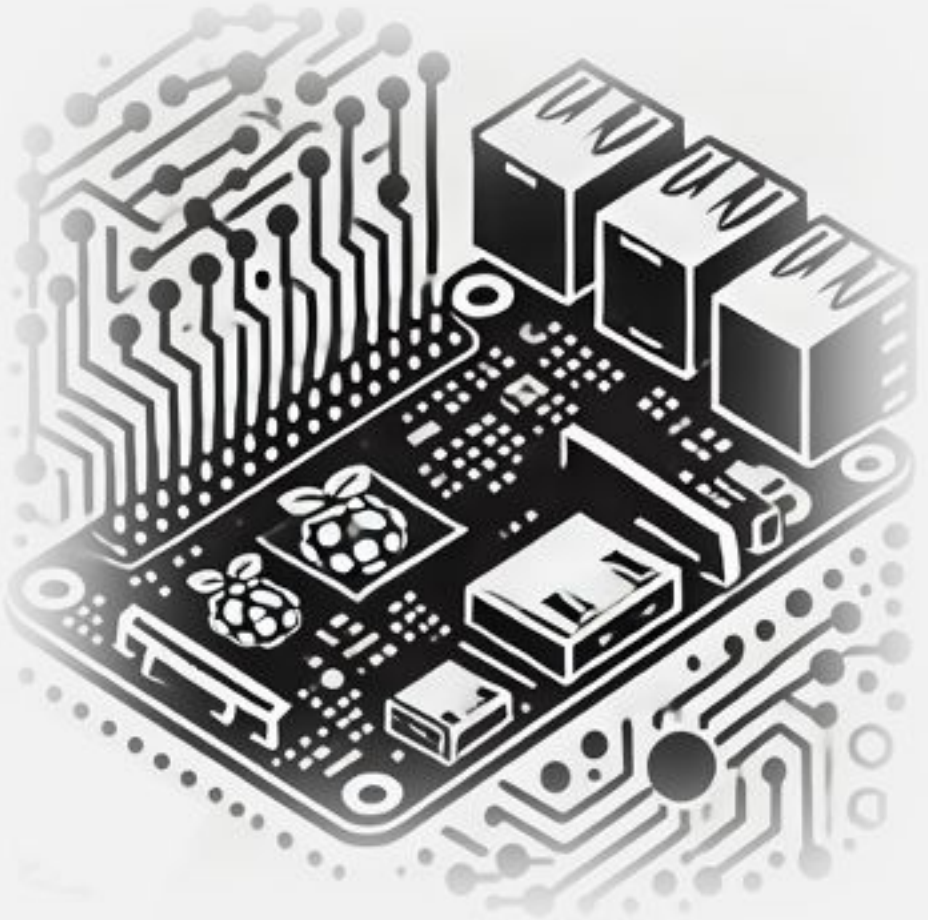
IESTI05 – Edge AI

Machine Learning System Engineering



6. Image Classification Project: Goal and Data Collection

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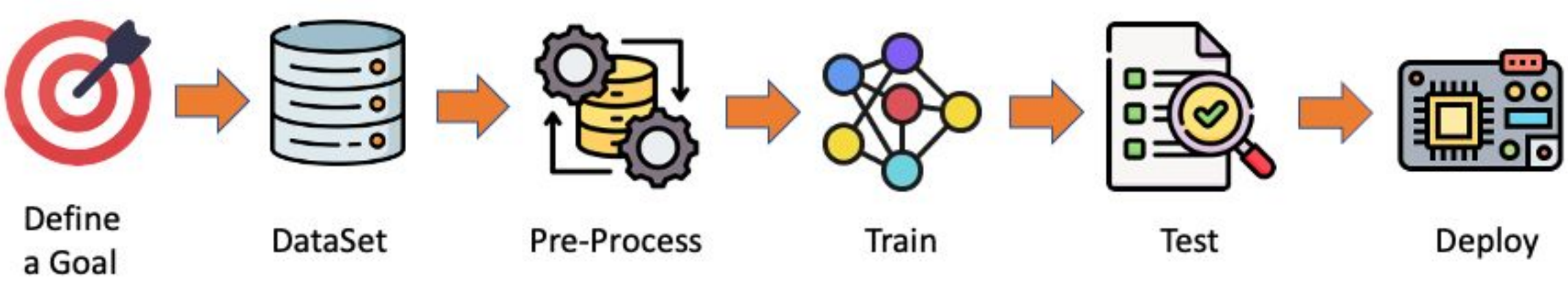
Professor Honoris Causa

Machine Learning Workflow



Machine Learning Workflow

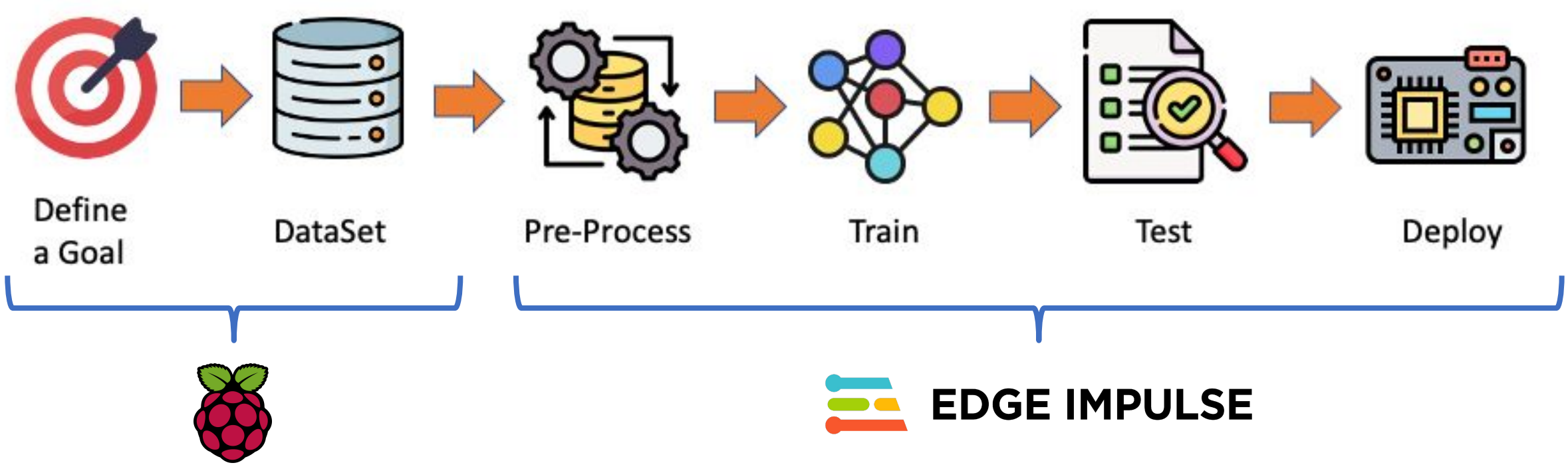
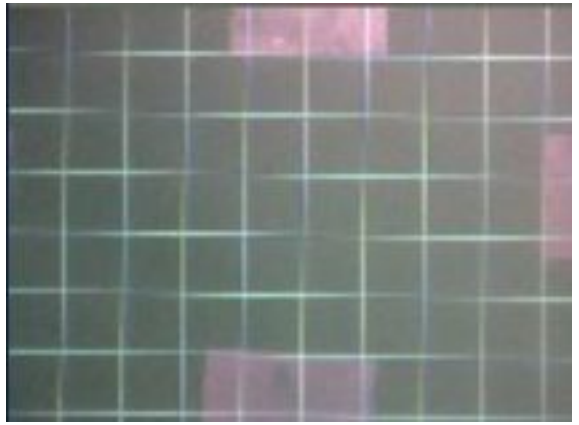


Image Classification Example

Define
a Goal

- Classes:
  - medicine
  - background



https://studio.edgeimpulse.com/public/114253/latest

Image Classification Example

Define
a Goal

- Classes:
  - mug
  - background

https://studio.edgeimpulse.com/public/139479/latest

Img Class Example

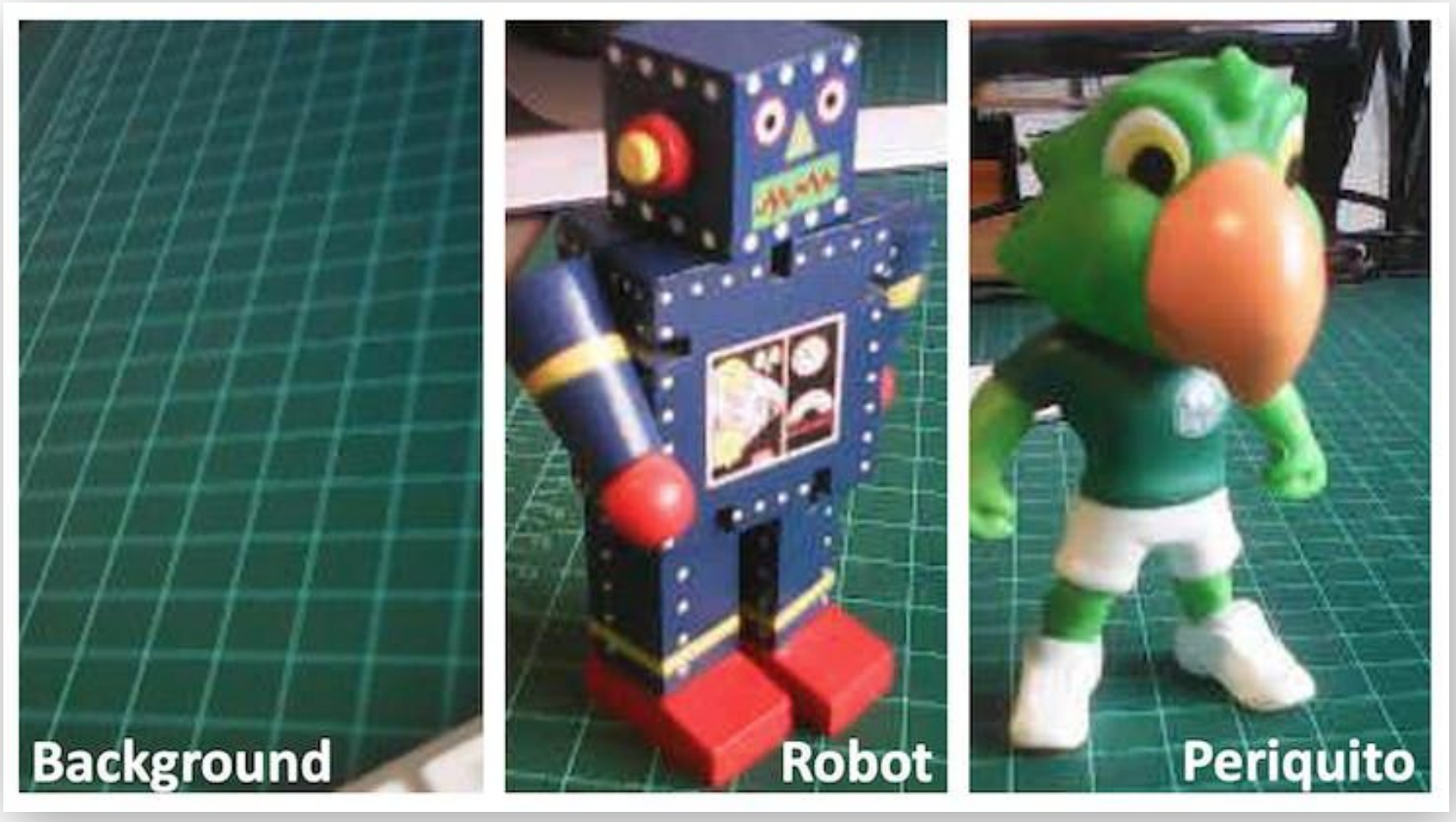
Medicine Classificator

Define
a Goal

- Classes:
  - prodR
  - prodD
  - prodT
  - backG

https://studio.edgeimpulse.com/public/540912/live

The Goal

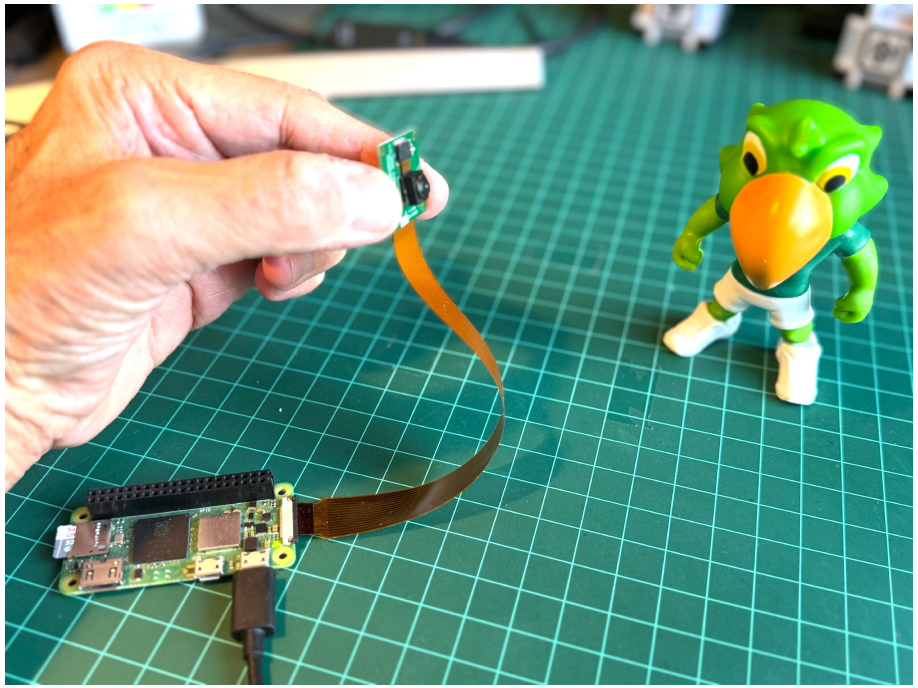


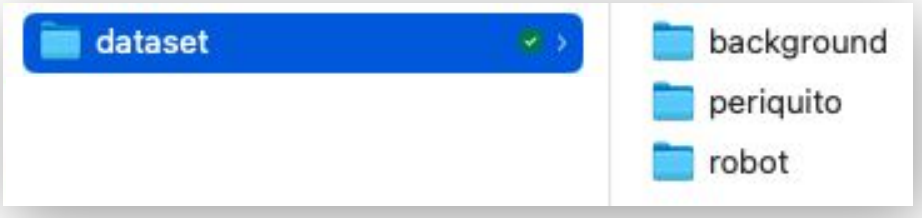
Data Collection Guidelines

- Set up a **web server** on the Raspberry Pi to view captured images
- Use **Flask**, a lightweight web framework for Python
- Capture **QVGA (320 x 240)** images with the Raspberry Pi camera
- Collect around **60 images** from each category (periquito, robot, and background)
- Capture different **angles, backgrounds, and light conditions**

Dataset quality directly impacts model performance

Data Collection – Web App





Web Interface
Accessible from any device on the same network

Live Camera Preview
Shows real-time feed from the camera

Labeling System
Input labels for different image categories

Organized Storage
Saves images in label-specific subdirectories

Per-Label Counters
Tracks captured images for each label

Summary Statistics
Provides summary when stopping capture

Setting up a Venv, installing Flask, and running the App

Activate the environment:

```
source ~/tflite_env/bin/activate
```

Install Flask

```
pip3 install flask
```

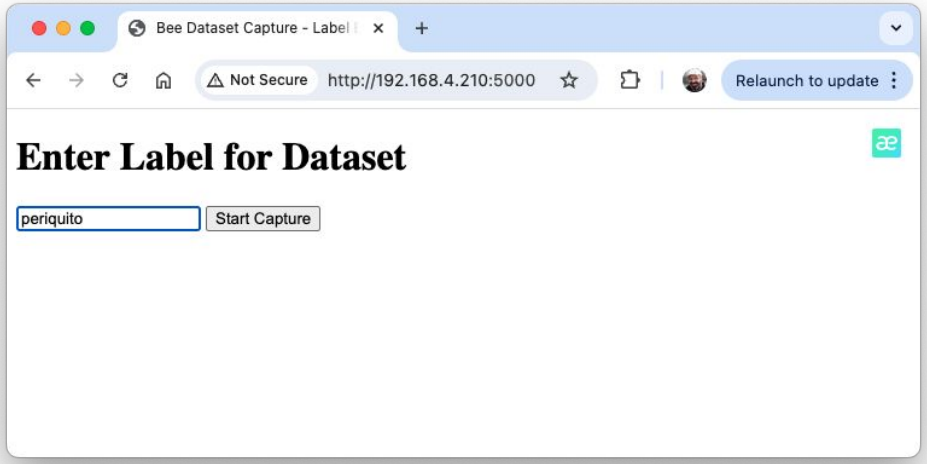
Run the app

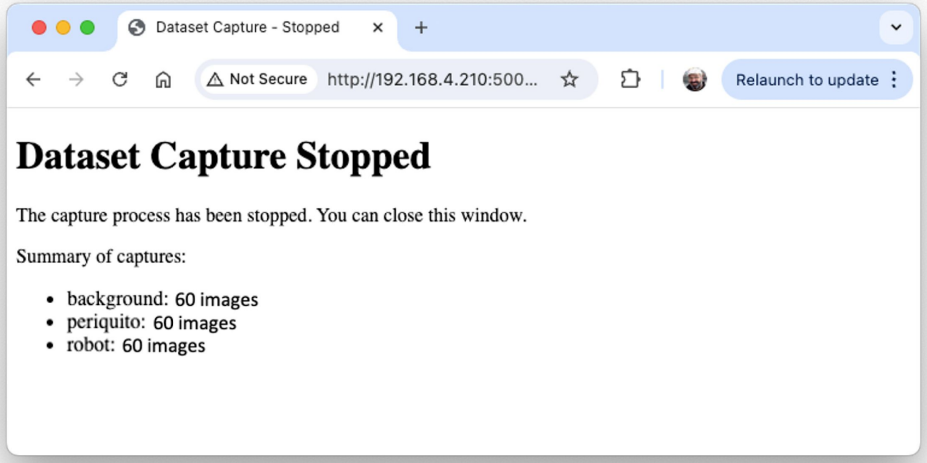
```
python get_img_data.py
```

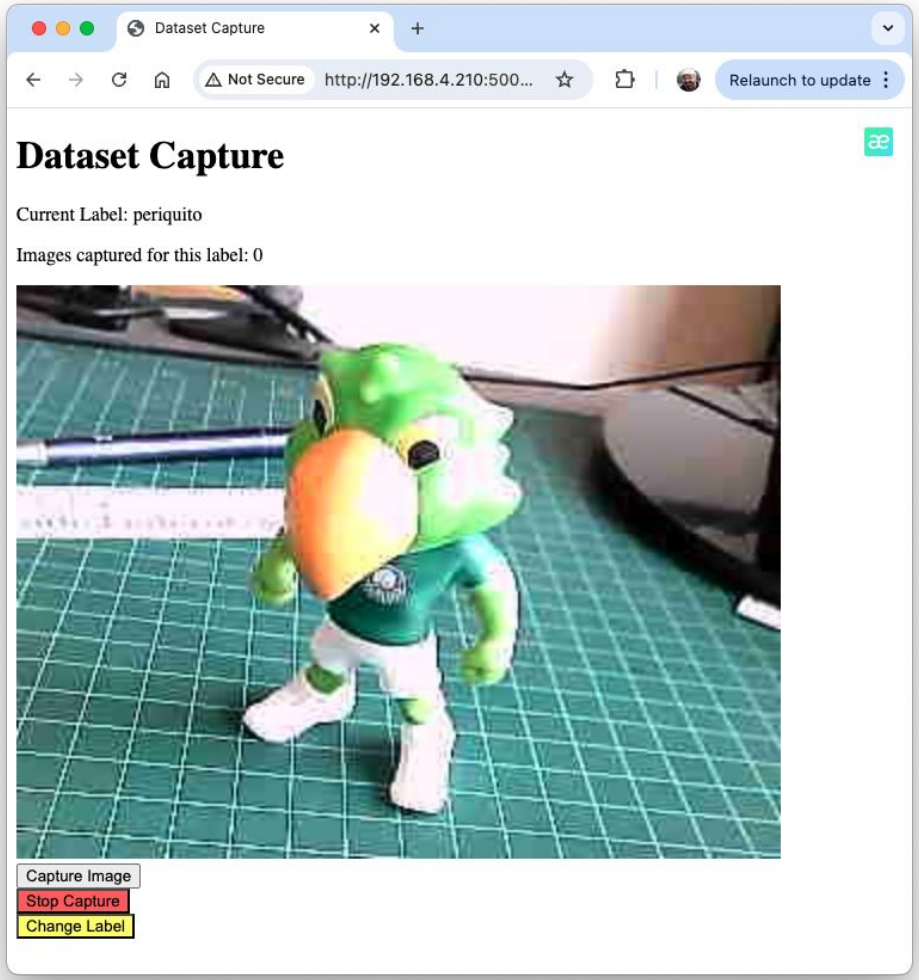
To exit the virtual environment, use:

```
deactivate
```

The Web App


Bee Dataset Capture - Label
Not Secure
http://192.168.4.210:5000
Relaunch to update
Enter Label for Dataset
periquito
Start Capture


Dataset Capture - Stopped
Not Secure
http://192.168.4.210:500...
Relaunch to update
Dataset Capture Stopped
The capture process has been stopped. You can close this window.
Summary of captures:
background: 60 images
periquito: 60 images
robot: 60 images


Dataset Capture
Not Secure
http://192.168.4.210:500...
Relaunch to update
Dataset Capture
Current Label: periquito
Images captured for this label: 0
Capture Image
Stop Capture
Change Label

Questions?

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