IPXAnalytics
Datasheet

Heads Module

IPExtreme

Content

Heads Module

Compatibility: IPXAnalytics PRO, 2.0 or higher.

IPXAnalytics

IPXAnalytics is a software that uses 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 the behavior of the human brain. Compared to existing video analytics software on the market today, IPXAnalytics significantly reduces the number of false alarms.

Heads Module

Our Head Detection Module was developed with a focus on ensuring accurate people counting in busy environments. Using advanced computer vision algorithms, the system performs head detection, offering a high degree of assertiveness.

Key highlights include:

- **Head Detection:** The module is specialized in identifying, maintaining counting accuracy at levels higher than traditional methods.
- **Counting with Crossing Line Algorithm :** By defining virtual lines in the environment, the system accurately counts the number of people crossing a certain point. Ideal for controlling flow, entries and exits.
- **High precision in high-traffic areas:** Whether in factories, stores, events or public transport, the module stands out by maintaining accurate counting even with high volumes of movement.
- **Integration with monitoring systems:** The Heads Module can be integrated with partner VMS or platforms such as IPXMonitor , allowing data to be cross-referenced with other operational metrics and behavior analysis.

Benefits:

• Accurate people counting;

• Reduction of errors in environments with a large volume of individuals;

• Improvement in flow control and occupancy analysis ;

• Applicable in different sectors: retail, security, transportation, events, etc.; •

Real-time data for strategic decision-making .

Feature Examples

head

The head object is the central element of the Heads Module. The software is capable of detecting heads, ensuring a more reliable count. This accuracy is achieved through algorithms trained to **identify** characteristic shapes and positions of the top of the head, allowing for more stable tracking of individuals in dynamic environments.

person

The person object represents the complete structure of the body and is used as a complement to ensure that the head detection corresponds to a person. This combination allows the system to validate the count with greater accuracy, especially useful in **cases** of multiple people grouped together or partially hidden by obstacles in the environment.
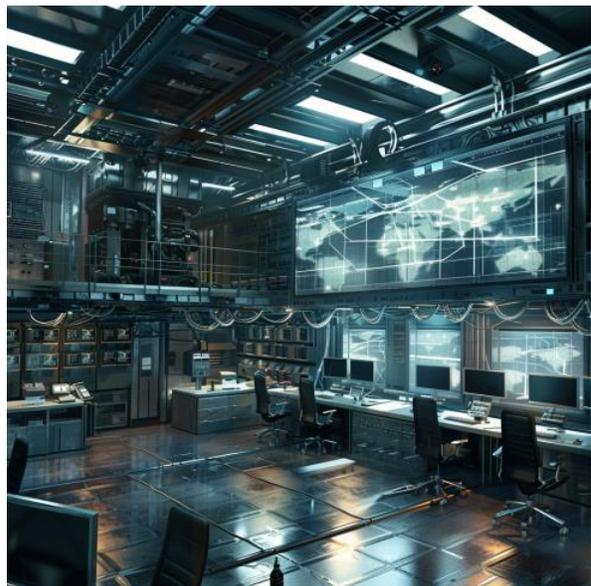
Integration

The software has a REST HTTP API that allows integration with any partner system. It is also integrated with the market-leading VMS: 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 features mentioned here, the software can also assist in numerous other situations. It is designed to be customized to meet the customer's needs. For example, in a production environment, the software can identify errors and critical failures in a specific part. To request a customization proposal, contact us on our website: www.ipextreme.com.br .

Limitations and considerations

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

IPXAnalytics offers demo licenses and we recommend selling them to the customer only after successful testing in the desired environment.

Technical Sheet

Examples and descriptions of objects:

Objects

The Fatigue Module can identify these objects:

- head
- person

head

The head object **is the main element used to ensure accurate people counting, even in crowded scenarios. By detecting**
the top of the head, the system efficiently tracks each individual, significantly increasing the accuracy of the count compared to methods based solely on the entire body. Ideal for environments where there is a lot of movement or people close to each other.

person

The person **object** serves as a complementary validation to head detection. It represents the complete figure of an individual in the field of view. The union between the head and person objects allows the platform to confirm the presence of real people, eliminating possible duplications and reducing false positives in the count.

Recommended minimum sizes for detection

A common question is about 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 recommended minimum size of the object in the image as a percentage. The percentage refers to the relative size of the object, as there can be different types of resolutions and resizing. So when we say that 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 size of the object directly in IPXAnalytics .

Object	Minimum percentage size for identification	Camera height
head	0.5%	2.5-5 meters
person	3%	2.5-5 meters

Camera Positioning

For the Heads Module to achieve maximum accuracy in people counting, the camera must be installed on the ceiling, positioned slightly in front of the counting point, with a maximum inclination of 30° in relation to the vertical. This angle allows an efficient overhead view, reducing overlaps between individuals and increasing counting accuracy.

It is recommended that the camera be able to visualize the flow of people before and after the counting point. This margin ensures that the system can track the complete movement of individuals, improving detection and avoiding counting errors.

Technical recommendations:

Ideal height: according to the ceiling height of the location (2.5-5m)

Angle: Installed on the ceiling with a maximum inclination of 30° in relation to the vertical

Coverage: adjust lens to view the flow of people before and after the counting point.
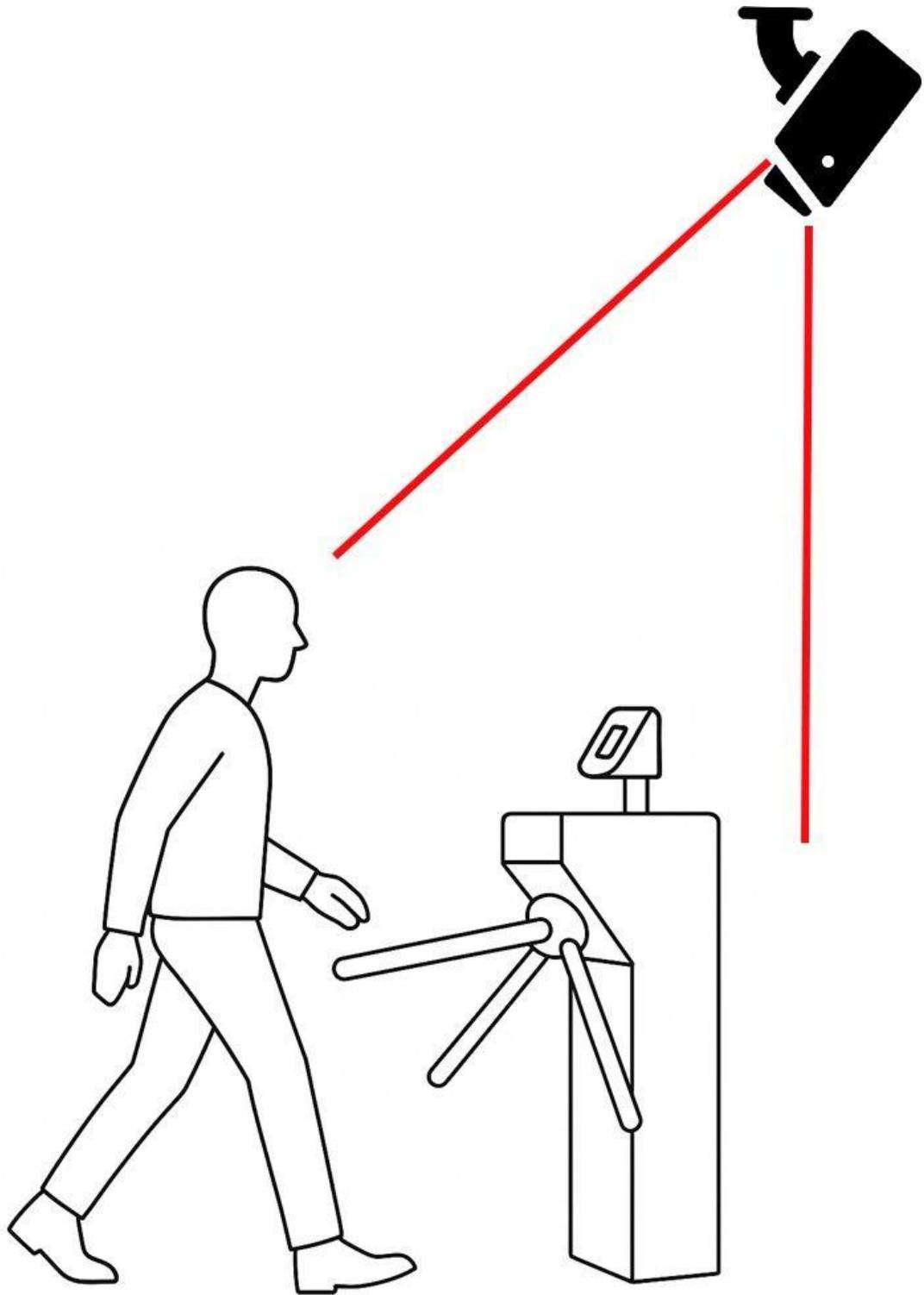
How to identify the size of an object

In IPXAnalytics , you can view the live image in two ways: using the debug mode or clicking View in the admin client. When registering a camera, in the first tab, check the "show object information" option. This option will display the size of each object detected in the image and its orientation (vertical or horizontal).
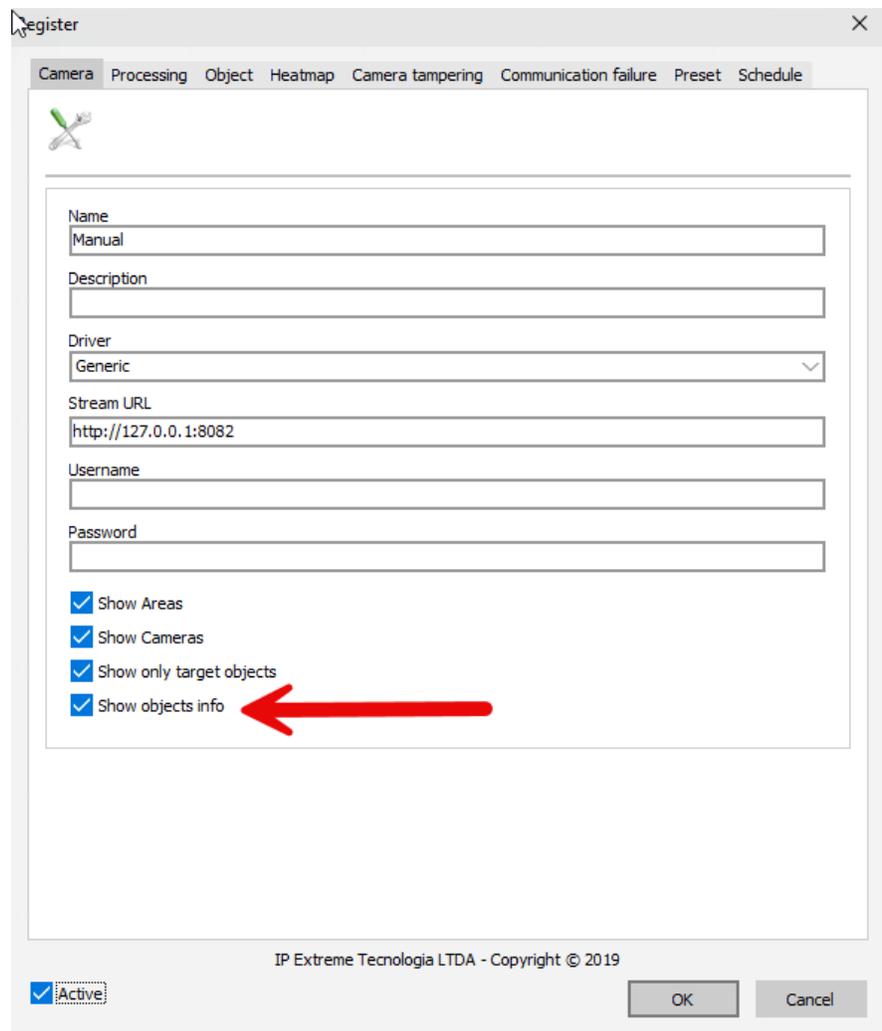
Examples:

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

Helmet detected in the image with a size of 0.69%.

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 affect detection and what minimum dimensions are recommended for effective recognition.
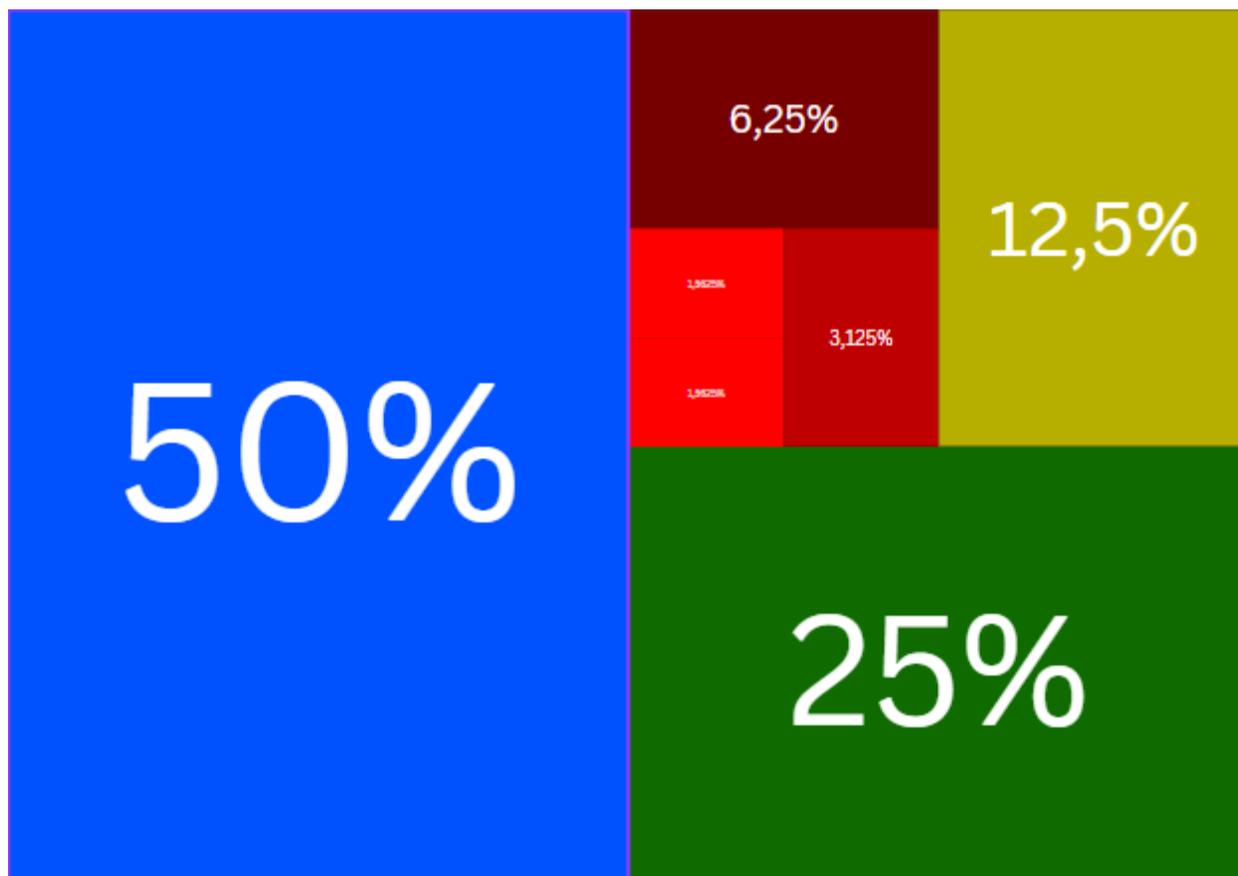
Optimal camera resolution for object recognition

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, such as 1080p or 4K, require more processing power without significantly improving accuracy and can lead to diminishing returns. On the other hand, lower resolutions can result in blurry or distorted images, making object recognition more difficult. Therefore, a resolution of 512x512 is the ideal minimum for reliable and efficient object detection.

Low Resolution vs High Resolution Comparison: