



Institución  
**Universitaria**  
Reacreditada en Alta Calidad

# RaspBerry Pi and Edge Impulse

## Aprendizaje Automático Embebido

Somos Innovación Tecnológica con *Sentido Humano*



Alcaldía de Medellín



# Raspberry Pi

1. Data Acquisition (Images)
2. Install Raspberry Pi
2. Ways to access the Raspberry Pi
3. Connect Raspberry Pi to Edge Impulse
4. Model Deployment in Raspberry Pi

# Image Acquisition

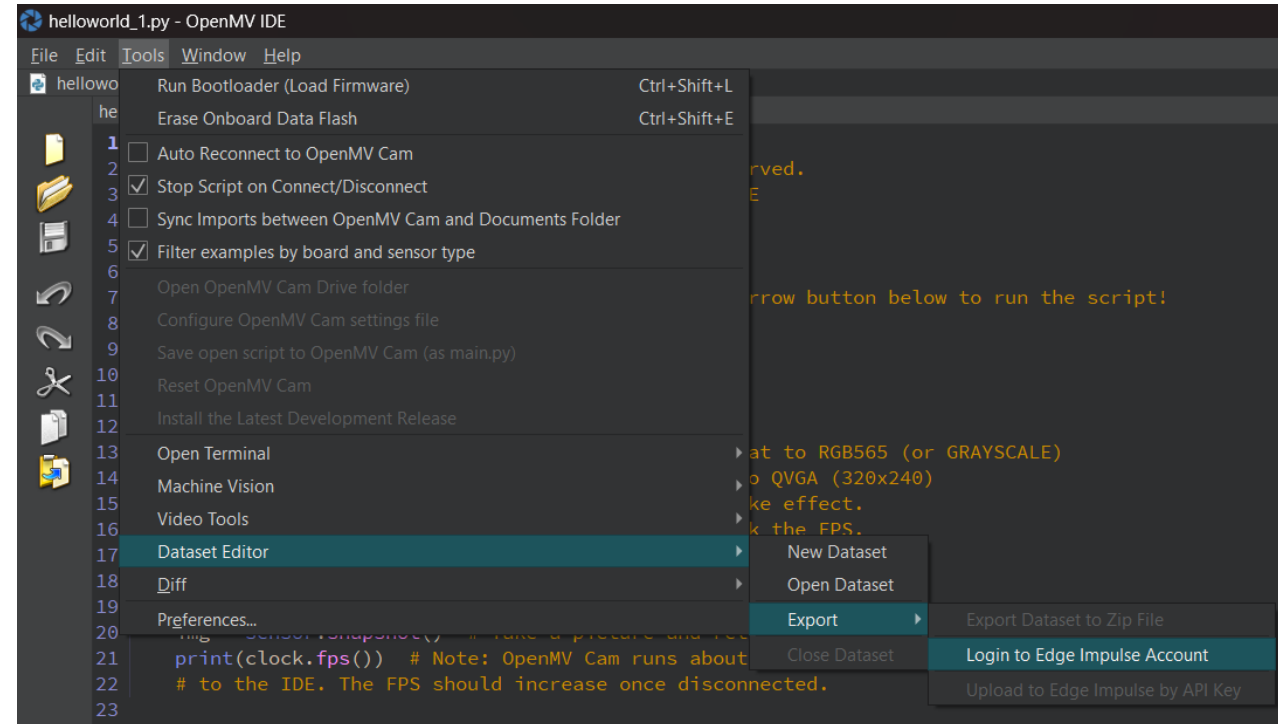
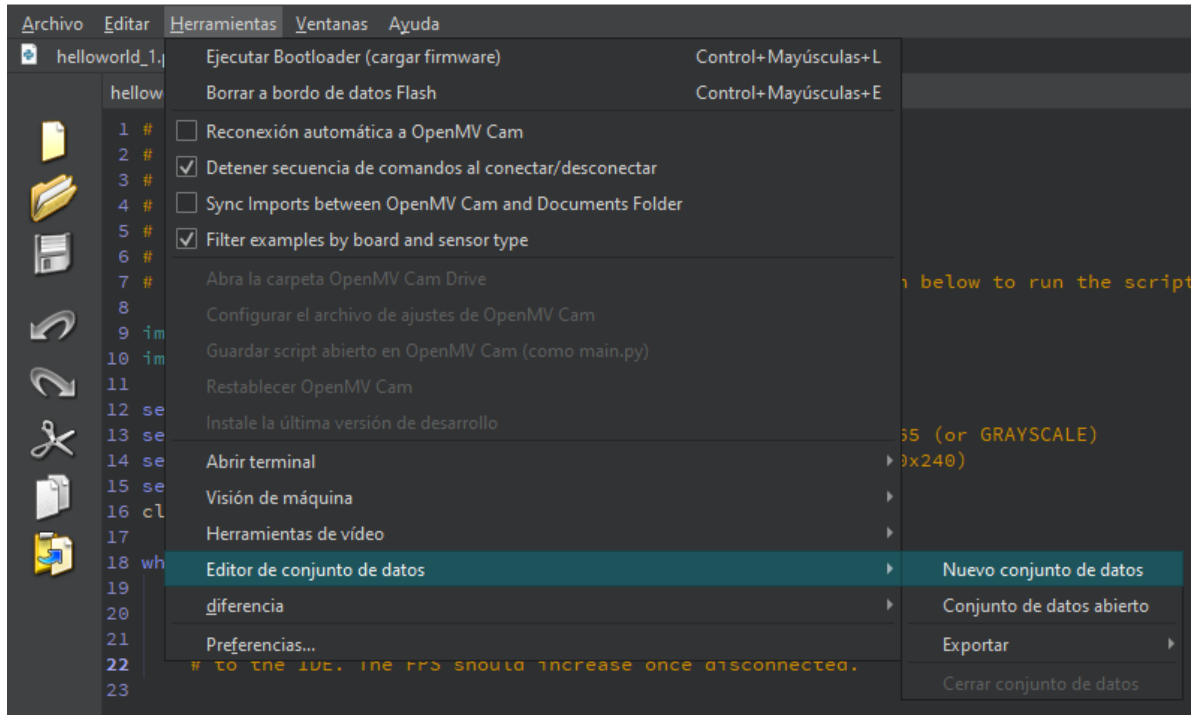
There are different ways to build/generate the dataset for image classification

1. Upload images from a local o cloud folder (OpenMV IDE).
2. Take images from Smartphone connected to Edge Impulse.
3. Take images from camera/raspberry pi to Edge Impulse.



# Upload Dataset using OpenMV IDE

helloworld\_1.py - OpenMV IDE





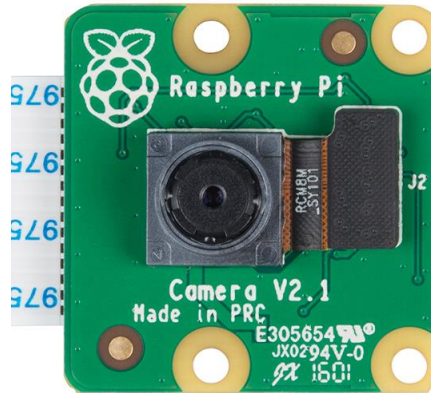
# Image Acquisition



>64MP

Edge Impulse

512x512



3280 x 2464 = 8MP

Edge Impulse

640x480



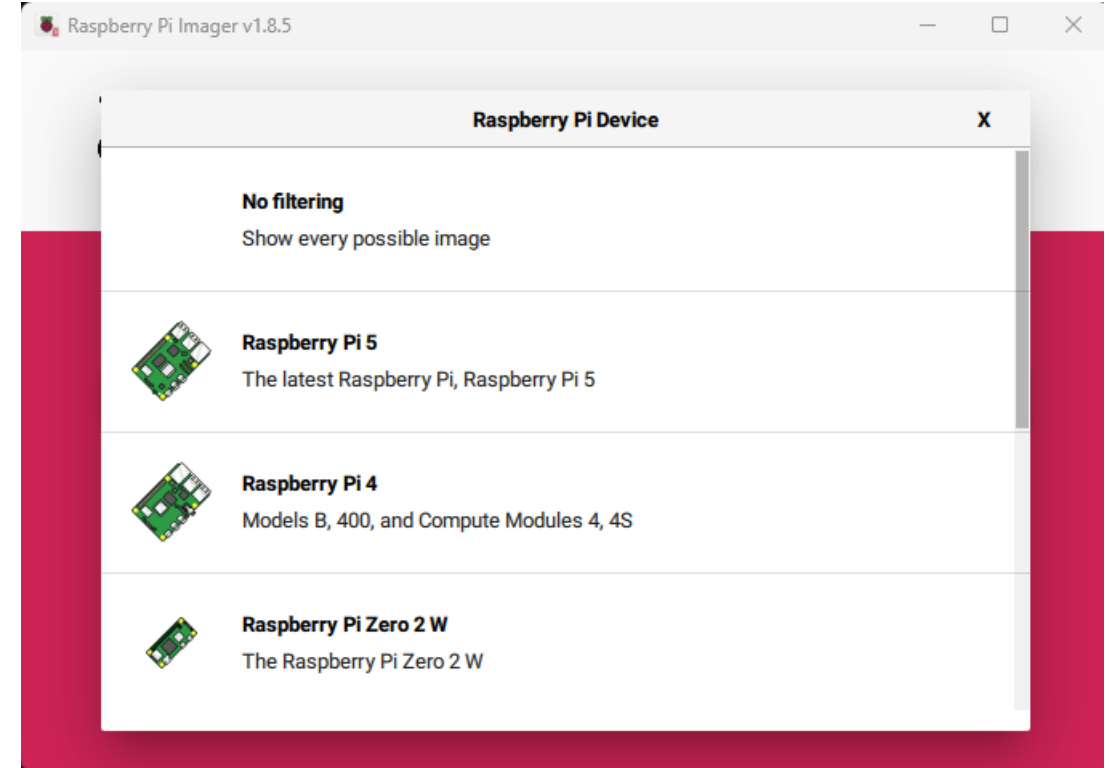
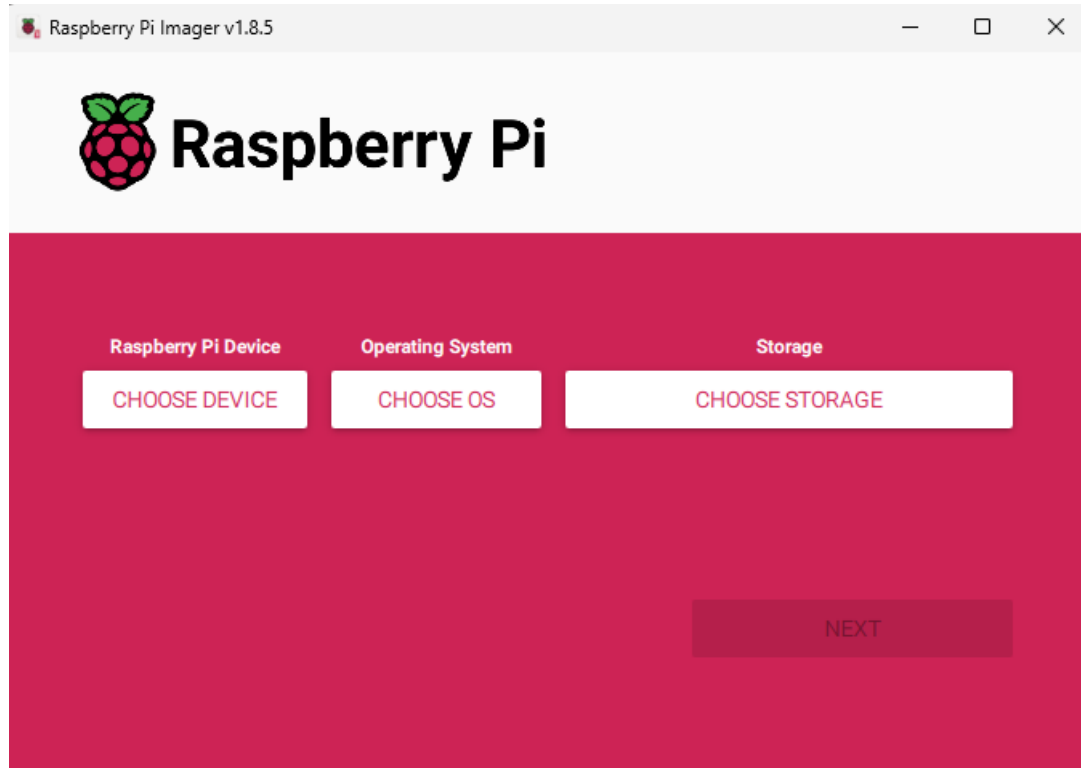
640 x 480 = 300kP

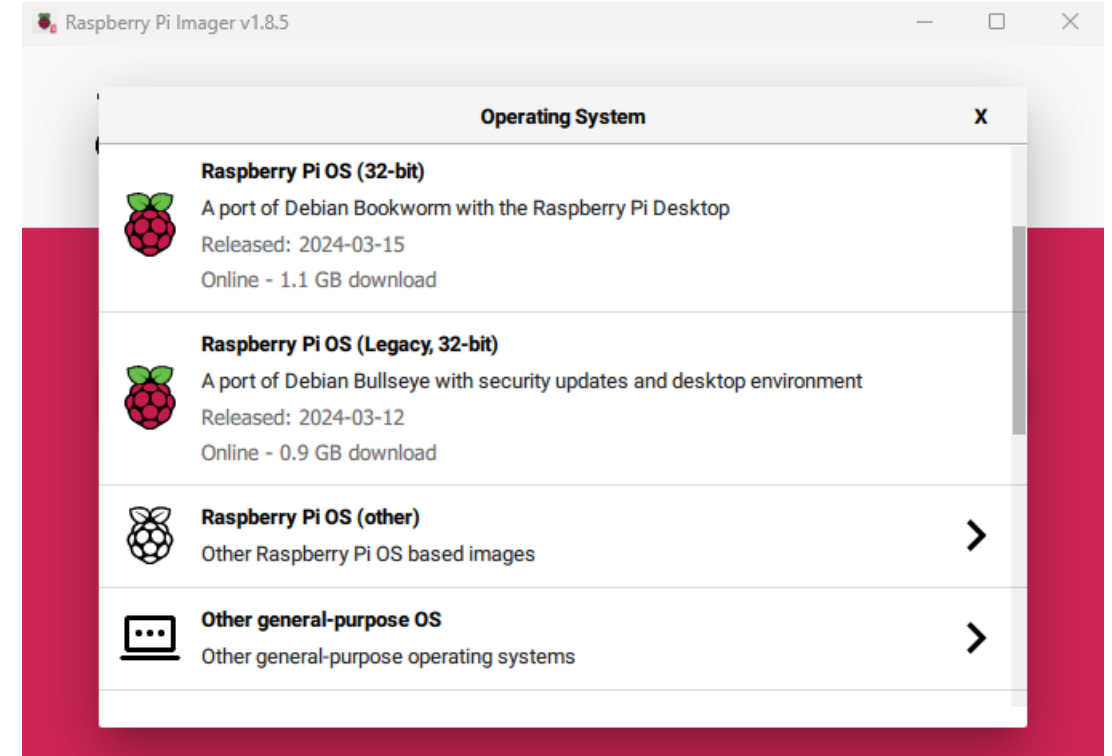
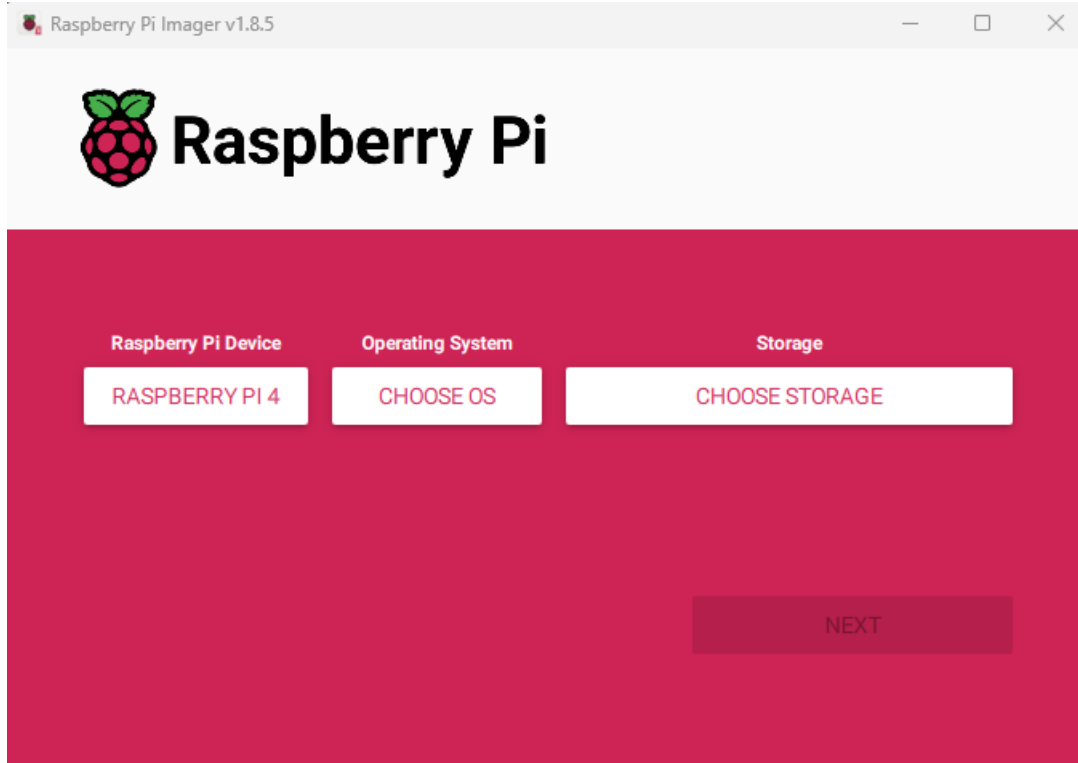
Edge Impulse

640x480

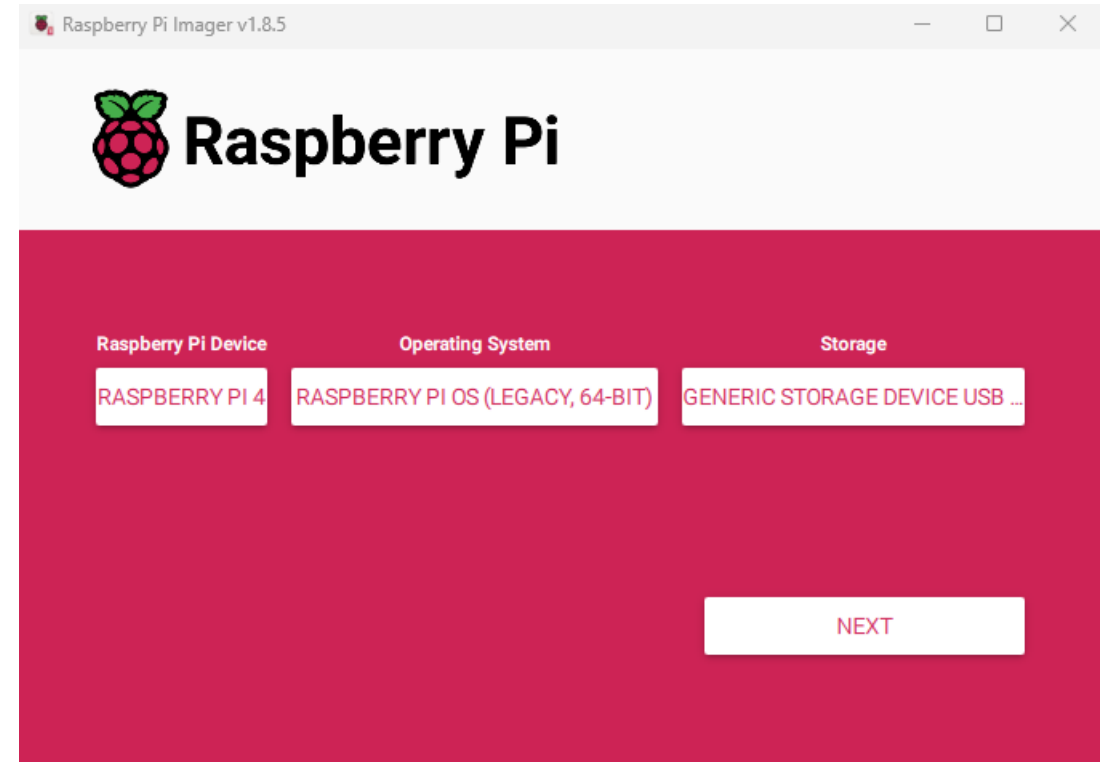
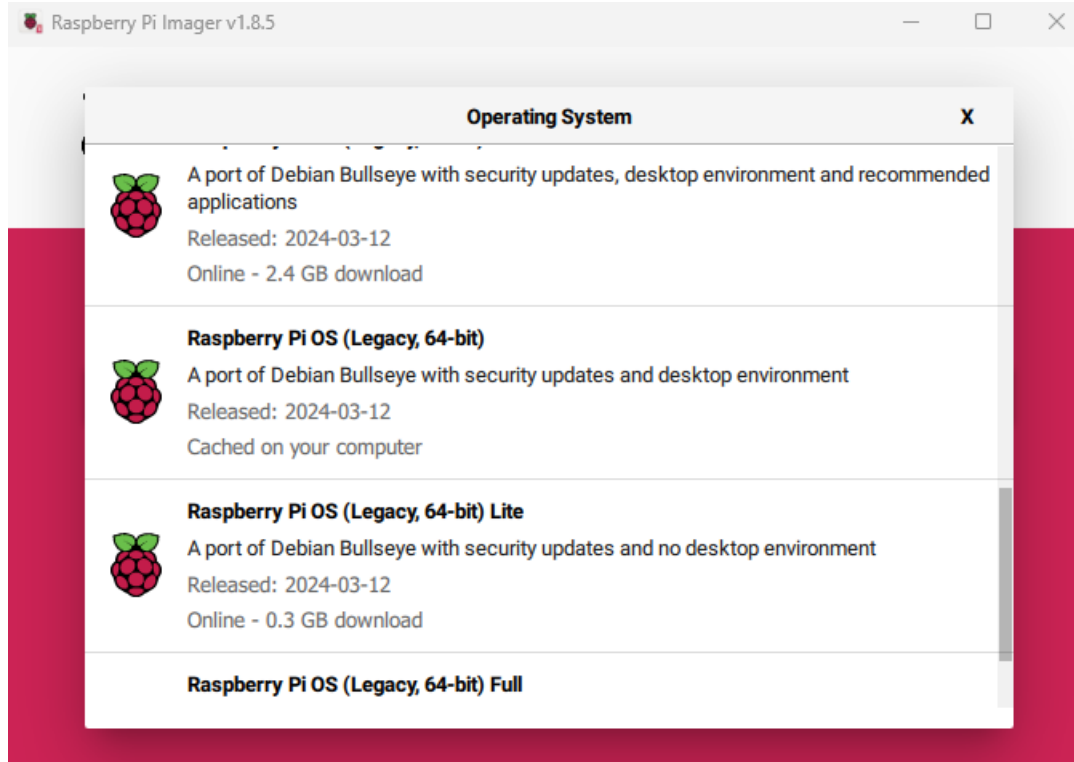
# Raspberry Pi

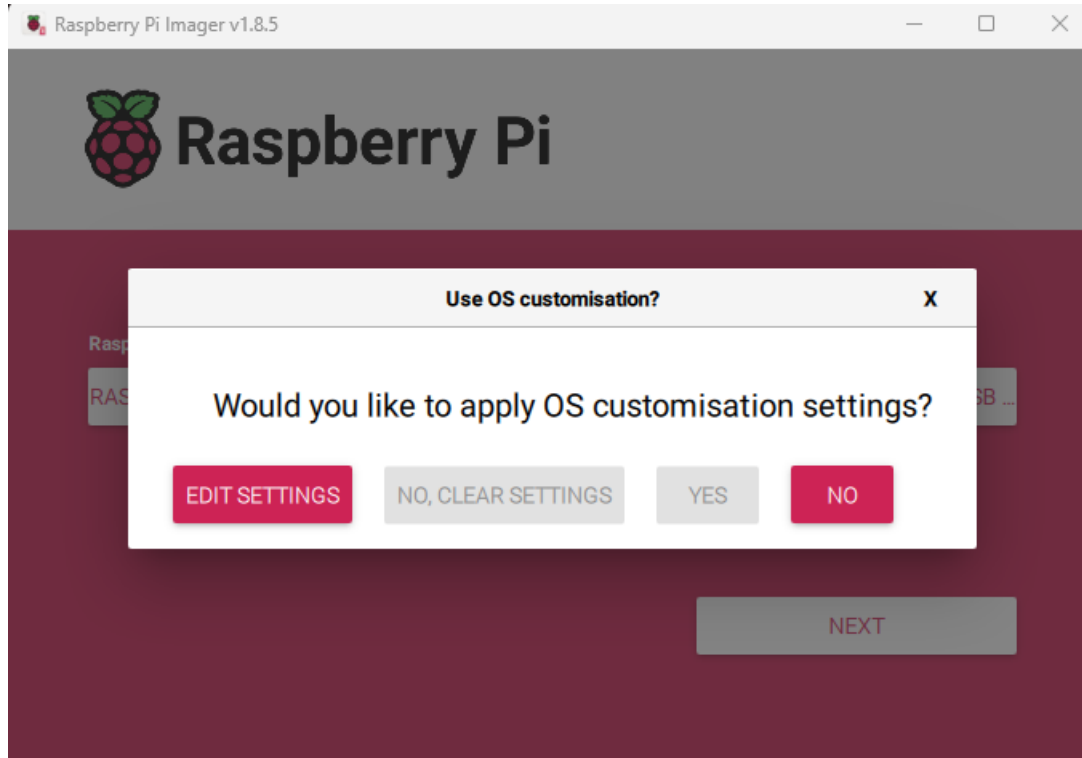
1. Data Acquisition (Images)
2. Install Raspberry Pi (SD reader)
2. Ways to access the Raspberry Pi
3. Connect Raspberry Pi to Edge Impulse
4. Model Deployment in Raspberry Pi











OS Customisation

GENERAL SERVICES OPTIONS

☐ Set hostname: raspberrypi.local

☒ Set username and password

Username: pi

Password: ••••••••

☒ Configure wireless LAN

SSID: RedWifi

Password: clavewifi

☒ Show password ☐ Hidden SSID

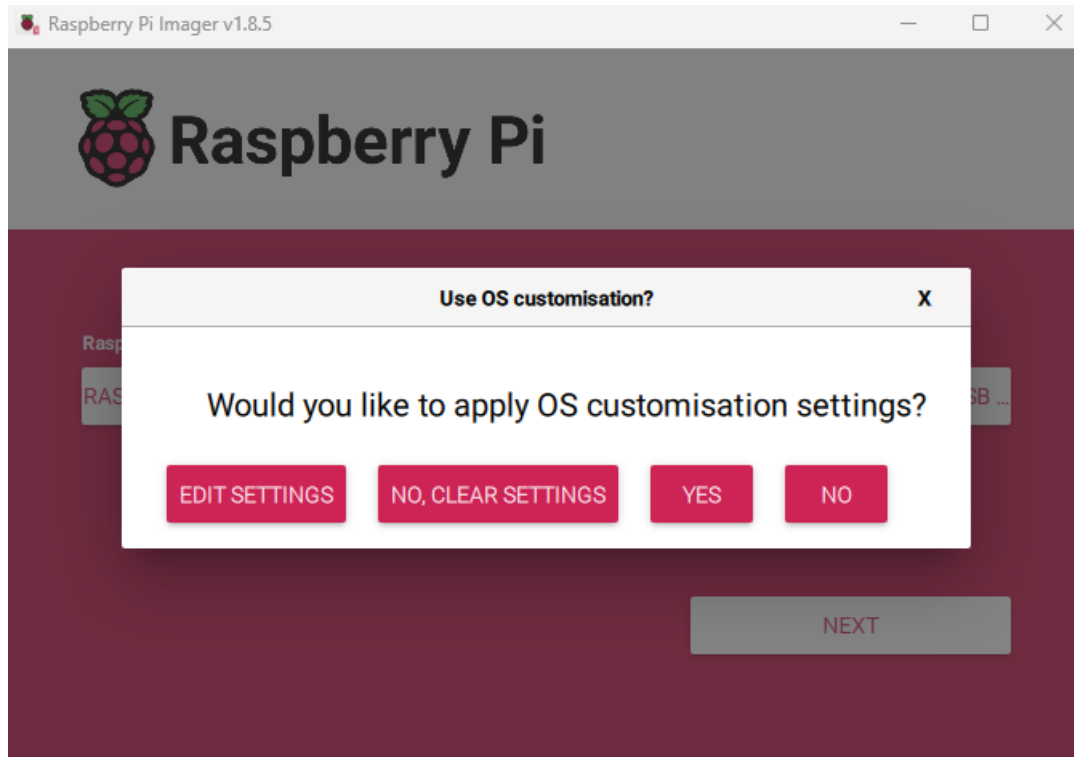
Wireless LAN country: CO

☐ Set locale settings

Time zone: America/Bogota

Keyboard layout: us

SAVE



# Raspberry Pi - Options

OS Customisation

GENERAL SERVICES OPTIONS

☒ Enable SSH

☒ Use password authentication

☐ Allow public-key authentication only  
Set authorized\_keys for 'pi':

RUN SSH-KEYGEN

SAVE

OS Customisation

GENERAL SERVICES OPTIONS

☐ Play sound when finished

☒ Eject media when finished

☒ Enable telemetry

SAVE



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# Extra Tools

<https://raspberrypi-guide.github.io/filessharing/mount-raspberry-pi-sd-card>

<https://sourceforge.net/projects/ext2fsd/files/Ext2fsd/0.53/>

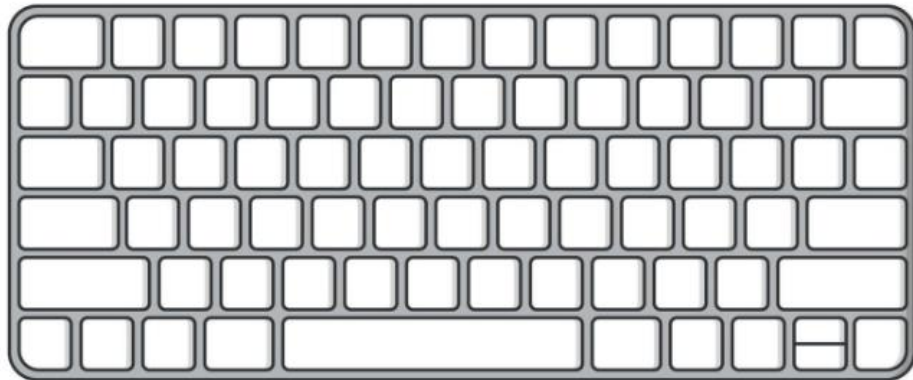
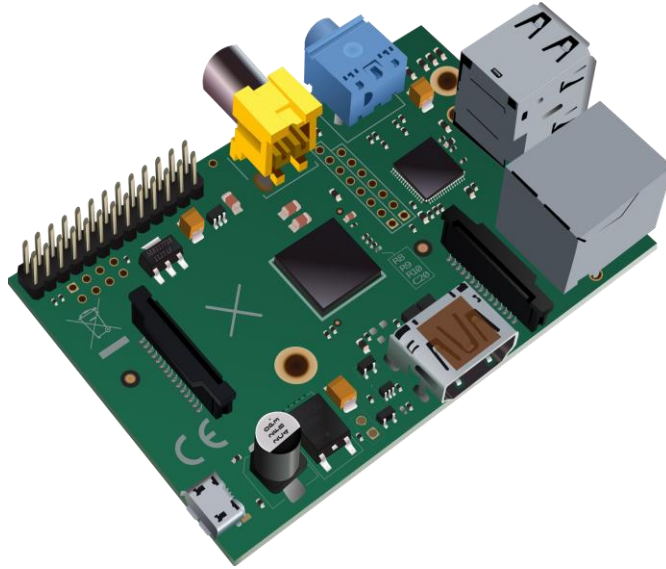


# Raspberry Pi

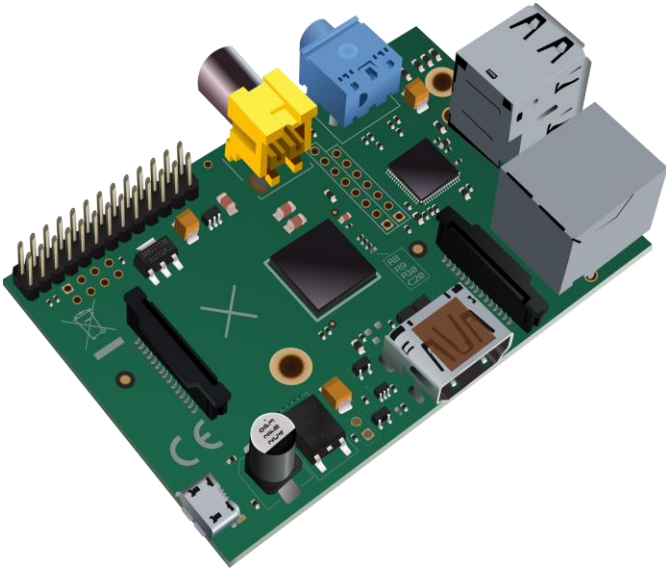
1. Data Acquisition (Images)
2. Install Raspberry Pi
3. Ways to access the Raspberry Pi
4. Connect Raspberry Pi to Edge Impulse
5. Model Deployment in Raspberry Pi



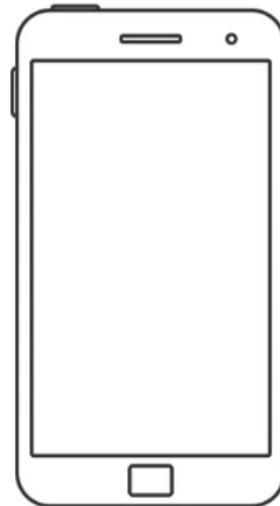
# Monitor and Keyboard connected to Raspberry Pi



# Laptop connected through Wifi using SSH



# Laptop connected through HotSpot using SSH





# Raspberry Pi

1. Data Acquisition (Images)
2. Install Raspberry Pi
3. Ways to access the Raspberry Pi
4. Connect Raspberry Pi to Edge Impulse and Model definition
5. Model Deployment in Raspberry Pi

# Terminal Installation steps

```
sudo apt update
```

```
curl -sL https://deb.nodesource.com/setup_20.x | sudo bash -
```

```
sudo apt install -y gcc g++ make build-essential nodejs sox gstreamer1.0-tools  
gstreamer1.0-plugins-good gstreamer1.0-plugins-base gstreamer1.0-plugins-base-apps
```

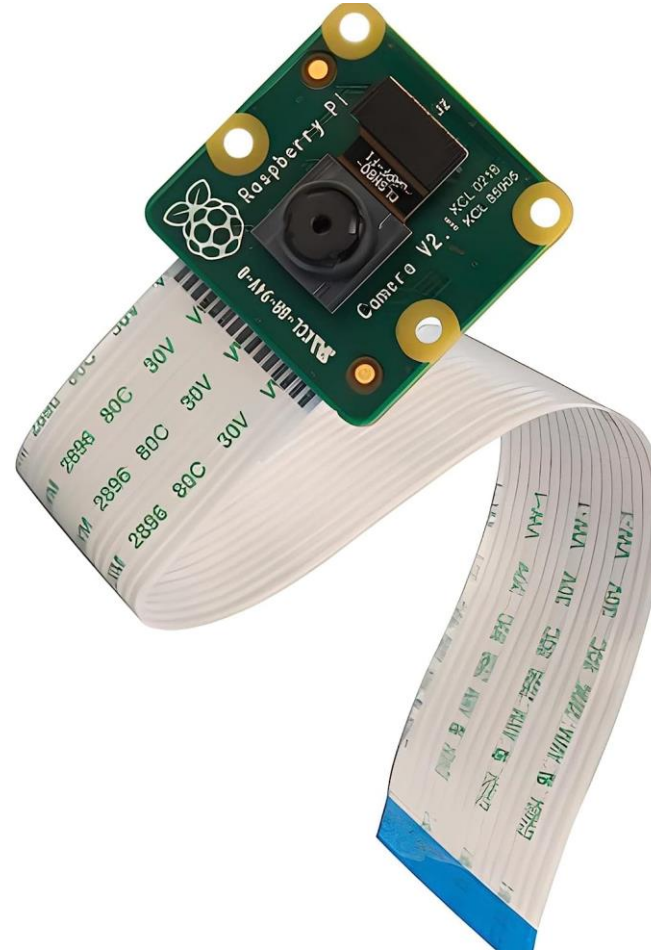
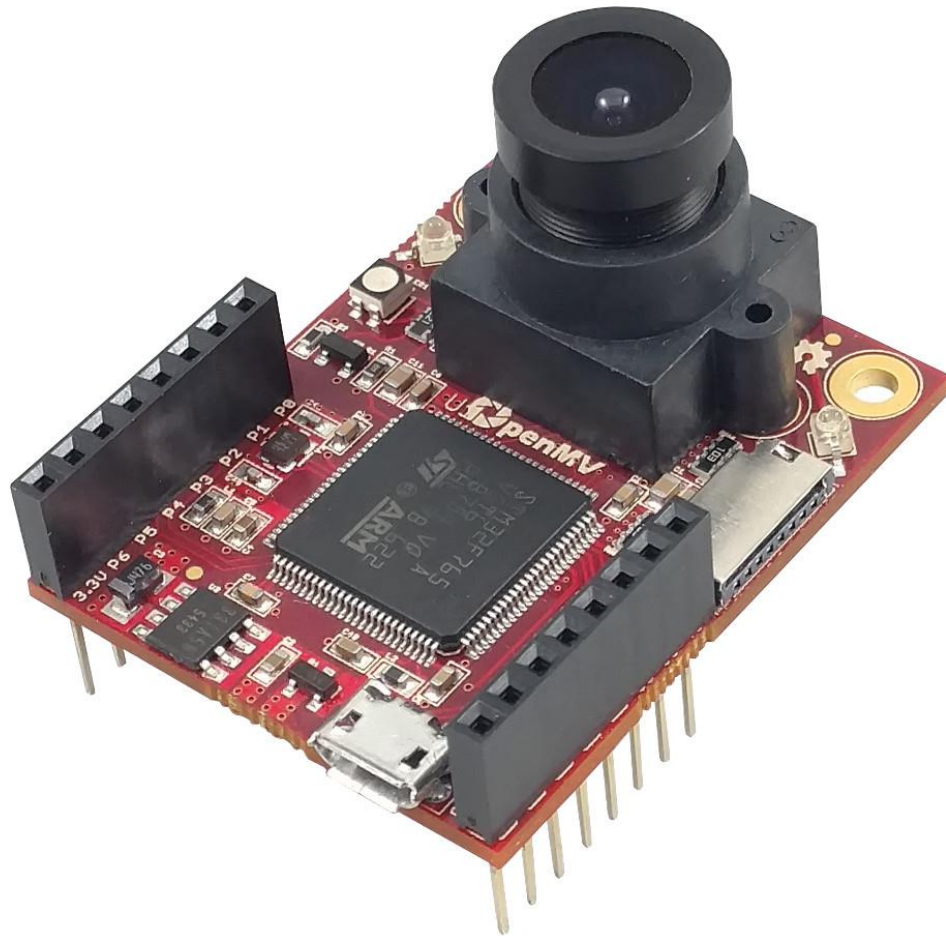
```
sudo npm install edge-impulse-linux -g --unsafe-perm
```

```
sudo apt-get install libatlas-base-dev libportaudio0 libportaudio2 libportaudiocpp0  
portaudio19-dev
```

```
pip3 install edge_impulse_linux -i https://pypi.python.org/simple
```




# Vision Artificial





# Model Definition

Image data



Input axes

image

Image width


96



Image height

96


Resize mode

Fit shortest



Image




Name


Image

Input axes (1)

☒ image



Transfer Learning (Images)



Name


Transfer learning

Input features


☒ Image

Output features

3 (apple, banana, grapes)




Output features



3 (apple, banana, grapes)

Save Impulse

# Crop and Scale Input Images



**Image data** 



**Input axes**  
image

**Image width**

**Image height**

**Resize mode**



96x96



# MobileNet Versions

MobileNetV1	96x96	0.1
Model Version	Input image size	Imagenet Classification Accuracy



# MobileNet Versions

## MobileNetV1 96x96 0.1

OFFICIALLY SUPPORTED

Uses around 53.2K RAM and 101K ROM with default settings and optimizations. Works best with 96x96 input size. Supports both RGB and grayscale.

Edge Impulse

Add

## MobileNetV2 96x96 0.35

OFFICIALLY SUPPORTED

Uses around 296.8K RAM and 575.2K ROM with default settings and optimizations. Works best with 96x96 input size. Supports both RGB and grayscale.

Edge Impulse

Add

## MobileNetV2 96x96 0.1

OFFICIALLY SUPPORTED

Uses around 270.2K RAM and 212.3K ROM with default settings and optimizations. Works best with 96x96 input size. Supports both RGB and grayscale.

Edge Impulse

Add



# MobileNet Versions

## MobileNetV2 160x160 1.0

OFFICIALLY SUPPORTED

Uses around 1.3M RAM and 2.6M ROM with default settings and optimizations.  
Works best with 160x160 input size. Supports RGB only.

Edge Impulse

Add

## MobileNetV2 160x160 0.75

OFFICIALLY SUPPORTED

Uses around 1.3M RAM and 1.7M ROM with default settings and optimizations.  
Works best with 160x160 input size. Supports RGB only.

Edge Impulse

Add

## MobileNetV2 160x160 0.5

OFFICIALLY SUPPORTED

Uses around 700.7K RAM and 982.4K ROM with default settings and optimizations. Works best with 160x160 input size. Supports RGB only.

Edge Impulse

Add

## MobileNetV2 160x160 0.35

OFFICIALLY SUPPORTED

Uses around 683.3K RAM and 658.4K ROM with default settings and optimizations. Works best with 160x160 input size. Supports RGB only.

Edge Impulse

Add



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# Terminal command

edge-impulse-linux-runner

<https://github.com/edgeimpulse/edge-impulse-linux-cli>

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***¡Gracias!***

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