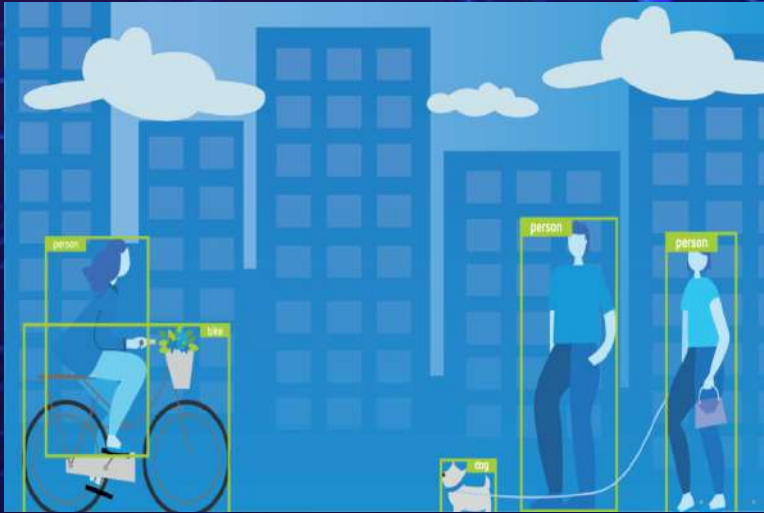




Artificial Intelligence

Computer Vision
Recognition of Objects
Alerts & Analytics

Object Recognition and Tracking



Object recognition in computer vision is the task of finding and identifying objects in an image or video sequence. The above with the idea of imitating the human being in the recognition of a multitude of objects in images with little effort, despite the fact that the image of the object may vary a little in different points of view, in different sizes or scale and even when they are translated or rotated.



Our Solutions with AI Scenarios

[illegible]

```
0: 640x640
cheetos pink 2
chipsfuego 1
chipsjalapeno 3
chokis 2
crackets 5
cupnoodlespollo 3
doritosnacho 2
fritos 2
jumexclarificadomanzana 3
jumexdurazno 5
jumexmanzana 4
minibarritas 2
paketaxomenolanito 1
petaloservilletas 2
polvorones 2
principeblue 3
rancheritos 7
rolescanela 5
sabritasdobadas 5
sabritasoriginal 3
sanissimotostadas 3
tunyblue 3
tunygreen 3
zucaritasblue 2
```

Products not available



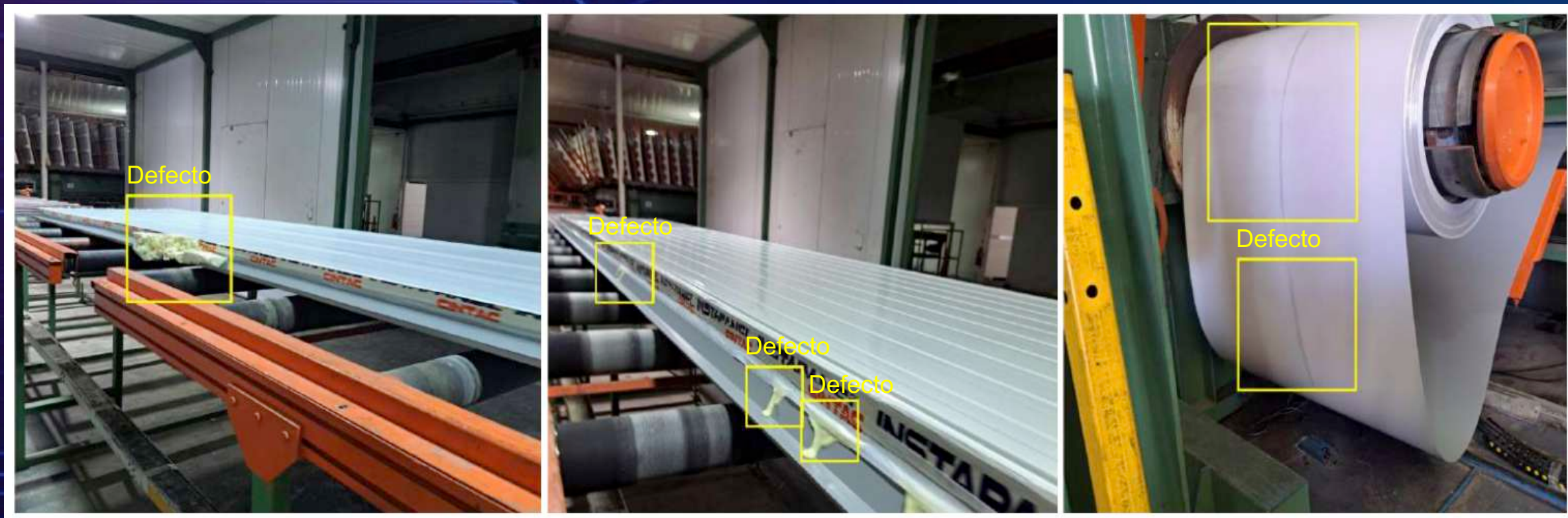
Identification Entry and Exit of Products



Cash payment detection and Box cash opening



Early detection of manufacturing defects o breakdown of machinery



Early detection
of defects in
production



Detection of hygienic elements in production

- Hat
- Mask
- Gloves



Detection of elements Of security

- Helmets
- Lenses
- Vests



Advantages of our AI solutions

- Security Alert
- Product verification and production control
- Avoid economic losses
- Integration with third-party frontends
- PostgreSQL database storage
- Compatible with Metadata Json
- On-premise solution & Low cost



Architecture

Solution Architecture

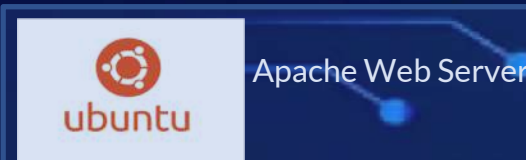
IP cameras pointing to area



Mini-Pc JPG



VirtualBox

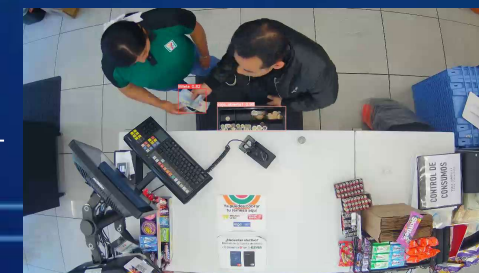


CLOUDFLARE
Tunnel Trust

Connectivity Mobile Broadband USB



Access to Local Frontend
Visualization of alerts



- Send Metadata Json to Third-Party Applications (By Client API)



- PostgreSQL database Storage

Virtual Labeling of Objects



Training and Detection Cycle

The cycle of training, detection and subsequent recognition is given by the following steps:

1. Selection, extraction of frames and labeling of Images (labeling)
2. Export of tagged images
3. Training on Google Colab servers
4. File export with training results for analytics server
5. File import in analytics platform (Backend)
6. Import of photographic frame of camera connected in zone focusing object.
7. Execution of object detection and recognition analysis in cycles
8. Object alert and counting



Analytical Server (Backend)

Multiphotographic training

For object detection training the following tasks are performed:

1. A photographic set of among 20 generated virtually from 1 video frame is used
2. The photo of the object should be in a view similar to the one on the shelf
3. Processing about 100 objects takes about 4 hours to do the labeling.
4. A labeling server is used that allows to select the outline of the object
5. A label (identifying name) is assigned to each object.
6. 2 groups of photo sets are extracted (labeled and without some unlabeled photos)
7. The unlabeled photos of the objects are used to perform the detection tests (automatic)
8. The photos are accompanied by a coordinate file that are uploaded to the Labeling server
9. The training process takes 1 hour

Cloud Server



Progressive photographic training

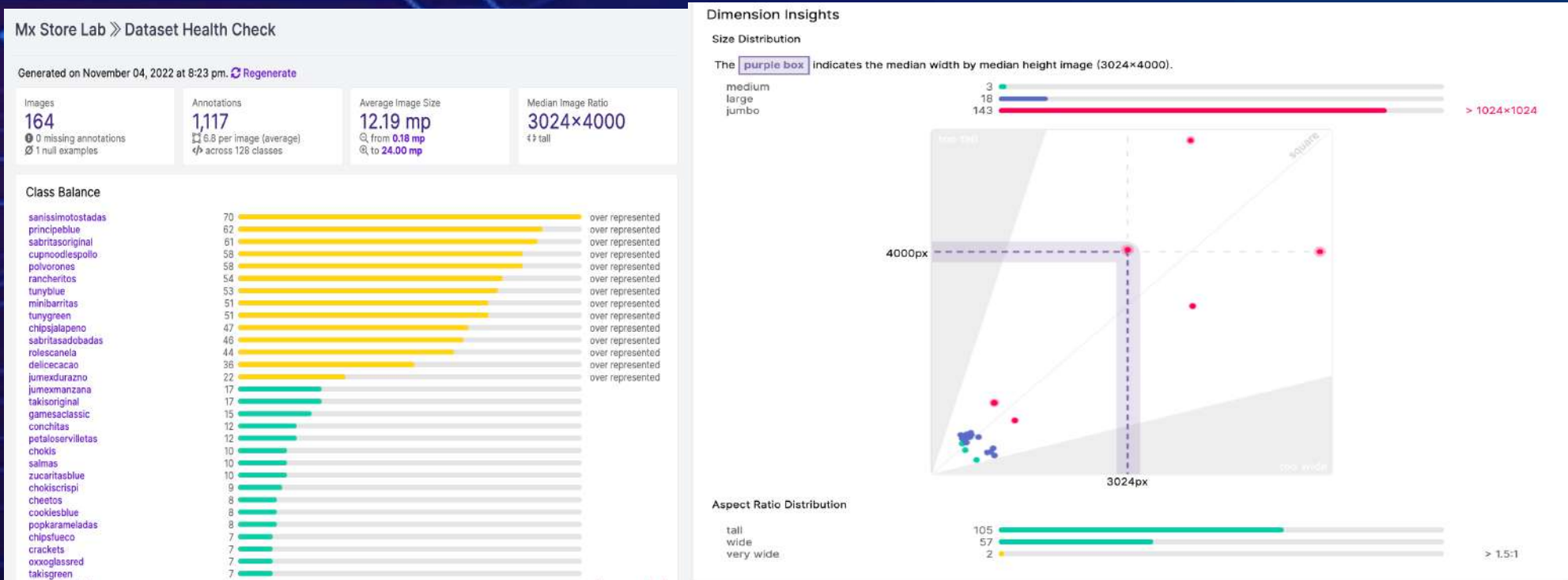
For this type of object detection training the following tasks are performed:

1. A photographic set of 1 photo captured from the frame of the video camera is used
2. The frame corresponds to the camera that is pointed at the shelf
3. The objects are processed by camera, it takes about 1 hour to make the labeling.
4. A labeling server is used that allows to select the outline of the object
5. A label (identifying name) is assigned to each object.
6. 2 groups of photo sets are extracted (labeled and unlabeled some photos)
7. The photos without labeling the objects, are used to perform the detection tests (automatic)
8. The photos are accompanied by a coordinate file that are uploaded to the Labeling server
9. The training process takes 1 hour
10. Advantage: shorter processing time and allows to reduce error margins (no detection)

Cloud Server



Tagged Metrics Report



The background is a dark blue gradient with a complex pattern of glowing blue lines and dots, resembling a circuit board or a neural network. The lines are thin and vary in length, some connecting to small circular nodes. The dots are also blue and vary in size, some appearing as single pixels and others as larger, slightly blurred circles. The overall effect is a high-tech, digital aesthetic.

Results & Tips Object recognition

Web Analytics Results

The object recognition results cycle is performed in the following steps:

1. Mini Analytics PC server connects to zone camera
2. Execution of analytics on frame captured with objects
3. Detection results in dataframe file
4. Detection, recognition and summation of objects
5. Export of photographic results with detected objects to Frontend Server
6. Export of object summation to Frontend Server
7. Sending Results to Third-Party Applications (By Client API)
8. Frontend server shows in web url html, javascript, photography and data



Web Server (Frontend)

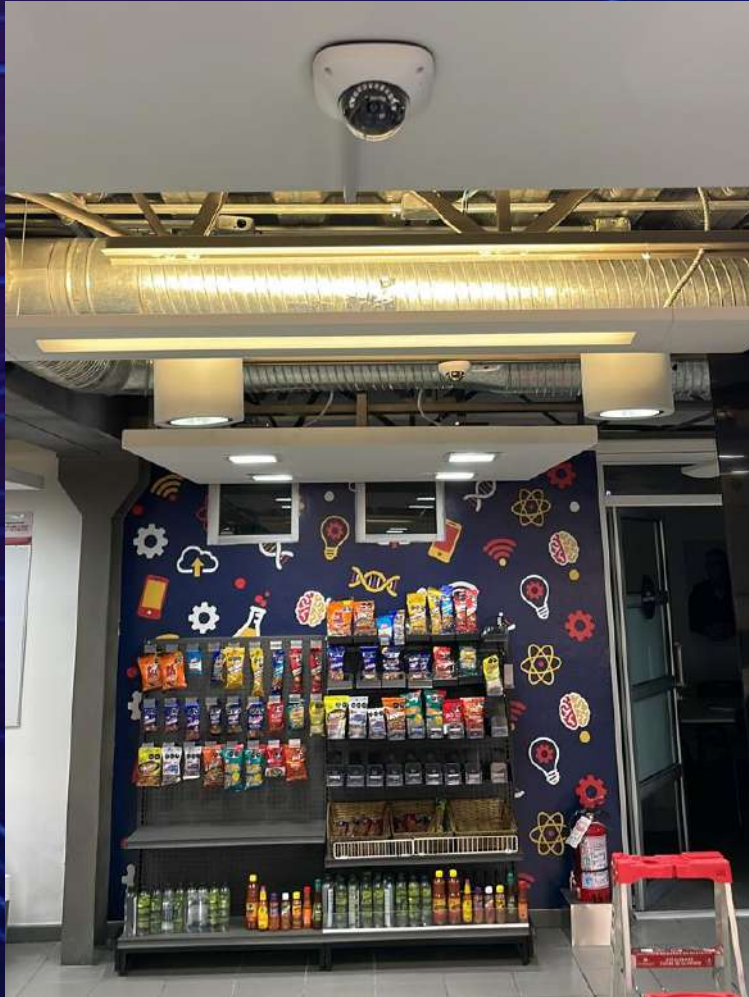
Optimal Recommendations for Object Detection and Recognition

- A. Distance from the camera and position. The closer the camera is, the more accurate the object recognition becomes.
- B. The location of the camera is recommended in an average position with respect to the area to be monitored.
- C. If the camera is moved, an image extraction must be performed from a video frame and a label and training of the objects must be performed, before continuing with the detection and recognition.
- D. If more objects are placed, the corresponding to step step B must be performed
- E. The fast training is done with 1 frame of image which takes 1 hour
- F. When one object is in front of another (overlapping) and the camera has only one field of view that sees practically a single product, it will only detect 1 object.
- G. The more photos of each product, with different distances, the recognition also improves, although it is in the case that the camera is away from the objects or for those where the size of the object is very small.

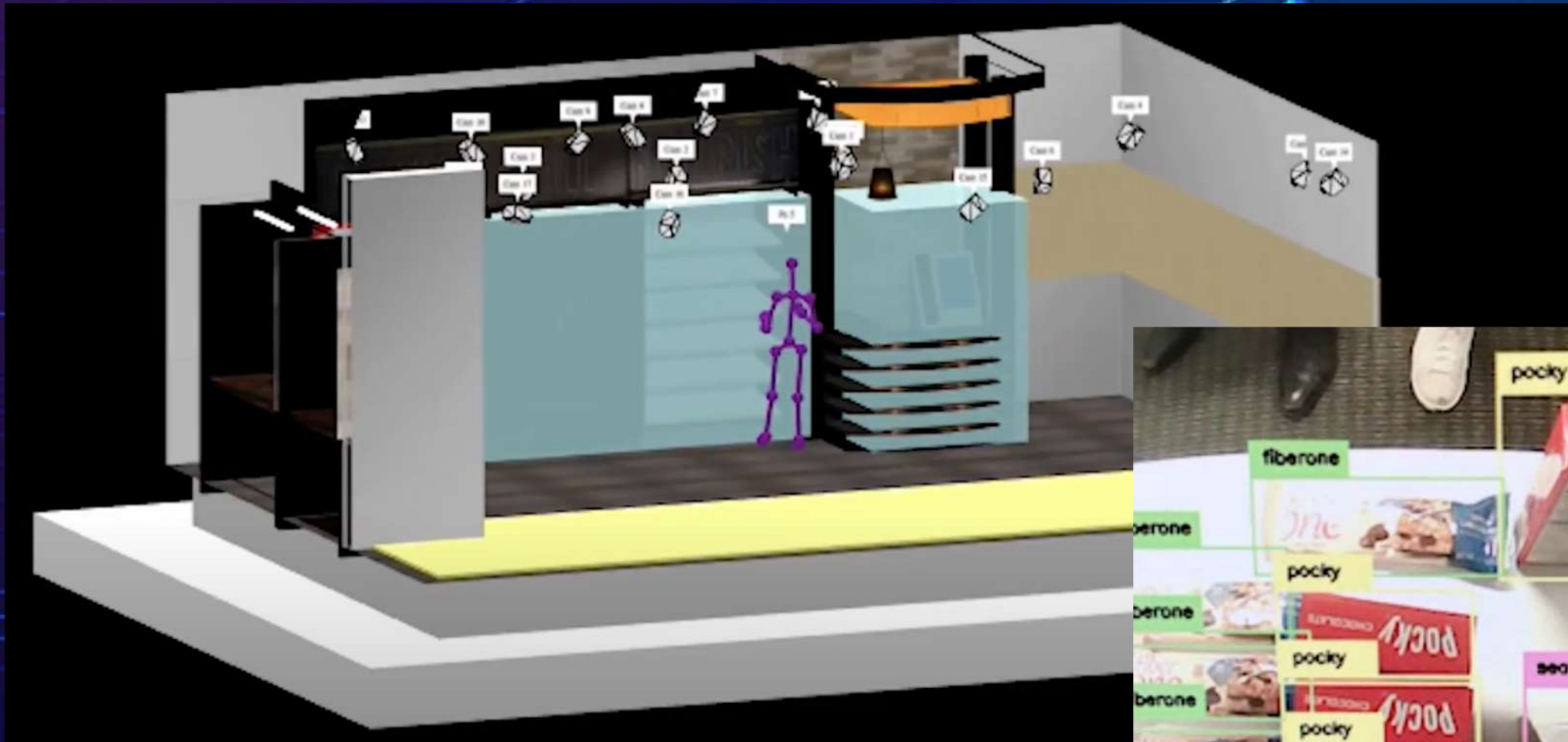


Camera Position

Example of Camera Positioning



Example Location of IP Cameras



Estanteria o Caja de Pagos



**Let Us Help Power Your Digital Transformation.
Contact us at enrique.Aguayo@visyed.com**