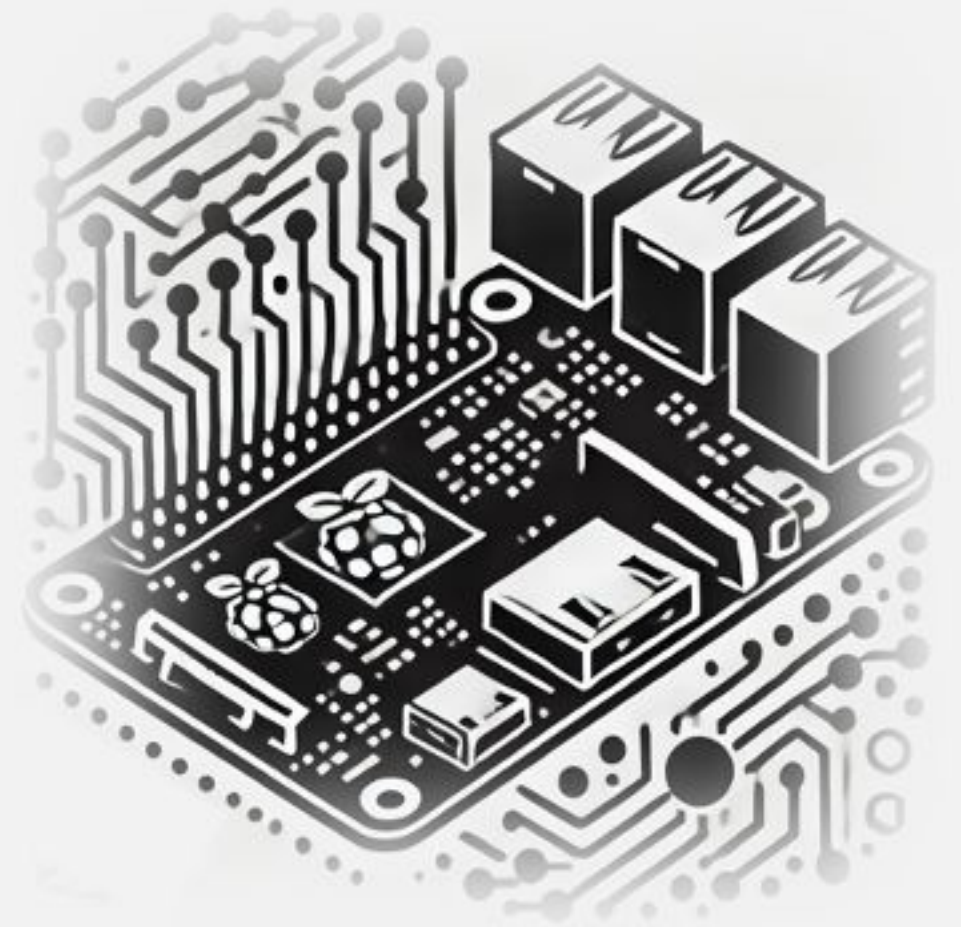


IESTI05 – Edge AI

Machine Learning System Engineering

7. Image Classification Project: Training, Test & Deploy at EI

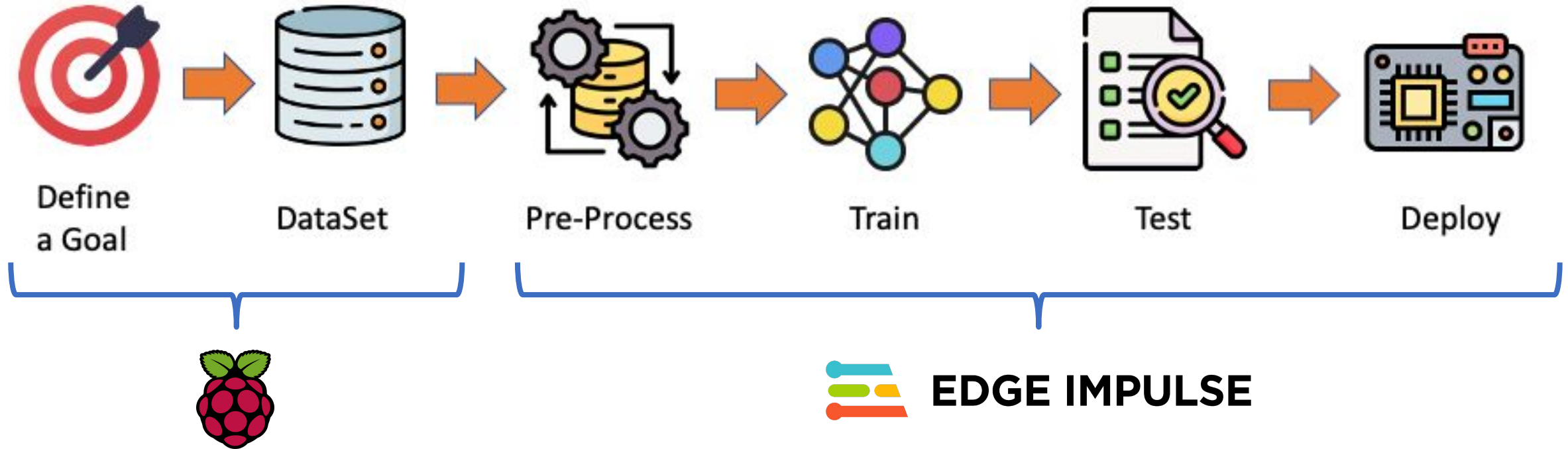


UNIFEI

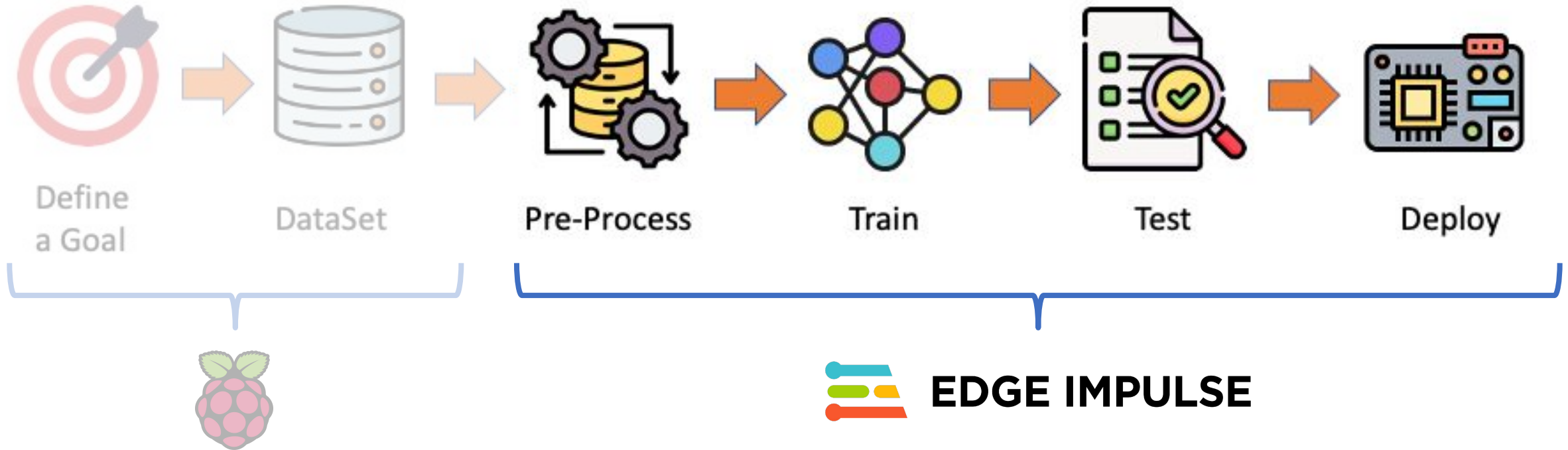
Marcelo Rovai

Professor Honoris Causa

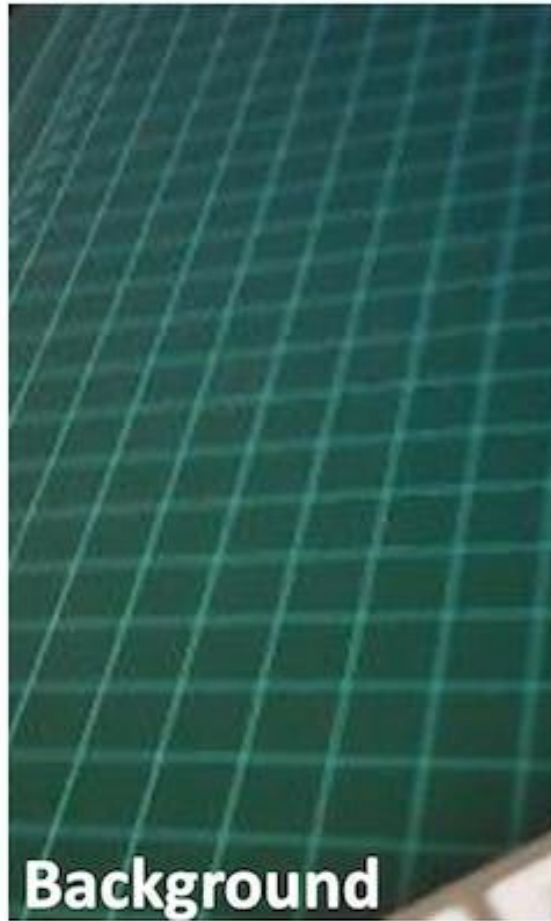
Machine Learning Workflow



Machine Learning Workflow



The Goal



Background

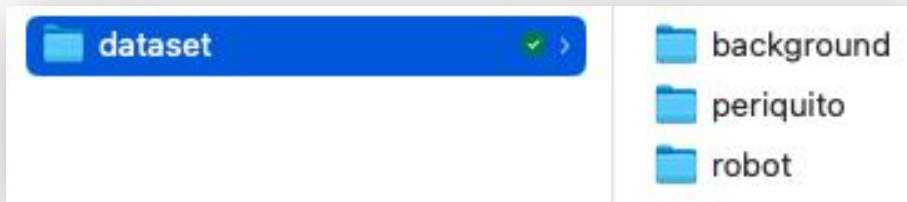
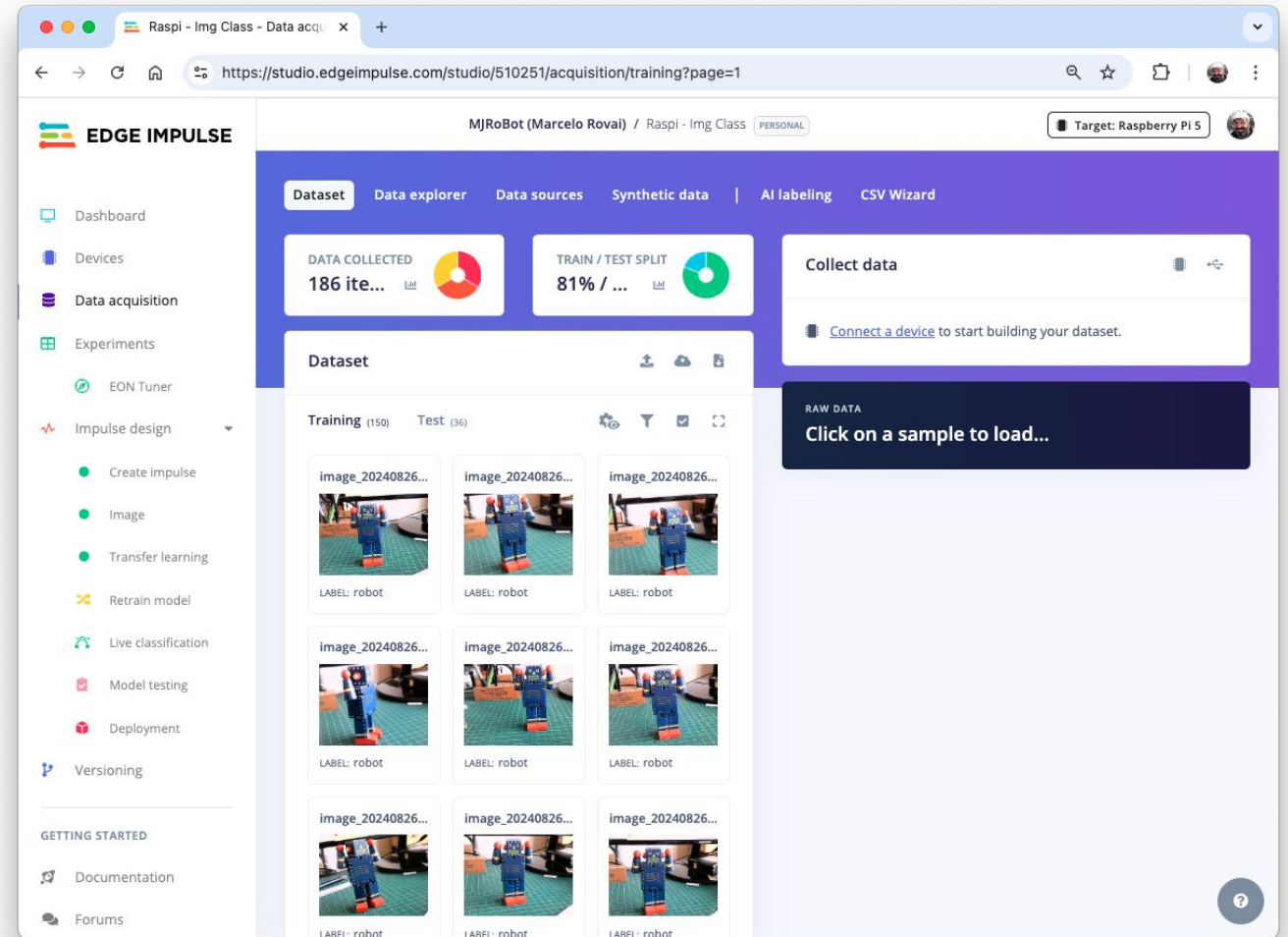


Robot



Periquito

Data Aquisition



Pre-Processing



Image data

Input axes

image

Image wi...
160

Image he...
160

Resize mode

Sq...

Image

Name

Image

Input axes (1)

☒ Image

EDGE IMPULSE

Dashboard

Devices

Data acquisition

Experiments

EON Tuner

Impulse design

Create impulse

Image

Transfer learning

Retrain model

Live classification

Model testing

Deployment

Versioning

GETTING STARTED

Documentation

Raspi - Img Class - Image - E

https://studio.edgeimpulse.com/studio/510251/impulse/1/dsp/image/3

MJRoBot (Marcelo Rovai) / Raspi - Img Class

Target: Raspberry Pi 5


Parameters

Generate features

Raw data

Show: All labels

image_20240826-201348 (r1



Raw features

0x372b2f, 0x362a2e, 0x504448, 0x665a5e, 0x7d7175, 0x918589, ...

Parameters

Image


Color depth ②

RGB

Save parameters

DSP result

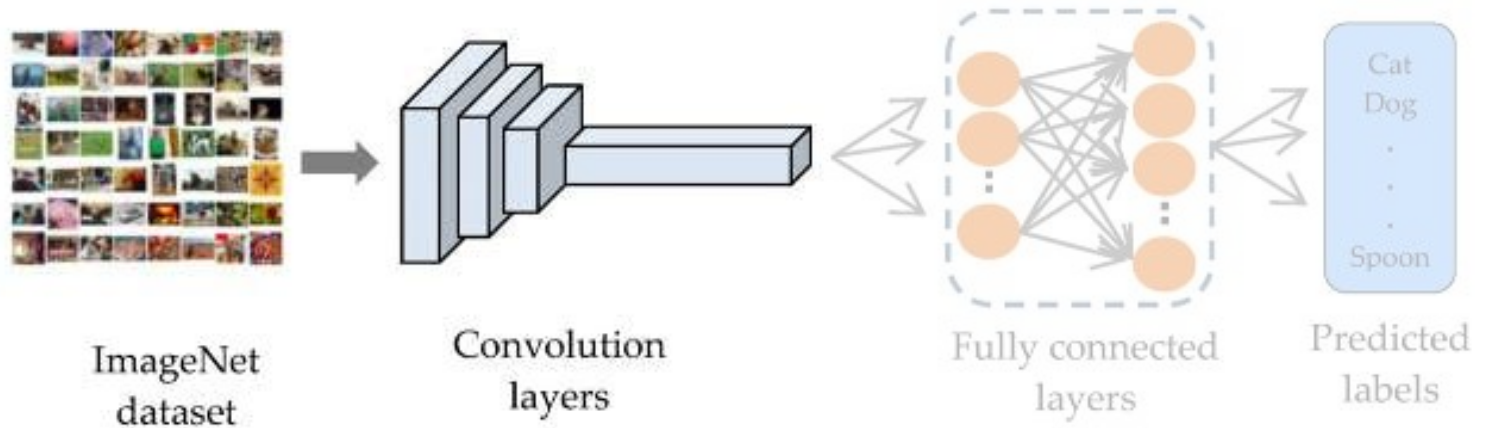
Image



Processed features

0.2157, 0.1686, 0.1843, 0.2118, 0.1647, 0.1804, 0.3137, 0.26

Model



MobileNetV2 160x160 1.0

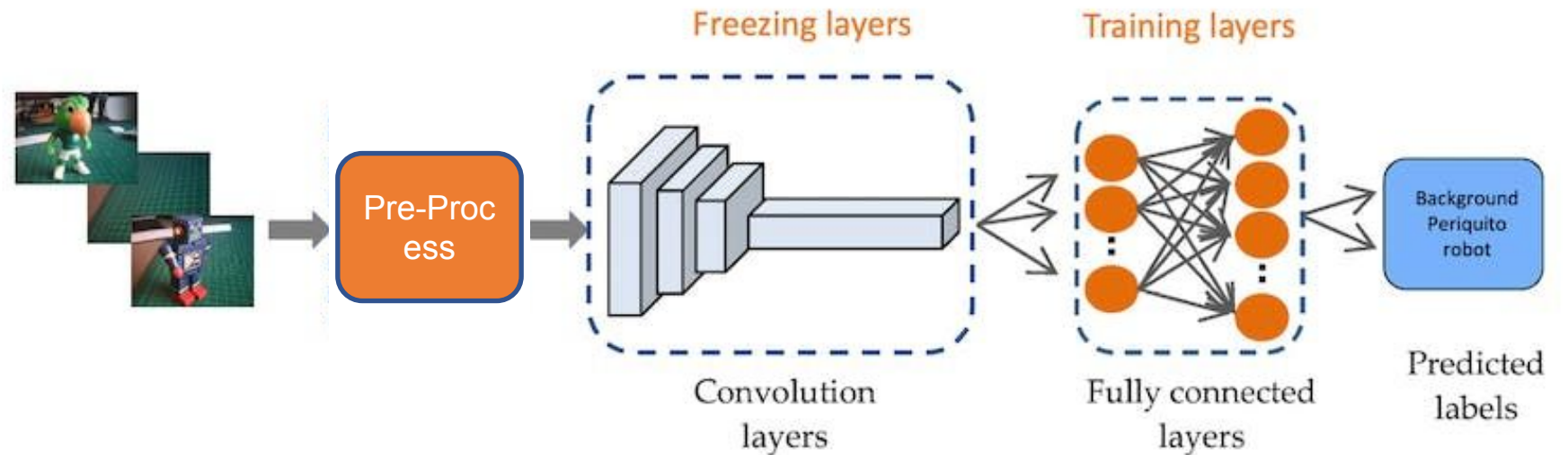
Transfer Learning (Images)

Name: Transfer learning

Input features: ☒ Image

Output features: 3 (background, periquito, robot)

Save Impulse



Train & Test



Neural Network settings

Training settings

Number of training cycles ②

Use learned optimizer ② ☐

Learning rate ②

Training processor ②

Data augmentation ② ☒

Advanced training settings

Validation set size ② %

Split train/validation set on metadata key ②


Batch size ②

Auto-weight classes ② ☐

Profile int8 model ② ☒

Neural network architecture

Input layer (76,800 features)


MobileNetV2 160x160 1.0 (no final dense layer, 0.1 dropout)

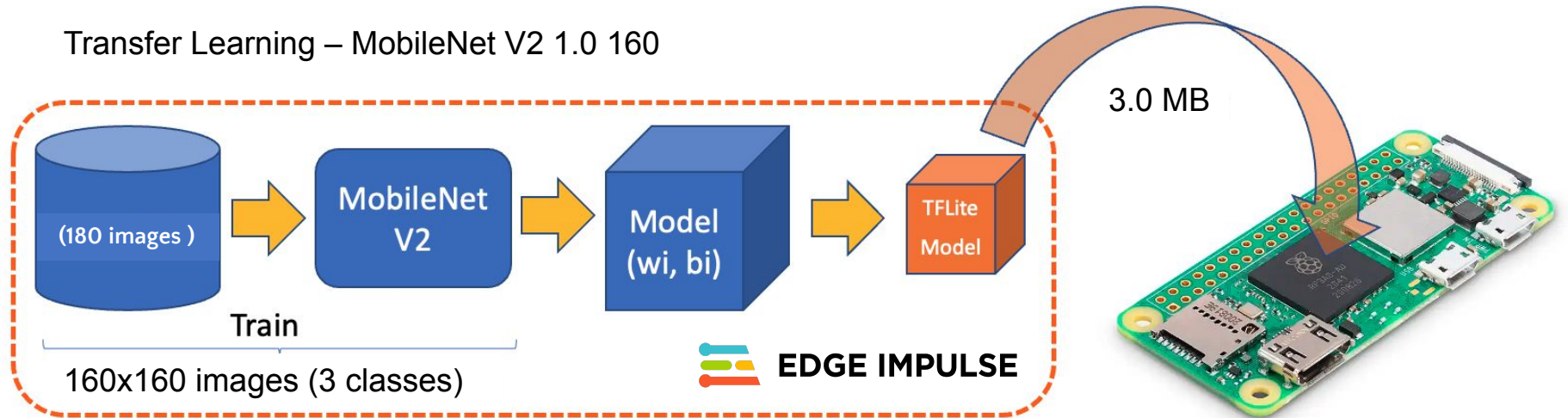
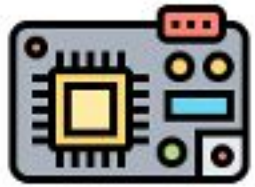
Choose a different model

Output layer (3 classes)



Deploy

Transfer Learning – MobileNet V2 1.0 160



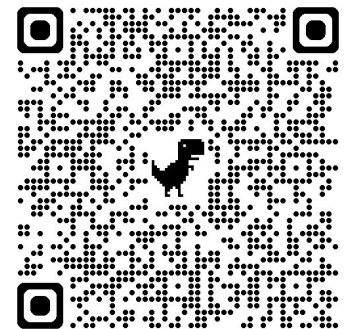
Download block output			
TITLE	TYPE	SIZE	
Image training data	NPY file	150 windows	B
Image training labels	NPY file	150 windows	B
Image testing data	NPY file	36 windows	B
Image testing labels	NPY file	36 windows	B
Transfer learning model	TensorFlow Lite (float32)	9 MB	B
Transfer learning model	TensorFlow Lite (int8 quantized)	3 MB	B
Transfer learning model	Model evaluation metrics (JSON file)	5 KB	B
Transfer learning model	TensorFlow SavedModel	8 MB	B
Transfer learning model	Keras h5 model	8 MB	B

Edge Impulse Project: Raspi - Img Class



Raspberry Pi Inference:

30_Image_Classification_edge_impulse.ipynb



Questions?



Prof. Marcelo J. Rovai

rovai@unifei.edu.br



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