent accuracy, despite not getting the most ideal angle," said Patrick Lim, Director of Sales and Marketing at Ademco.

Advanced algorithms today have higher tolerance for imperfect angles, but the basic VCA system still demands some adjustment, or accuracy can be compromised up to a low 30- to 40-percent, Lim said.

Cameras must be appropriate for the application. For example, users should not expect to recognize license plates in the dark with a camera that is not IR-enabled, said Rustom Kanga, CEO of iOmniscient. "On freeways, this application would also require a camera with fast shutter speed. Unfortunately, users often select cameras and other equipment that are appropriate for general manual surveillance, but might be completely unsuitable for automated surveillance."

▲ Headlights of a moving vehicle, coupled with the speed of movement, and the size and shape of shadows can be similar to a person or a group of people. This makes it difficult for analytics to make a distinction.

OUTDOOR PERFORMANCE

Outdoor performance has improved with different tactics. Employing sophisticated background options, adding more processors or using dual sensors tackle environmental obstacles such as weather, lighting, and other nuisances.

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VP of Product Development at Aimetis

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Director of Sales and Marketing at Ademco

Ulf Holmstrom
CEO of UTS

"Traditional video motion detection carries an inherent flaw — it assumes that any pixel change is significant. This is where the issue of outdoor performance becomes challenging," Schorn said. The movements of people, wind, rain, shadows and light reflections can cause pixel change. Traditional motion detection will alert on all changes, creating an unmanageable number of false alarms.

More sophisticated analytics can filter out irrelevant pixel changes, backed by improved background options. "Complex background models require more processing power, but will reduce false alarms," Schorn said. For example, layered parameters can ignore swaying tree branches or other repetitive movements.

Increasing processing power is another option. "Our cameras have five onboard processors. Four are dedicated to cleaning up imaging problems associated with outdoor environments, which would otherwise cause false alarms, and the fifth runs the analytics," said John Romanowich, CEO of SightLogix. Without effective image processing, the alternative would be to lower the system's sensitivity, which is often unacceptable for outdoor applications.

Many false alarms are caused by small animals and blowing debris. Geo-registered analytics can measure an object's position, size, velocity and bearing, and filter out

these nuisances while detecting an intrusion, Romanowich said.

EXTREME WEATHER

Extreme weather changes, such as torrential rain, snow or fog, challenge VCA systems. "The more intelligent systems perform quite well, even under conditions of heavy snow," Lim said. "In such cases, it is difficult for the human eye to see a car, but advanced analytics are capable of this detection."

In subzero or blazing temperatures, heat dissipation becomes a bigger concern for edge devices. Edge devices have more components than standard devices, making them more sensitive to temperature differences. "We have tried a few types of embedded devices for moist and extremely hot weather, but so far the results are not encouraging," Lim said. "The alterative is to design enclosures to cool the camera, but that is complex and costly."

Weather can cause false alarms in indoor scenarios, where there are large glass windows and doors. Variable lighting and shadows change the scene, Schorn said.

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Pauline Marin
Marketing Manager of Keeneo

Nicolas Jdanoff
Sales Director of IPVision (a company of Hymatom)

Rustom Kanga
CEO of iOmniscient

VARIABLE LIGHTING

Lighting is a continuous uphill battle, and arguably, the most trying. "Although some advanced VCA systems can perform in low-light conditions, total darkness is still a big problem. We advise customers, whenever possible, to provide good lighting for optimum performance," Lim said.

Rectifying ambient light includes better camera placement. "When the camera is better positioned, we run the algorithm until we're satisfied," Ulf Holmstrom, CEO of UTS. "If you have poor backlight conditions, you have definite false alarms."

Some vendors mask areas of the image that are bombarded by backlighting and shadows, said Zvika Ashani, CTO and co-founder of Agent Video Intelligence. These blind spots help manage false alarms.

The most difficult scenarios are large areas with bright sun and crowds. In such cases, thermal and megapixel cameras produce better performance. "The heat contrast from the thermal camera will give more accurate interpretations of movement, and the megapixel camera can validate the alarm," Holmstrom said.

INDOOR REQUIREMENTS

Indoor deployments are more controlled environments, but still challenging. The biggest problem is crowd control. Whether for business intelligence or security, crowds represent fast-changing movement and can result in false alarms.

Generally, more activity causes more false alarms. For people counting algorithms deployed in retail, people moving closely increases the possibility of analytics counting two people as one, Schorn said. However, wearing more clothes does not adversely affect accuracy.

Large crowds of slow-moving people who are densely packed affect accuracy, such as at trade shows or concerts. "People counting works best when there is constant traffic flow moving through the camera field of view," Schorn continued.

Ceiling-mounted cameras can improve accuracy. "If you have a camera that counts people from the side, factors such as height differences and being blocked by people standing in front will negatively affect the count," said Pauline Marin, Marketing Manager of Keeneo. Retail algorithms can accurately count a person pushing a trolley.

Most retail applications mount cameras at a 45-degree angle. "The main issue is separating people in a crowd, and in our experience, out of 15 people, analytics deployed under these conditions detected only four," Holmstrom said.

With existing systems, overhead cameras are not preferred, since it requires separate cameras for analytics and monitoring. "Ceiling-mounted cameras will not allow operators to see a person's face, which is a non-negotiable feature of video surveillance," Holmstrom said.