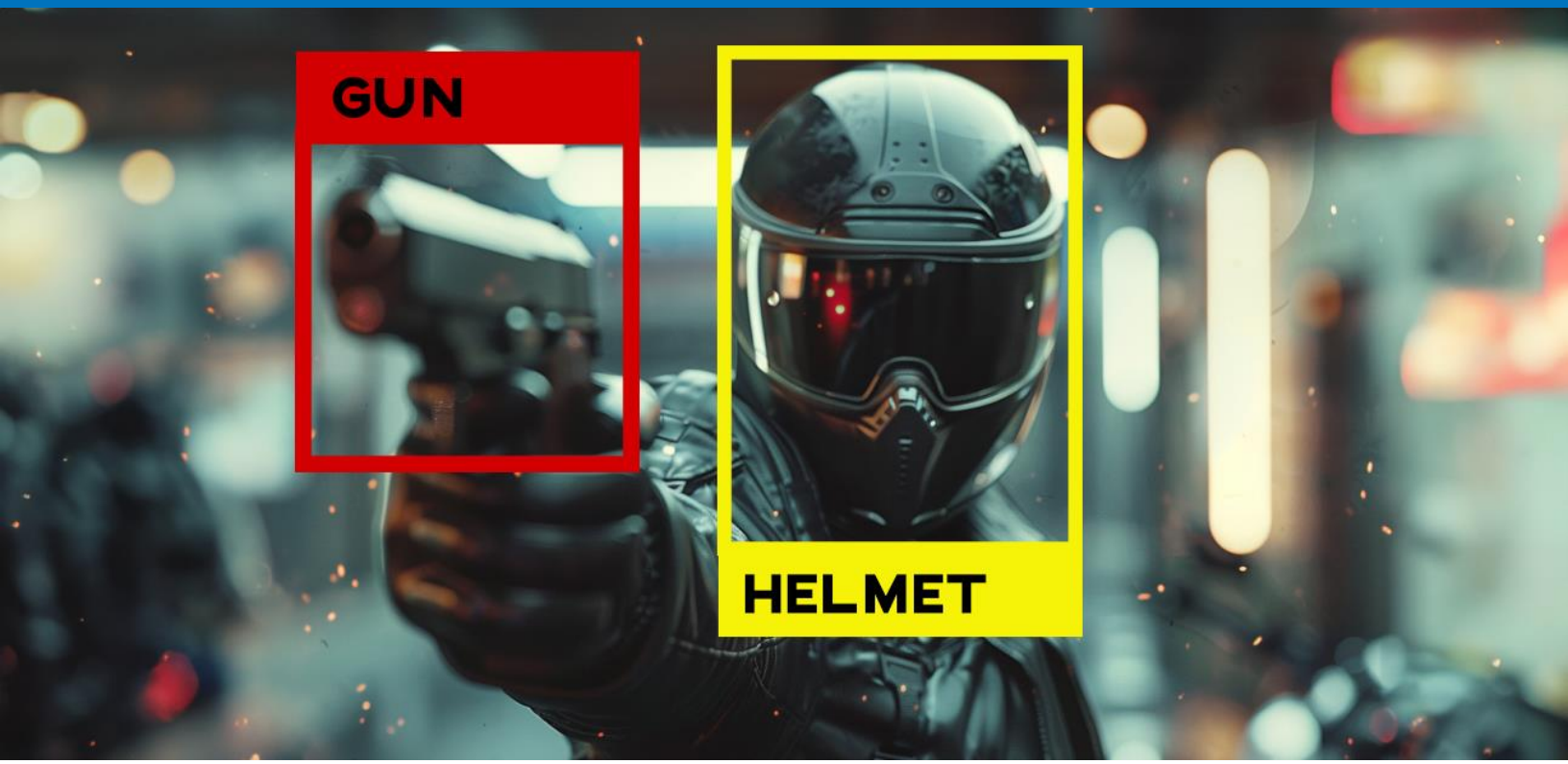
IPXAnalytics
Datasheet

Crime Module



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Crime Module

Compatibility: IPXAnalytics STANDARD, 2.0 or higher.

IPXAnalytics

IPXAnalytics is a software that utilizes artificial intelligence to learn and detect events from surveillance cameras. The artificial intelligence is based on neural networks and LLMs, which are algorithms designed to mimic human brain behavior. Compared to existing video analysis software on the market today, IPXAnalytics significantly reduces the number of false alarms.

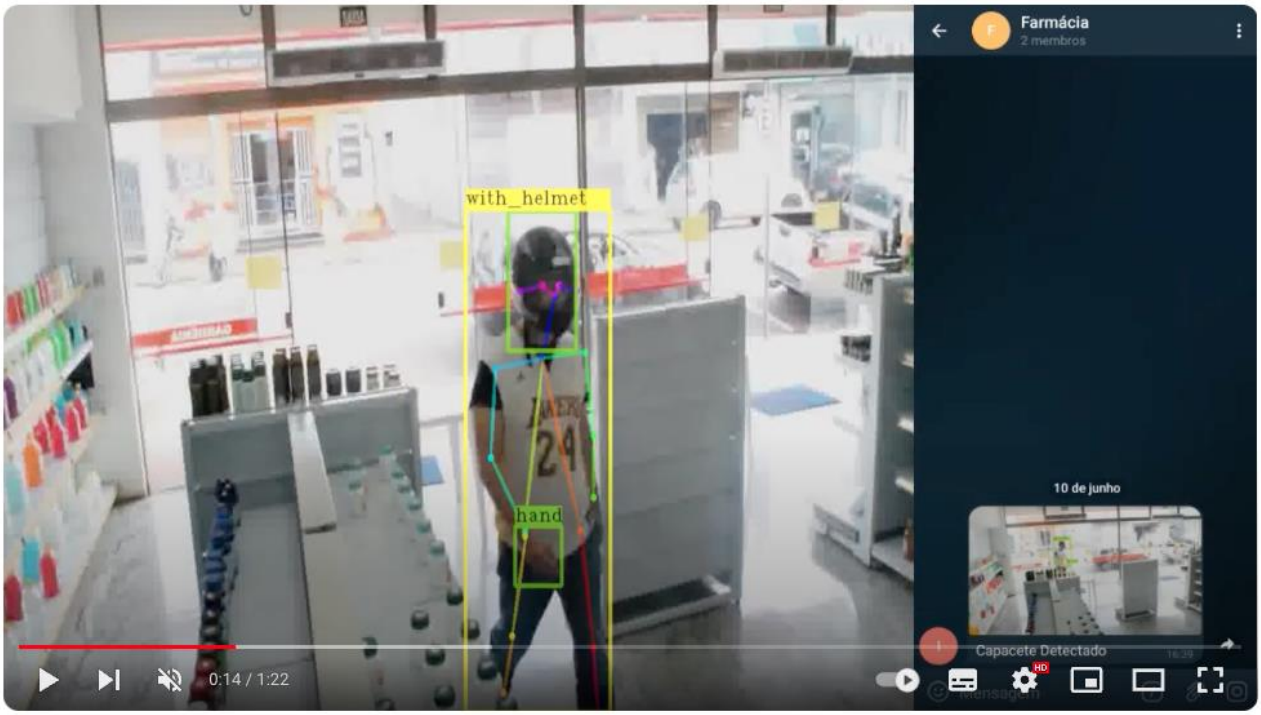
Standard Module for Crime Detection

Our computer vision software is the ultimate solution for maximizing security in critical environments. With real-time analysis capabilities, our technology is designed to detect a variety of potentially dangerous scenarios, providing immediate alerts for rapid intervention.

Implementation Advantages

- **Real-Time Alerts:** Receive instant notifications of suspicious activities, allowing for proactive responses to prevent incidents.
- **Simplified Integration:** Our software easily integrates with partners monitoring systems, ensuring a smooth transition to enhanced security.
- **Flexible Customization**: Tailor the software to the specific security needs of your organization, ensuring a personalized and effective solution.
- **Increased Operational Efficiency:** Reduce response times to incidents and optimize security resources, enhancing the operational efficiency of your team.

Video Example

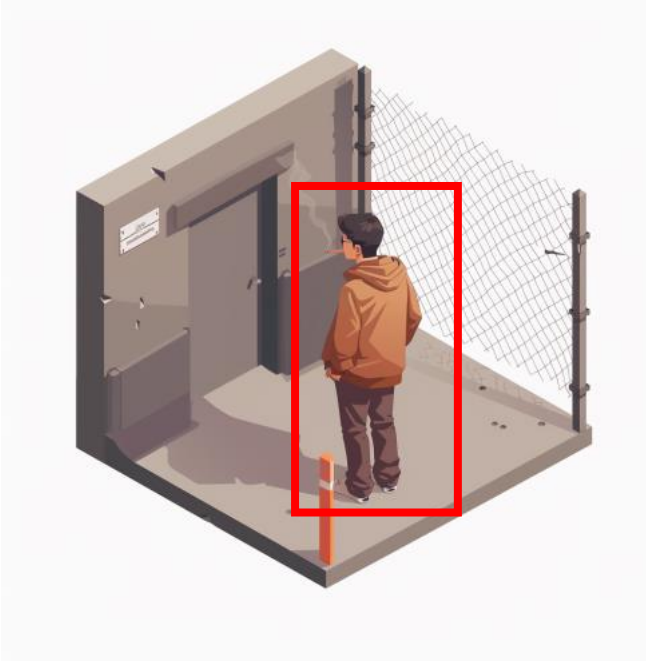


https://www.youtube.com/watch?v=zSnEOjLbIQA

Feature Examples

Person Detection

Identify the presence of individuals in restricted or suspicious areas, ensuring effective surveillance of critical spaces.



Weapon Detection

Automatically recognize the presence of short or long firearms, ensuring a rapid response to emergency situations.

Example:
https://www.youtube.com/watch?v=05PyBDdETqQ

Helmet, Cap, Hat, and Accessory Detection

Identify individuals wearing motorcycle helmets, caps, hats, and accessories in prohibited areas to detect suspicious behavior.

Example:
https://www.youtube.com/watch?v=5gf5cVXi01U

Fight Detection

Instant alerts are triggered when fight activities are detected, allowing for a quick response to prevent larger conflicts.

Example:
https://www.youtube.com/watch?v=lHJUK75Hl_M

Fallen Person Detection

Identify people who have fallen to the ground, enabling an immediate emergency response to ensure their safety.

Example:

https://www.youtube.com/watch?v=5ZiUTN38S_I

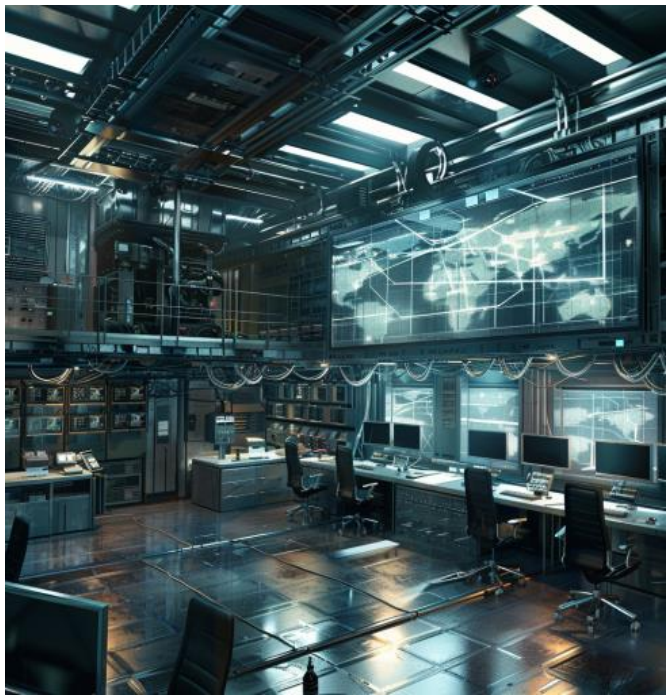
Integration

The software features an HTTP REST API that enables integration with any third-party system. It is also integrated with the leading VMSs in the market: Digifort, D-Guard, Milestone, and Avigilon.

Please check with our team about any additional licenses required for third-party software integrations.

For more information:

www.ipextreme.com.br



Customizations

In addition to the various functionalities mentioned here, the software can also assist in numerous other situations. It is designed to be customized to meet the client's needs. For example, in a production environment, the software could identify errors and critical failures in a specific part.

Limitations and Considerations

We understand the importance of reliability in critical applications. Therefore, it is crucial to note that no artificial intelligence software can guarantee 100% accuracy. Our solution offers robust and rapid detection, but we always recommend maintaining backup systems and additional security protocols to ensure a comprehensive response in emergency situations.

IPXAnalytics offers demonstration licenses, and we recommend selling to the client only after successful tests in the desired environment.

Datasheet

Objects samples and descriptions:

Objects

The Crime Module can identify these objects:

- person
- suspect
- gun
- with_helmet
- cell phone
- hand
- shotgun
- mask
- helmet
- hat
- with_mask
- cap
- fight
- fall
- hands_up
- hood

person

The person object is the primary element in crime detection, enabling the software to track and analyze human behavior. The software detects people based on their legs, arms, and head, even if only the upper half of their body is visible. This is crucial for identifying potential suspects or victims in criminal scenarios.

gun

The software detects small gun object that could be used in crimes. Detection accuracy depends on object visibility and camera, playing a crucial role in identifying threats in real time.

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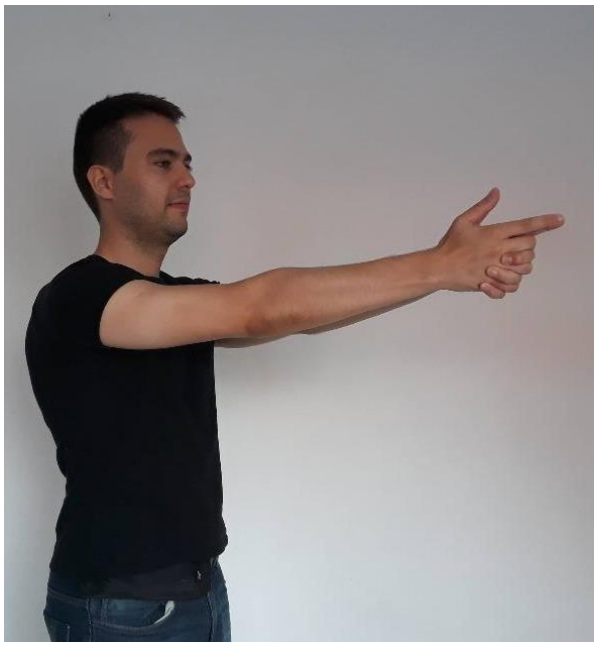
suspect

The system detects the "suspect" based on a specific behavior: individuals with their hands raised, signaling suspicious activity. This behavior is often associated with high-risk situations, such as crimes, thefts, or confrontations, where the individual may be carrying a weapon or suspicious object.



with_helmet

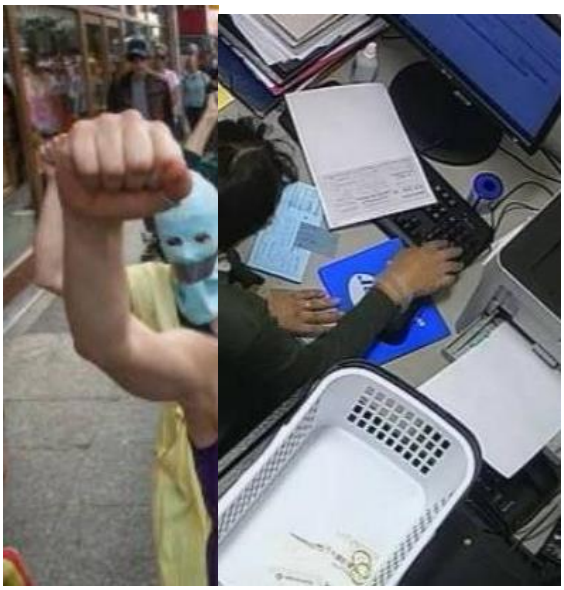
The software detects with_helmet an individual wearing a helmet, specifically identifying the presence of the helmet on the upper part of the head. For optimal performance, it is recommended to use with_helmet in conjunction with contains rule, alongside the helmet object, to accurately confirm the presence of a helmet.

cellphone

The detection of a cellphone, in this module, serves as a counterpart to the detection of weapons like "gun," allowing the differentiation between the use of the device as a communication or distraction tool and the handling of potentially dangerous objects. This helps identify the presence of a cellphone without directly associating it with an immediate threat, such as a weapon.

hand

The detection of the hand, in this module, serves as a counterpart to the detection of weapons like "gun," allowing the differentiation between the simple manipulation of the hand and the handling of potentially dangerous objects. This helps identify movements that do not indicate an immediate threat but may precede the use of a weapon.



shotgun

A shotgun is detected as a high-risk firearm, representing large weapons in general, and differing from general weapon detection. The software analyzes the shape and size of firearms, making it crucial for monitoring armed robbery or active shooter incidents.

balaclava

Balaclavas are often used in criminal activities to fully conceal a person's identity. Detecting a balaclava is crucial in identifying high-risk individuals, especially in cases of armed robbery, burglary, or assaults.

helmet

While helmets are generally used for safety, they can also serve as a disguise in criminal activities. Helmet detection can be used to flag individuals who might be attempting to obscure their identity in security-sensitive areas.

hat

Detecting a hat is useful for suspect identification, as it can be part of a disguise. The system recognizes different hat types based on shape and texture, assisting in matching suspect descriptions.

with_mask

Mask detection is crucial for identifying individuals attempting to hide their identity, a common tactic in crimes such as theft, robbery, or vandalism. The system detects whether a mask is present or absent, helping authorities track masked suspects.

hood

Hood detection helps identify individuals using hooded clothing to obscure their face or head, a common tactic in criminal activities. This detection is useful for tracking potential suspects in surveillance footage.

fight

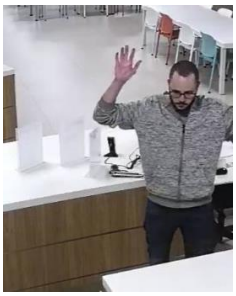
Fight detection relies on recognizing specific poses and aggressive body movements, such as punches, kicks, and grappling actions, which are common in physical altercations. This feature is crucial for detecting street fights, assaults, or disturbances, enabling timely intervention by law enforcement and enhancing security in various environments.

fall

Fall detection is crucial in crime-related scenarios, such as victims being knocked to the ground during a robbery, assault, or violent confrontation. The software detects sudden downward movements and significant changes in body posture, which are indicative of someone being pushed, shoved, or forcibly brought to the ground. This allows for the rapid identification of potential victims in need of immediate assistance. For enhanced accuracy, it is recommended to have a clear horizon line in the field of view, improving the system's ability to detect these critical events.

handsup

Hands-up detection is crucial in law enforcement situations, identifying when a suspect complies with police orders or when a person signals surrender. This detection helps analyze compliance in high-risk security scenarios.



Minimum Recommended Sizes for Detection

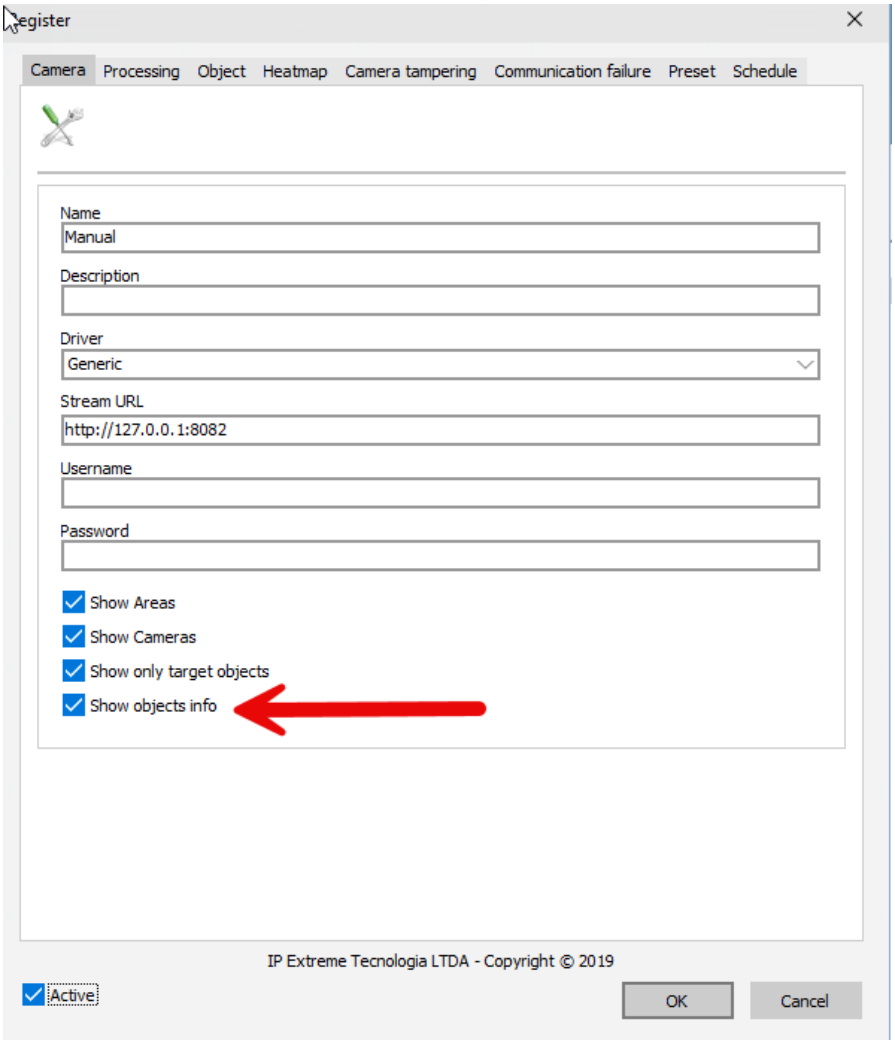
A common question is about the position where the camera should be installed for optimal detection. It is difficult to say with complete certainty because cameras can have different lenses, angles, and zoom levels. The most important factors are the size of the object in the image and its visibility. The table below indicates the minimum recommended object size in the image as a percentage. The percentage refers to the relative size of the object, as there may be various types of resolutions and resizing. So, when we say an object is 1% in size, we are indicating that, for example, in a 512x512 image, the object would be 5.12 pixels by 5.12 pixels. See the next chapter for instructions on how to check the object's size directly in IPXAnalytics.

Object	Minimum percentage for identification	Camera Height
person	5%	1-3 meters
suspect	5%	1-3 meters
gun	1%	1-3 meters
with_helmet	1%	1-3 meters
cell phone	1%	1-3 meters
hand	1%	1-3 meters
shotgun	1%	1-3 meters
helmet	1%	1-3 meters
hat	1%	1-3 meters
with_mask	1%	1-3 meters
cap	1%	1-3 meters
fight	5%	1-5 meters
fall	5%	1-5 meters
hands_up	2%	1-3 meters

How to identify an object size

In IPXAnalytics, it is possible to view the live image in two ways: by using Debug mode or by clicking on Preview in the admin client.

When registering a camera, on the first tab, check the option "show objects info." This option will display the size of each detected object in the image and its orientation (vertical or horizontal).



Examples:

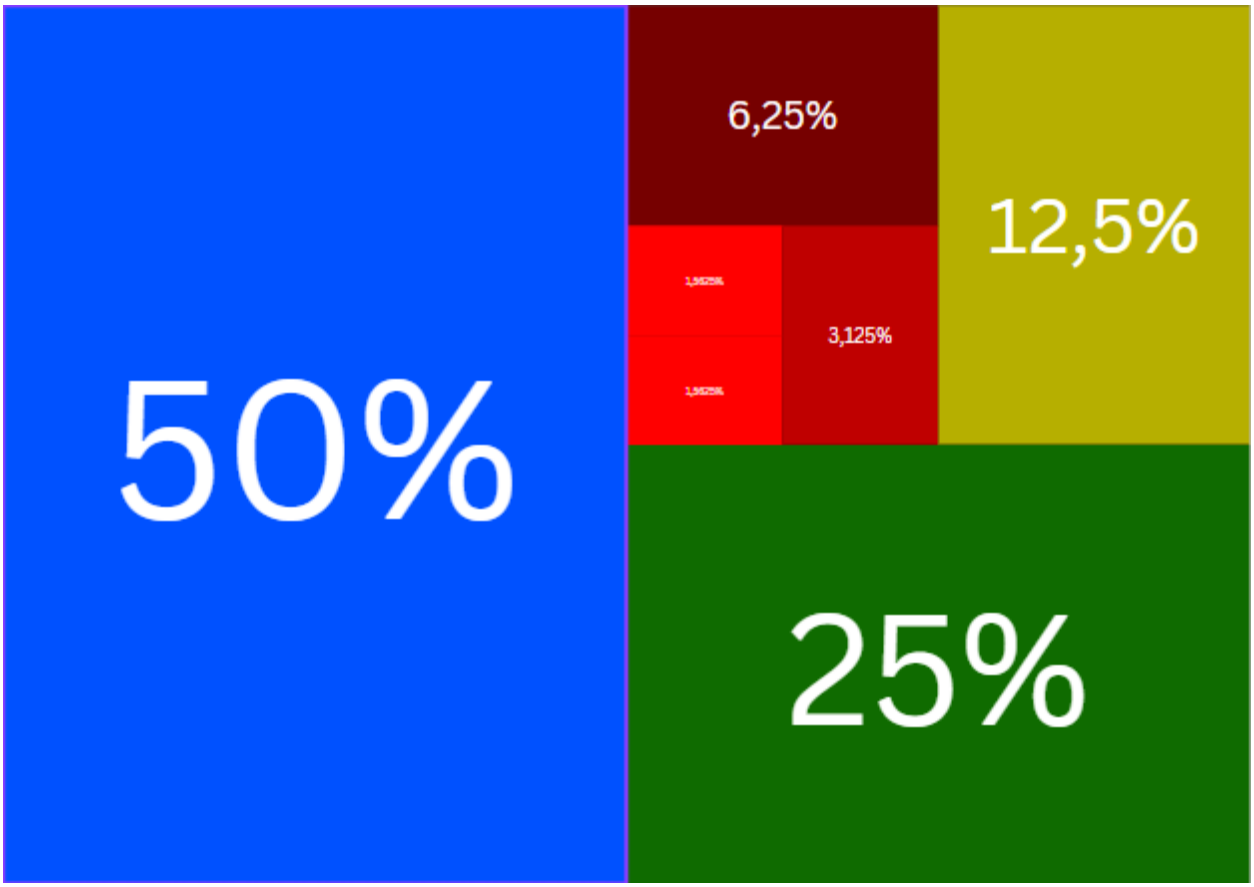
A balaclava detected in the image with a total size of 0.79%.

A gun detected in the image with a total size of 0.48%.

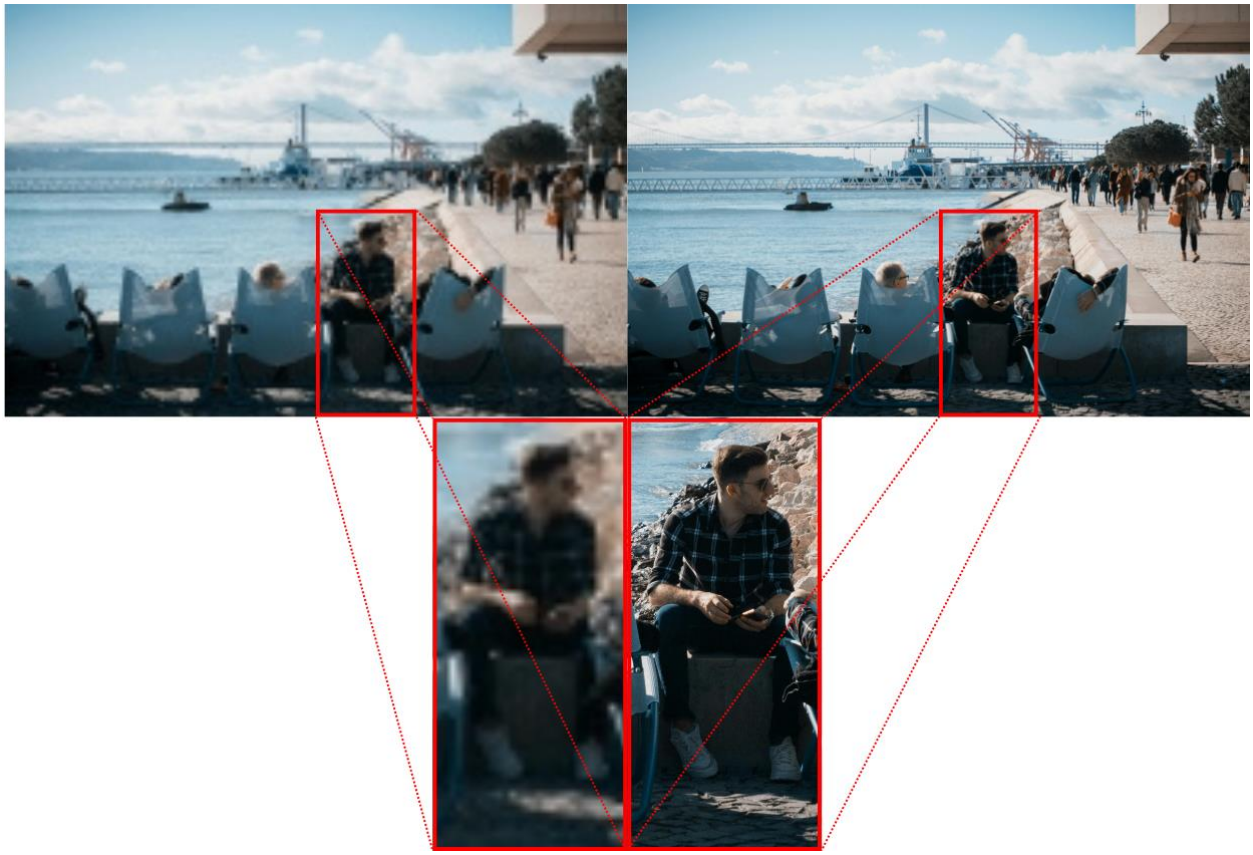
A person detected in the image with a total size of 4.0%.

The image was created to visually illustrate the proportion of an object in relation to the total screen. It divides the space into different percentage areas, making it easier to understand the minimum size required for computer vision software to accurately recognize an object.

Each rectangle represents a specific fraction of the total screen, starting at 50% and successively subdividing each area into halves. This way, the user can intuitively understand how different sizes impact detection and what minimum dimensions are recommended for effective recognition.



Ideal Camera Resolution for Object Recognition

For effective object recognition, camera resolution is essential. The minimum recommended resolution for optimal performance is **512x512**. This resolution provides enough detail for accurate detection and classification while balancing computational efficiency. Higher resolutions, like 1080p or 4K, require more processing power without significantly improving accuracy, and may lead to diminishing returns. On the other hand, lower resolutions can result in blurred or distorted images, making object recognition difficult. Therefore, 512x512 resolution is the minimum ideal for reliable and efficient object detection.

Low resolution vs High resolution comparison: