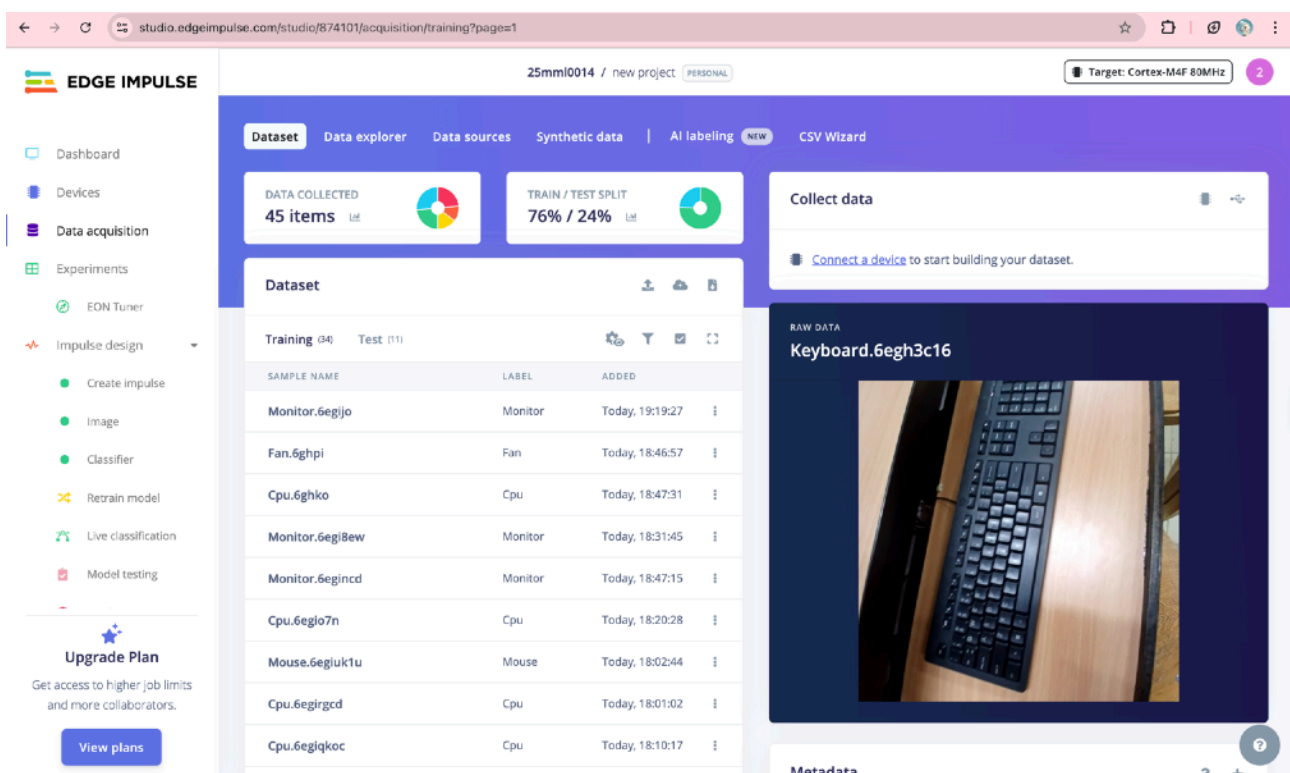
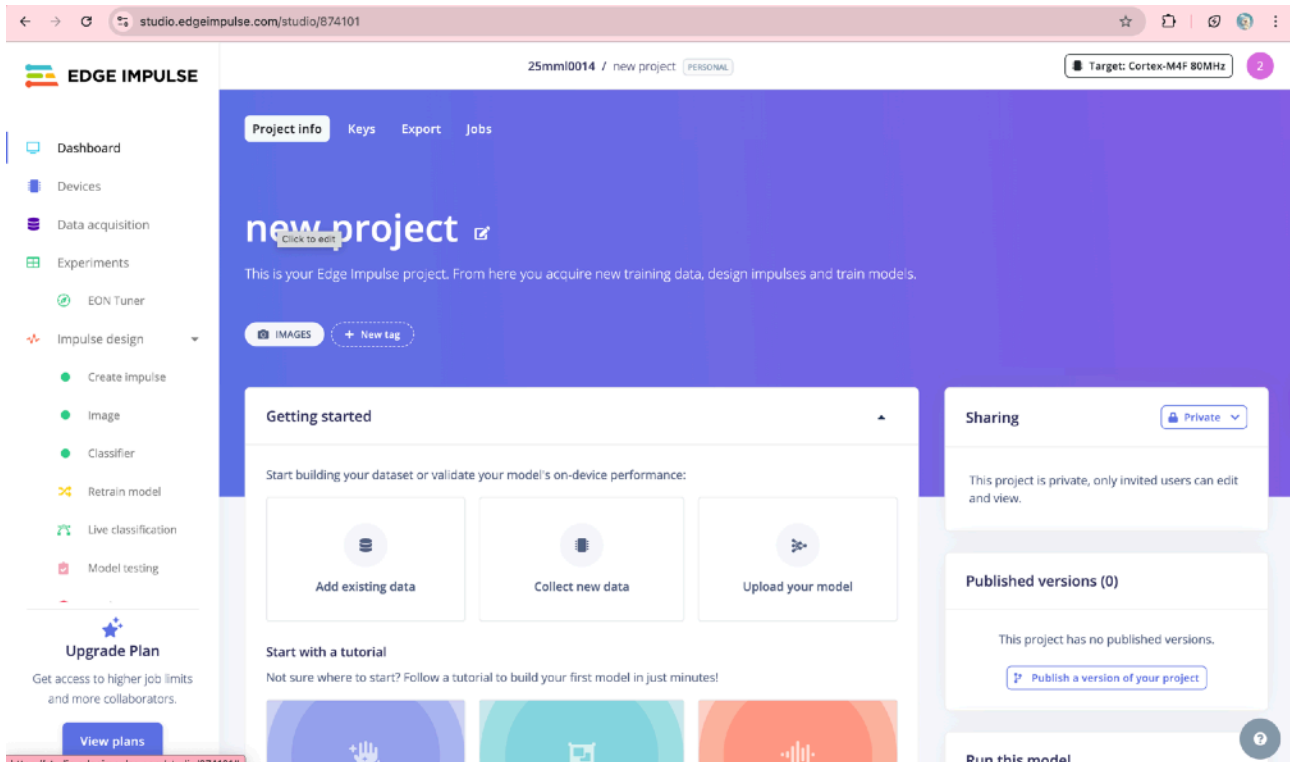


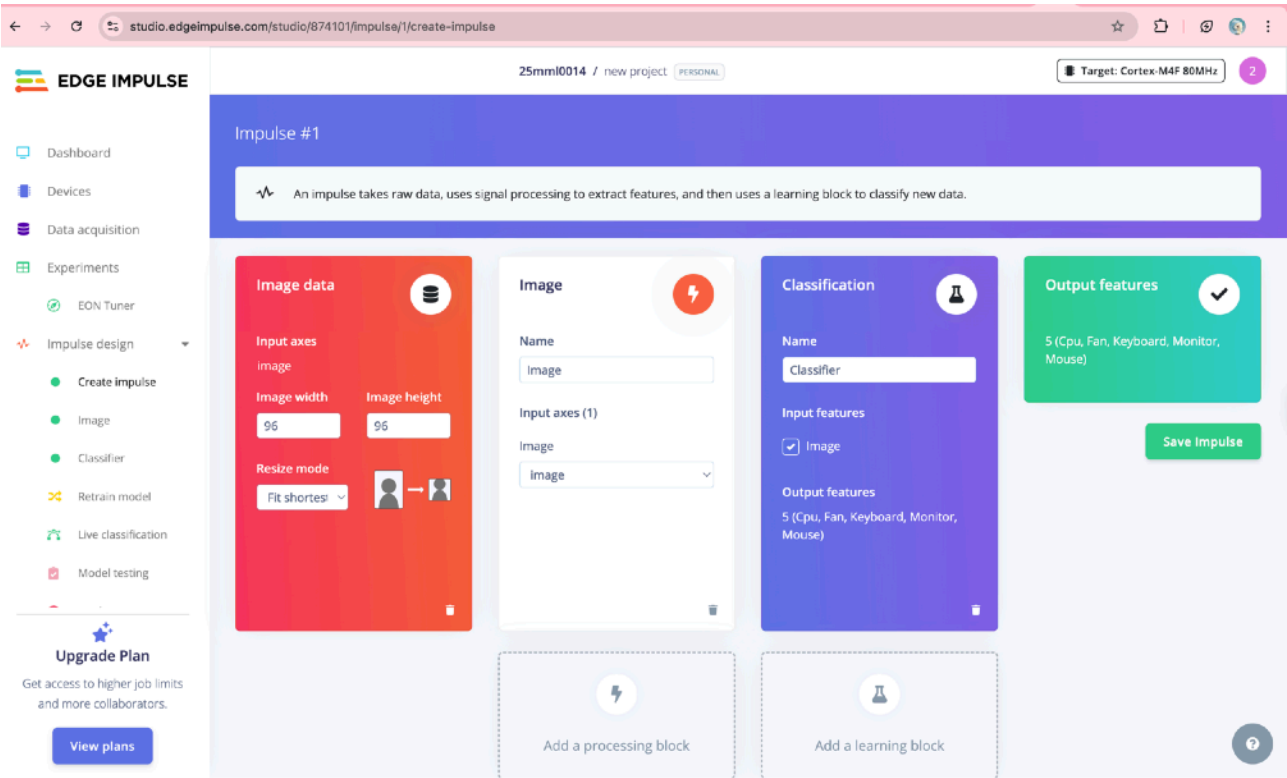
25MML0014 Anusree V

Lab 5

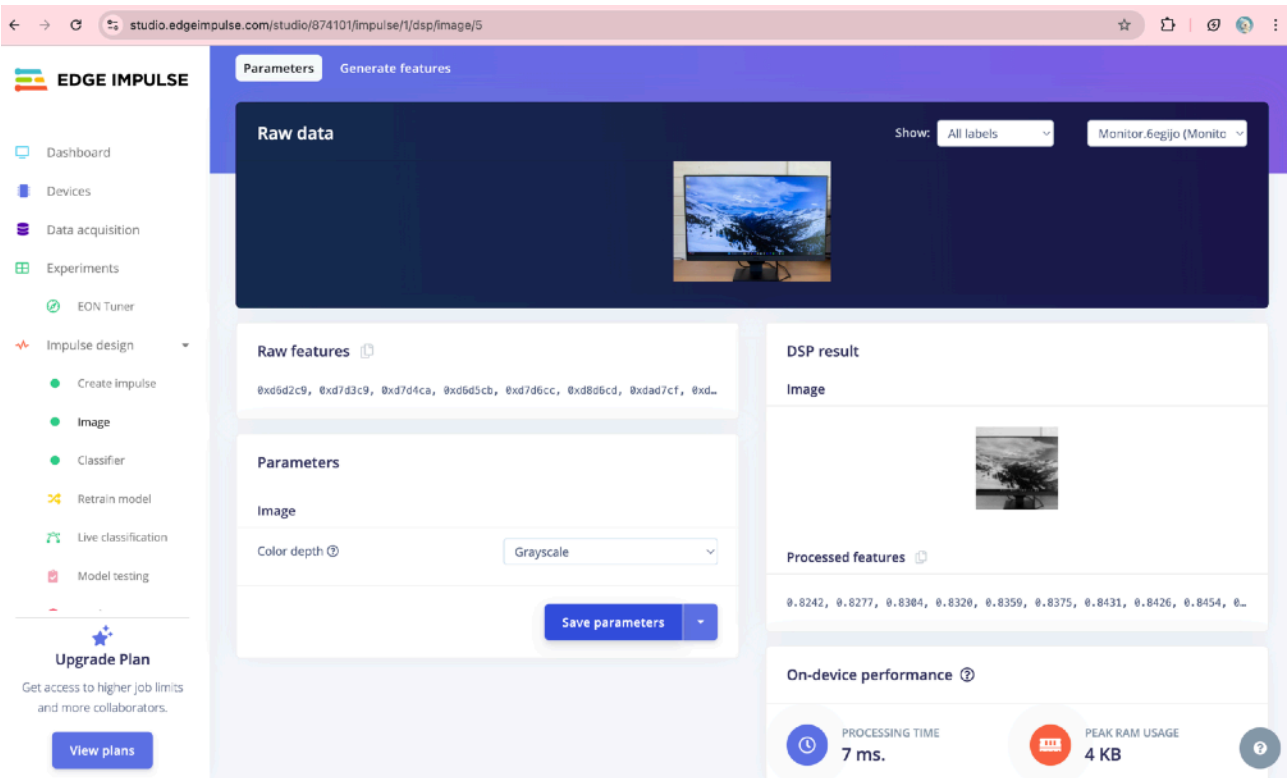
Create dataset of lab items like mouse, keyboard etc and classify the object



Create impulse



Image



Generate features

EDGE IMPULSE

Dashboard

Devices

Data acquisition

Experiments

EON Tuner

Impulse design

Create impulse

Image

Classifier

Retrain model

Live classification

Model testing

Upgrade Plan

Get access to higher job limits and more collaborators.

View plans

25mm10014 / new project

PERSONAL

Target: Cortex-M4F 80MHz

2

Parameters

Generate features

Training set

Data in training set34 items

Classes5 (Cpu, Fan, Keyboard, Monitor, Mouse)

Generate features

Feature explorer

Cpu

Fan

Keyboard

Monitor

Mouse

Feature generation output

0

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Classifier

Dashboard

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Deployment

Versioning

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View plans

25mm10014 / new project

PERSONAL

Target: Cortex-M4F 80MHz

2

Neural Network settings

Training settings

Number of training cycles30

Use learned optimizer

Learning rate0.005

Training processorCPU

Advanced training settings

Neural network architecture

Neural network

Transfer learning

Input layer (9,216 features)

2D conv / pool layer (16 filters, 3 kernel size, 1 layer)

2D conv / pool layer (32 filters, 3 kernel size, 1 layer)

Flatten layer

Dropout (rate 0.25)

Training output

Creating embeddings OK (took 1 second)

Calculating performance metrics...

Calculating float32 accuracy...

INFO: Created TensorFlow Lite XNNPACK delegate for CPU.

Calculating int8 accuracy...

Extracting TensorBoard logs...

Extracting TensorBoard logs OK

Model training complete

Extracting TensorBoard logs OK

Model training complete

Job completed (success)

Model

Model version: Quantized (int8)

Last training performance (validation set)

ACCURACY85.7%

LOSS0.76

Confusion matrix (validation set)

	CPU	FAN	KEYBOARD	MONITOR	MOUSE
CPU	100%	0%	0%	0%	0%
FAN	0%	0%	0%	100%	0%
KEYBOARD	-	-	-	-	-
MONITOR	0%	0%	0%	100%	0%

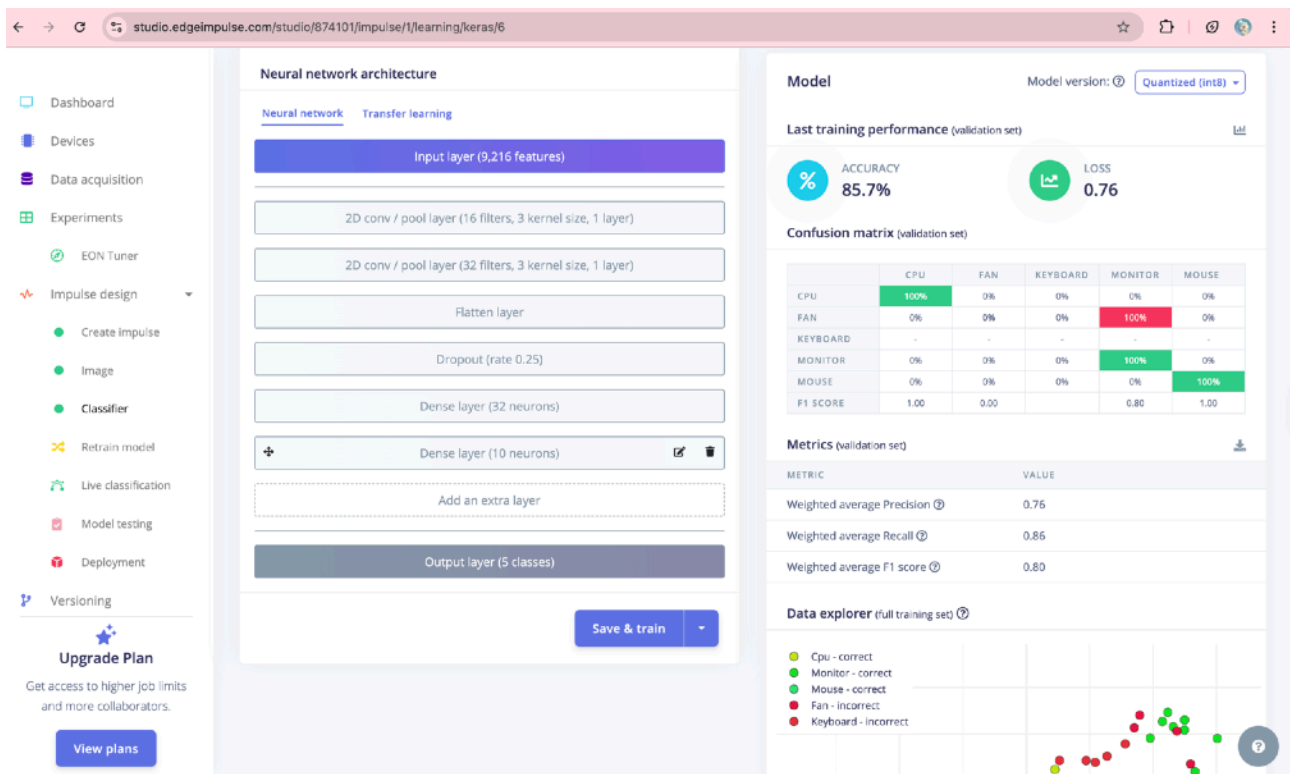
At first I got 42.7% accuracy, after doing these steps I got **85.7%** accuracy

I taken 30 training cycles

Droup out 0.3

Dense layer 32

Dense layer 10





Deployment

studio.edgeimpulse.com/studio/874101/impulse/1/deployment

EDGE IMPULSE 25mm10014 / new project PERSONAL Target: Cortex-M4F 80MHz 2

Configure your deployment

You can deploy your impulse to any device. This makes the model run without an internet connection, minimizes latency, and runs with minimal power consumption. [Read more.](#)

Deployment target

C++ library
A portable C++ library with no external dependencies, which can be compiled with any modern C++ compiler.

Inference engine

EON™ Compiler
Same accuracy, 17% less RAM.

Model optimizations and performance

Model optimizations can increase on-device performance but may reduce accuracy. Performance estimate for Cortex-M4F 80MHz - [Change target](#)


Quantized (int8)	IMAGE	CLASSIFIER	TOTAL
LATENCY	7 ms.	533 ms.	540 ms.
RAM	4.0K	183.1K	183.1K
FLASH	-	610.9K	-
ACCURACY	-	-	-

Unoptimized

IMAGE	CLASSIFIER	TOTAL
-	-	-

Run this model

Scan QR code or launch in browser to test your prototype



Launch in browser

Upgrade Plan
Get access to higher job limits and more collaborators.
[View plans](#)

Task 2:

Obtain gaggle dataset and upload and classify the object

I took fruits dataset

The screenshot shows the Edge Impulse Studio interface for a dataset named '25mm10014 / fruits'. The left sidebar contains navigation links: Dashboard, Devices, Data acquisition, Experiments, EON Tuner, and Impulse design. The main area displays the 'Dataset' tab with a table of training and test items. The table has columns for Sample Name, Label, and Added. The training items are all labeled 'banana' and were added today. The test items are also labeled 'banana'. To the right of the table, there is a 'Collect data' section with a 'Connect a device' button. Below the table, there is a 'RAW DATA' section showing a preview of 'Image_17', which is a photo of a bunch of yellow bananas. The bottom right corner shows a 'Metadata' section with a question mark icon.

SAMPLE NAME	LABEL	ADDED
Image_17	banana	Today, 17:13:11
Image_33	banana	Today, 17:13:09
Image_31	banana	Today, 17:13:08
Image_10	banana	Today, 17:13:08
Image_9	banana	Today, 17:13:07
Image_21	banana	Today, 17:13:07
Image_39	banana	Today, 17:13:05
Image_4	banana	Today, 17:13:04
Image_8	banana	Today, 17:13:04

The screenshot shows the 'Create Impulse' page in Edge Impulse Studio for the '25mm10014 / fruits' dataset. The page is titled 'Impulse #1' and includes a description: 'An impulse takes raw data, uses signal processing to extract features, and then uses a learning block to classify new data.' The main area is divided into four colored blocks: 'Image data' (red), 'Image' (light blue), 'Classification' (purple), and 'Output features' (green). The 'Image data' block shows input axes (image), image width (96), image height (96), and a resize mode (Fit shortest). The 'Image' block shows a name (Image), input axes (1), and a dropdown menu (image). The 'Classification' block shows a name (Classifier), input features (Image), and output features (9 (Mango, apple, banana, cherry, chickoo, grapes, kiwi, orange, stawberry)). The 'Output features' block shows the same list of fruits. A 'Save Impulse' button is located at the bottom right. At the bottom of the page, there are two buttons: 'Add a processing block' and 'Add a learning block'.

EDGE IMPULSE

Dashboard

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Impulse design

Create impulse

Image

Classifier

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Upgrade Plan

Get access to higher job limits and more collaborators.

View plans


25mm10014 / fruits PERSONAL

Target: Cortex-M4F 80MHz 2

ParametersGenerate features

Raw data

Show: All labelsImage_17 (banana)



Raw features

0x385709, 0x56791f, 0x6e8c36, 0x739132, 0x5e8220, 0x29460c, 0x183404, 0x3...

Parameters


Image

Color depth RGB

Save parameters

DSP result

Image



Processed features

0.2196, 0.3412, 0.0353, 0.3373, 0.4745, 0.1216, 0.4314, 0.5490, 0.2118, 0...

On-device performance

EDGE IMPULSE

Dashboard

Devices

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Create impulse

Image

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Retrain model

Live classification

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Upgrade Plan

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View plans

25mm10014 / fruits PERSONAL

Target: Cortex-M4F 80MHz 2

Neural Network settings

Training settings

Number of training cycles 25

Use learned optimizer

Learning rate 0.0005

Training processor CPU

Advanced training settings

Neural network architecture

Neural networkTransfer learning

Input layer (27,648 features)

2D conv / pool layer (16 filters, 3 kernel size, 1 layer)

2D conv / pool layer (32 filters, 3 kernel size, 1 layer)

Flatten layer

Dropout (rate 0.3)

Training output

Model

Model version: Quantized (int8)

Last training performance (validation set)

ACCURACY 48.2%

LOSS 1.38

Confusion matrix (validation set)

	MANGO	APPLE	BANANA	CHERRY	CHICKO	GRAPES	KIWI	ORANGI	STAWBE
MANGO	14.3%	0%	28.0%	0%	14.3%	14.3%	14.3%	14.3%	0%
APPLE	0%	83.3%	0%	16.7%	0%	0%	0%	0%	0%
BANANA	25%	0%	62.5%	0%	0%	0%	12.5%	0%	0%
CHERRY	0%	0%	0%	50%	40%	0%	0%	0%	0%
CHICKO	0%	14.3%	14.3%	0%	14.3%	14.3%	42.9%	0%	0%
GRAPES	0%	0%	0%	0%	16.7%	66.7%	0%	0%	16.7%
KIWI	0%	0%	10%	0%	50%	0%	40%	0%	0%
ORANGI	25%	0%	0%	0%	0%	0%	75%	0%	0%
STAWBE	0%	33.3%	0%	33.3%	0%	0%	0%	0%	33.3%
F1 SCO	0.18	0.77	0.59	0.50	0.12	0.67	0.42	0.75	0.40

Metrics (validation set)

METRIC	VALUE
Area under ROC Curve	0.87
Weighted average Precision	0.48

Neural network architecture

Neural network Transfer learning

Input layer (27,648 features)

2D conv / pool layer (16 filters, 3 kernel size, 1 layer)

2D conv / pool layer (32 filters, 3 kernel size, 1 layer)

Flatten layer

Dropout (rate 0.3)

Dense layer (64 neurons)

Dense layer (128 neurons)

Add an extra layer

Output layer (9 classes)

Save & train

Metrics (validation set)

Metric	Value
Area under ROC Curve	0.87
Weighted average Precision	0.48
Weighted average Recall	0.48
Weighted average F1 score	0.48

Data explorer (full training set)

- Mango - correct
- apple - correct
- banana - correct
- cherry - correct
- chickoo - correct
- grapes - correct
- kiwi - correct
- orange - correct
- stawberry - correct
- Mango - incorrect
- apple - incorrect
- banana - incorrect
- cherry - incorrect
- chickoo - incorrect
- grapes - incorrect
- blue - incorrect

Dense layer 64 and 128 are added

Drop out 0.3

Deployment is scanned through mobile phone I scanned and object with uploaded gagggle dataset

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Quantized (int8) **Selected**

	IMAGE	CLASSIFIER	TOTAL
LATENCY	7 ms.	848 ms.	855 ms.
RAM	4.0K	183.2K	183.2K
FLASH	-	1.2M	-
ACCURACY			-

Unoptimized

	IMAGE	CLASSIFIER	TOTAL
LATENCY			
RAM			
FLASH			
ACCURACY			

Run this model

Scan QR code or launch in browser to test your prototype

Launch in browser

Finally deployed model

