



# Artificial Intelligence Object Recognition Analytics

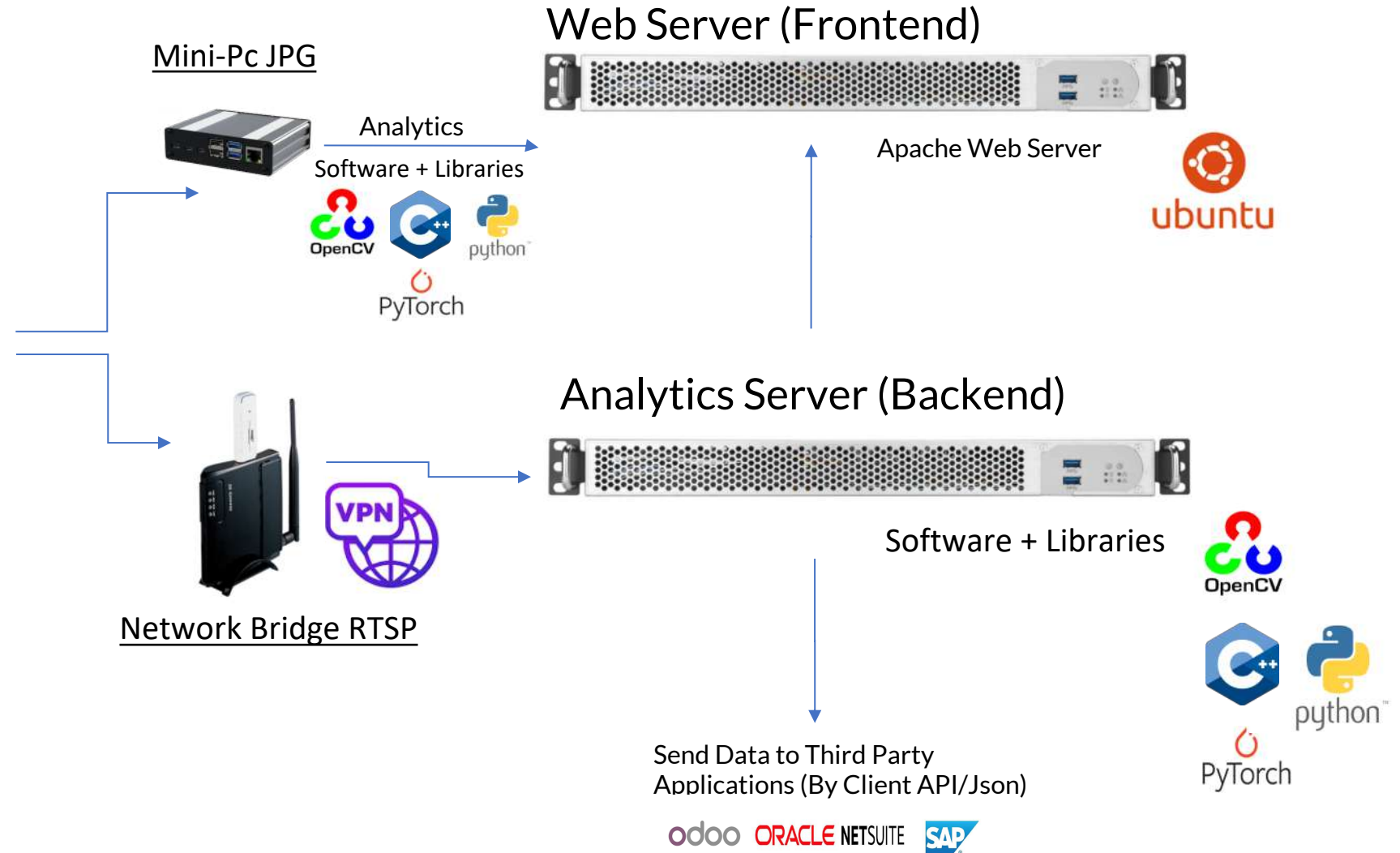
# Object recognition and tracking



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 recognizing a multitude of objects in images with little effort, despite the fact that the image of the object may vary somewhat at different points of view, at different sizes or scale and even when they are translated or rotated.

# Solution Architecture

## IP Cameras + Shelves



# Training and Detection Cycle

The cycle of training, detection and subsequent recognition consists of the following steps :

1. Image selection, frame extraction and labelling (labelling)
2. Export of labeled images
3. Training on Google Colab servers
4. Export of training results file to analytics servers
5. Import of file into analytics platform (Backend)
6. Import of photo frame from camera connected in store focusing on shelf
7. Execution of object detection and recognition analytics in cycles
8. Object counting



Analytics Server (Backend)

# Analytical Web Results

The result cycle of the object summation is performed in the following steps:

1. Analytic server connects to the camera
2. Running analytics on frame captured with objects
3. Detection results in dataframe file
4. Sum 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 displays html, javascript, photo and data in web url



Web Server (Frontend)

# Multi-photographic training

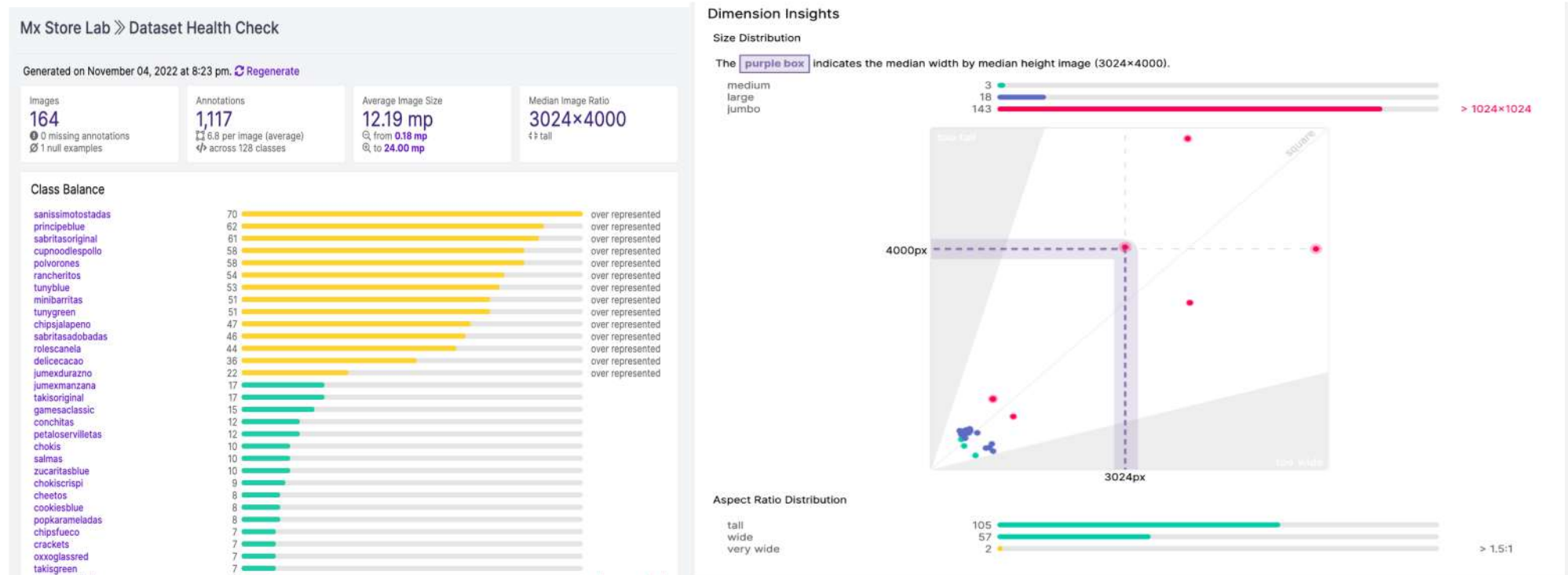
The following tasks are performed for object detection training:

1. A photographic set of 30 to 50 photos per object is used.
2. The object must be photographed in a similar view to the one on the shelf.
3. Processing about 100 objects takes about 4 hours for labeling.
4. A labeling server is used to select the outline of the object.
5. A label (identifying name) is assigned to each object.
6. Two groups of photographic sets are extracted (labeled and some unlabeled photos).
7. The unlabeled photos are used to perform the automatic detection tests.
8. The photos are accompanied by a file of coordinates that are uploaded to the Labeling server.
9. The training process takes 1 hour

Cloud Server



# Metrics Labeling Report





# 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 to the shelf
3. Objects are processed per camera, it takes about 1 hour to perform the labeling.
4. A labeling server is used to select the outline of the object
5. A label (identifying name) is assigned to each object
6. Two groups of photographic sets are extracted (labeled and unlabeled photos)
7. The unlabeled photos are used to perform the detection tests (automatic)
8. The photos are accompanied by a file of coordinates that are uploaded to the Labeling server
9. The training process takes 1 hour
10. Advantage: shorter processing time and reduced margins of error (non-detection)

Cloud Server





# Detection Results Every 5 Minutes



Analytics Server (Backend)



# Detection Results Every 5 Minutes

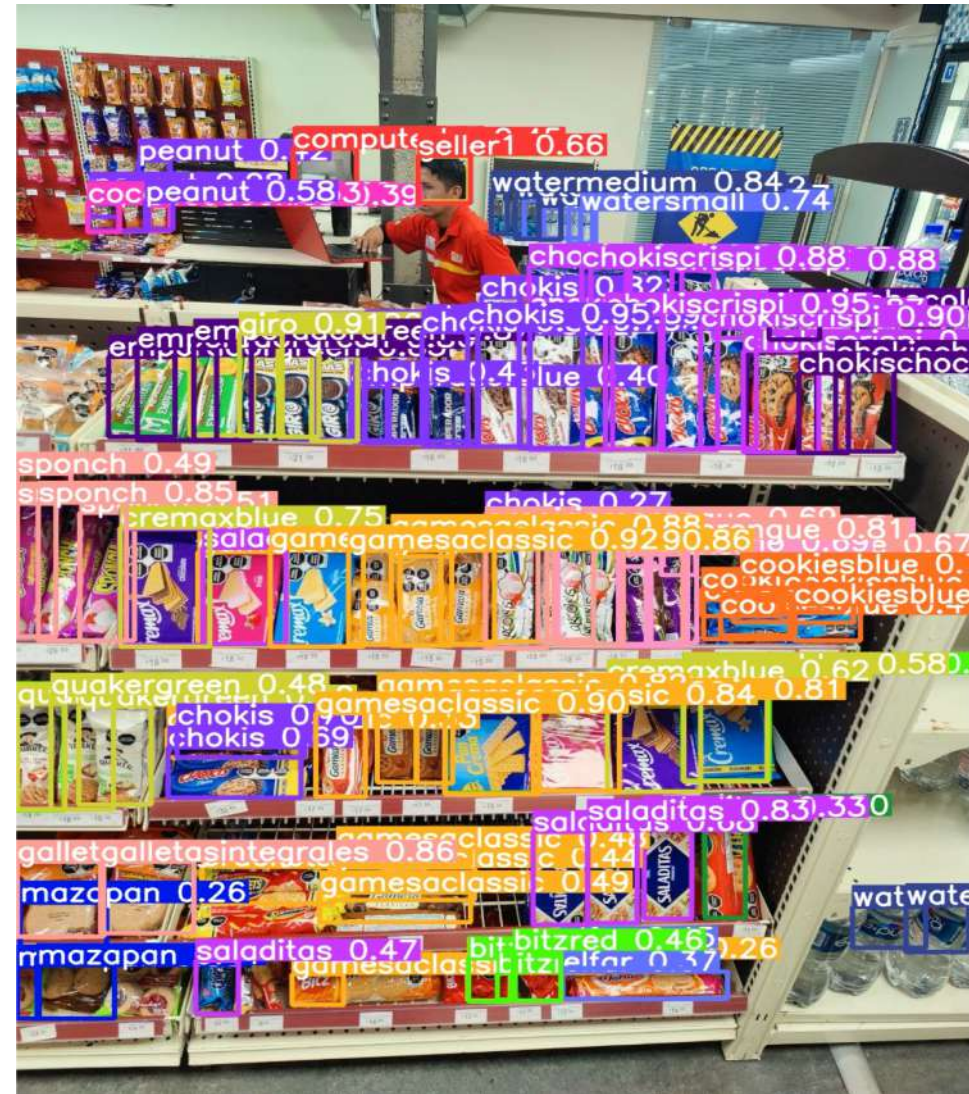
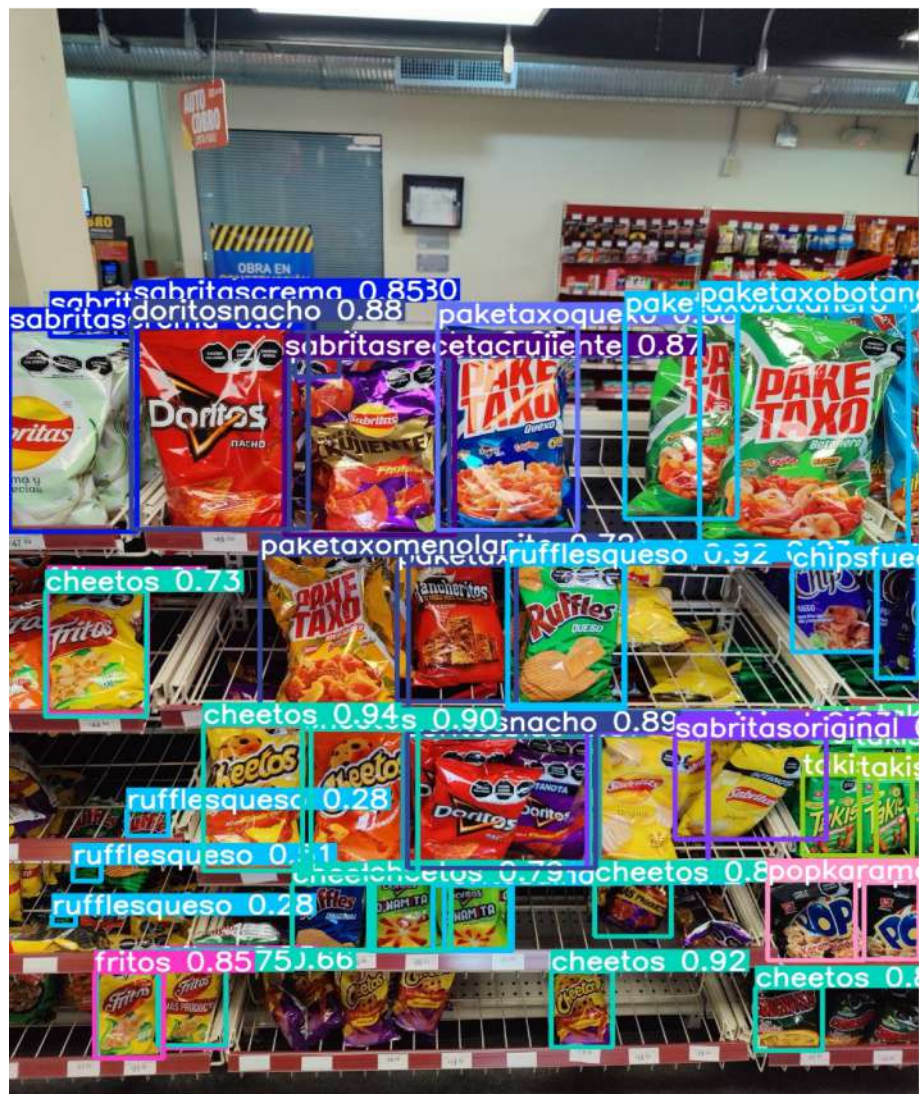


Analytics Server (Backend)





## Detection Results Every 5 Minutes





# Sum of Objects Every 5 Minutes



Web Server (Frontend)



# Sum of Objects Every 5 Minutes



```
Mini Barritas: 0
Tunyblue: 2
Tunyg...: 1
Cup Noodles de Pollo: 0
Roles con Canela: 1
Rancheritos: 2
Sabritas Adobadas: 1
Sabritas Original: 1
Chip Jalapeños: 2
Sanissimo Tostadas: 1
Polvorones: 1
Principe Blue: 0
Jumex Manzana: 0
Jumex Durazno: 1
Delice Cacao: 0
```

Web Server (Frontend)



## Optimum Recommendations for Object Detection and Recognition

- A. **Camera distance and position**, the closer the camera is, the greater the accuracy in product recognition and counting
- B. **The location of the camera** is recommended in a middle position with respect to the shelf
- C. **If the camera is moved**, an image extraction from a video frame and labeling and training of the products must be performed before continuing with the detection and recognition
- D. **If more products are placed**, the corresponding step B must be performed
- E. **Rapid training is performed** with 1 image frame which takes 1 hour
- F. **When a product is in front (over) of another** (overlapping) and the camera only has a field of view that sees practically only one product, only 1 product will be counted
- G. **The more photos of each product**, with different distances, also improves the recognition, although it is in the case that the camera is far away from the products or for those products of small size like a can of canned food

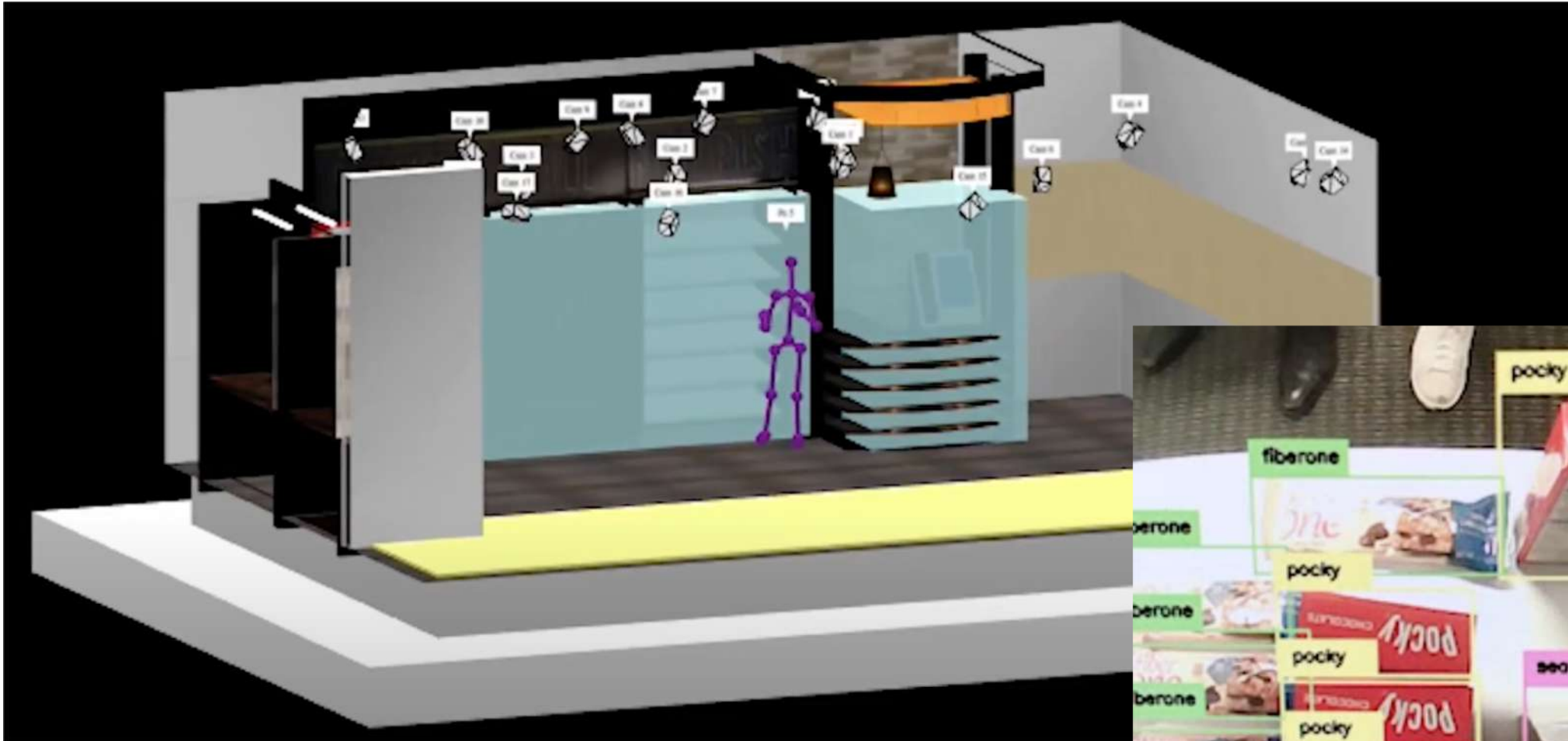


## Camera Positioning Example





# Example IP Camera Locations



Payroll Rack or Cashier's Office



# Hardware requirements

## Web Server (Frontend)



1. Core i / 2 Gb Ram
2. Hdd 5 gb

## Analytical Server (Backend)



1. CPU Core 2 Duo / 4 Ram (Per 100 Cameras)
2. Disco 20 gb

# On- Premise Integration Luxriot

Luxriot EVO Monitor — DESKTOP-73B6CBB (Display 1)

Live Playback Sequence Smart Search Alerts Library Reports FR Connection (3 servers) File Edit View Tools Help

Observing Default layout Tienda1

OMNIVIEW

Camera 1

10:43:09 PM

Mini Berritos: 0  
Tunyblue: 2  
Tunygreen: 1  
Cup Noodles de Pollo: 1  
Holes con Canela: 1  
Rancheritos: 2  
Sobritos Adonados: 1  
Sobritos Original: 1  
Chip Jalapeños: 2  
Sanissimo Tostadas: 1  
Polvorones: 2  
Príncipe Blue: 0  
Jumex Manzana: 1  
Jumex Durazno: 1  
Delice Cacao: 1

Camera 2

Mini Berritos: 0  
Tunyblue: 2  
Tunygreen: 1  
Cup Noodles de Pollo: 1  
Holes con Canela: 1  
Rancheritos: 2  
Sobritos Adonados: 2  
Sobritos Original: 1  
Chip Jalapeños: 1  
Sanissimo Tostadas: 1  
Polvorones: 1  
Príncipe Blue: 0  
Jumex Manzana: 0  
Jumex Durazno: 1  
Delice Cacao: 0

JPEG HD 720 0 FPS 345.7 Kb/s

# Advantages of the Solution

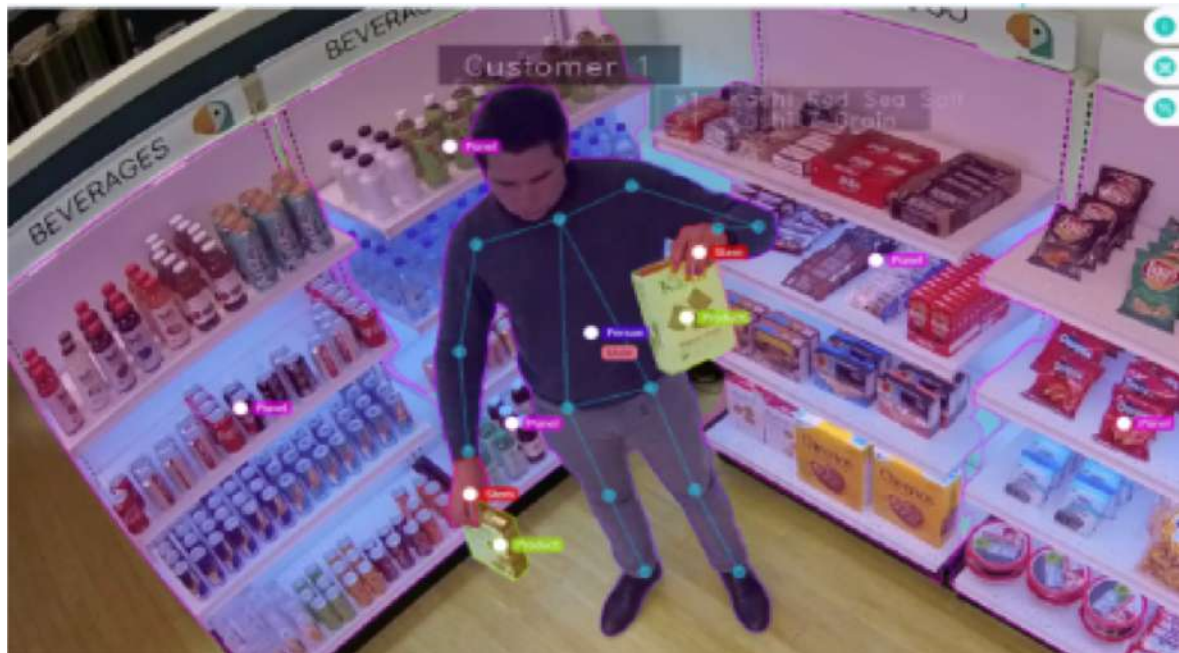
- Keep Stock Updated
- Avoid Product Leakage
- Inventory of all existing products every 5 minutes
- Cloud or on-premise solution
- High level of security - Antihacking
- Integration with third parts frontends

# **New Analytics & Integrations to develop**



# Control scenarios (Object Tracking)

Before Checkout



Before Checkout



# Control scenarios (Object Tracking)

Checkout



Stolen by Customer





# Industries: Early detection of production defects



# New Integrations with 3<sup>rd</sup> Applications



# Own Labeling Server





**Let Us Help Power Your Digital Transformation.**  
**Contact us at [enrique.aguayo@visyed.com](mailto:enrique.aguayo@visyed.com)**