

```
!python --version
!pip install --upgrade pip
!pip install mediapipe-model-maker
```

```
Python 3.10.12
Requirement already satisfied: pip in /usr/local/lib/python3.10/dist-packages (23.1.2)
Collecting pip
  Downloading pip-23.3.2-py3-none-any.whl (2.1 MB)
    2.1/2.1 MB 9.1 MB/s eta 0:00:00
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 23.1.2
    Uninstalling pip-23.1.2:
      Successfully uninstalled pip-23.1.2
  Successfully installed pip-23.3.2
Collecting mediapipe-model-maker
  Downloading mediapipe_model_maker-0.2.1.3-py3-none-any.whl.metadata (1.6 kB)
Requirement already satisfied: absl-py in /usr/local/lib/python3.10/dist-packages (from mediapipe-model-maker) (1.4.0)
Collecting mediapipe>=0.10.0 (from mediapipe-model-maker)
  Downloading mediapipe-0.10.9-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (9.6 kB)
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (from mediapipe-model-maker) (1.23.5)
Requirement already satisfied: opencv-python in /usr/local/lib/python3.10/dist-packages (from mediapipe-model-maker) (4.8.0)
Requirement already satisfied: tensorflow>=2.10 in /usr/local/lib/python3.10/dist-packages (from mediapipe-model-maker) (2.10.0)
Collecting tensorflow-addons (from mediapipe-model-maker)
  Downloading tensorflow_addons-0.23.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (1.8 kB)
Requirement already satisfied: tensorflow-datasets in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons) (0.15.0)
Requirement already satisfied: tensorflow-hub in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons) (0.15.0)
Collecting tf-models-official>=2.13.1 (from tensorflow-addons)
  Downloading tf_models_official-2.15.0-py2.py3-none-any.whl.metadata (1.4 kB)
Requirement already satisfied: attrs>=19.1.0 in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (21.4.0)
Requirement already satisfied: flatbuffers>=2.0 in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (23.2.1)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (3.7.1)
Requirement already satisfied: opencv-contrib-python in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (4.8.0.75)
Requirement already satisfied: protobuf<4,>=3.11 in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (3.20.3)
Collecting sounddevice>=0.4.4 (from tf-models-official>=2.13.1->tf-models-official)
  Downloading sounddevice-0.4.6-py3-none-any.whl (31 kB)
Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (1.6.0)
Requirement already satisfied: gast!=0.5.0,!>=0.5.1,!>=0.5.2,>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (0.5.2)
Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (0.2.0)
Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (3.10.0)
Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (13.0.0)
Requirement already satisfied: ml-dtypes~>=0.2.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (0.2.0)
Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (2.3.2)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (23.1)
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (68.0.0)
Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (2.1.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (4.5.0)
Requirement already satisfied: wrapt<1.15,>=1.11.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (1.14.0)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (0.23.1)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (1.60.0)
Requirement already satisfied: tensorboard<2.16,>=2.15 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (2.15.0)
Requirement already satisfied: tensorflow-estimator<2.16,>=2.15.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (2.15.0)
Requirement already satisfied: keras<2.16,>=2.15.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow-addons>=2.10->tensorflow-addons) (2.15.0)
Requirement already satisfied: Cython in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (3.0.10)
Requirement already satisfied: Pillow in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (9.5.0)
Requirement already satisfied: gin-config in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (0.5.0)
Requirement already satisfied: google-api-python-client>=1.6.7 in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (2.117.0)
Collecting immutabledict (from tf-models-official>=2.13.1->tf-models-official)
  Downloading immutabledict-4.1.0-py3-none-any.whl.metadata (3.2 kB)
Requirement already satisfied: kaggle>=1.3.9 in /usr/local/lib/python3.10/dist-packages (from tf-models-official>=2.13.1->tf-models-official) (1.3.9)
```

```
from google.colab import files
import os
import tensorflow as tf
assert tf.__version__.startswith('2')
```

```
from mediapipe_model_maker import image_classifier
import matplotlib.pyplot as plt
```

```
/usr/local/lib/python3.10/dist-packages/tensorflow_addons/utils/tfa_eol_msg.py:23: UserWarning:
```

```
TensorFlow Addons (TFA) has ended development and introduction of new features.
TFA has entered a minimal maintenance and release mode until a planned end of life in May 2024.
Please modify downstream libraries to take dependencies from other repositories in our TensorFlow community (e.g. Keras, Keras-
```

```
For more information see: https://github.com/tensorflow/addons/issues/2807
```

```
warnings.warn(
```

```
image_path = '/content/drive/MyDrive/New'
```

```
train_data=image_classifier.Dataset.from_folder(image_path+'/train')
```

```
test_data=image_classifier.Dataset.from_folder(image_path+'/test')
```

```
validation_data=image_classifier.Dataset.from_folder(image_path+'/validation')
```

```
spec = image_classifier.SupportedModels.MOBILENET_V2
hparams = image_classifier.HParams(export_dir="exported_model")
options = image_classifier.ImageClassifierOptions(supported_model=spec, hparams=hparams)
```

```
model = image_classifier.ImageClassifier.create(
    train_data = train_data,
    validation_data = validation_data,
    options=options,
)
```

WARNING:tensorflow:`period` argument is deprecated. Please use `save\_freq` to specify the frequency in number of batches seen.  
Model: "sequential"

Layer (type)	Output Shape	Param #
keras_layer (KerasLayer)	(None, 1280)	2257984
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 36)	46116

```
=====
Total params: 2304100 (8.79 MB)
Trainable params: 46116 (180.14 KB)
Non-trainable params: 2257984 (8.61 MB)
```

None

WARNING:tensorflow:From /usr/local/lib/python3.10/dist-packages/tensorflow/python/util/dispatch.py:1260: resize\_bicubic (from tf.image) is deprecated and will be removed in a future version. Instructions for updating:

Use `tf.image.resize(...method=ResizeMethod.BICUBIC...)` instead.

Epoch 1/10

1557/1557 [=====] - 579s 366ms/step - loss: 3.8765 - accuracy: 0.0472 - val\_loss: 3.4682 - val\_accuracy: 0.0472

Epoch 2/10

1557/1557 [=====] - 249s 160ms/step - loss: 3.1913 - accuracy: 0.1879 - val\_loss: 2.5107 - val\_accuracy: 0.1879

Epoch 3/10

1557/1557 [=====] - 253s 162ms/step - loss: 2.4222 - accuracy: 0.4451 - val\_loss: 1.8535 - val\_accuracy: 0.4451

Epoch 4/10

1557/1557 [=====] - 261s 167ms/step - loss: 2.0054 - accuracy: 0.5706 - val\_loss: 1.5631 - val\_accuracy: 0.5706

Epoch 5/10

1557/1557 [=====] - 236s 151ms/step - loss: 1.8096 - accuracy: 0.6378 - val\_loss: 1.4262 - val\_accuracy: 0.6378

Epoch 6/10

1557/1557 [=====] - 245s 157ms/step - loss: 1.7096 - accuracy: 0.6596 - val\_loss: 1.3447 - val\_accuracy: 0.6596

Epoch 7/10

1557/1557 [=====] - 245s 157ms/step - loss: 1.6199 - accuracy: 0.6917 - val\_loss: 1.2951 - val\_accuracy: 0.6917

Epoch 8/10

1557/1557 [=====] - 249s 160ms/step - loss: 1.5984 - accuracy: 0.6962 - val\_loss: 1.2583 - val\_accuracy: 0.6962

Epoch 9/10

1557/1557 [=====] - 240s 154ms/step - loss: 1.5454 - accuracy: 0.7241 - val\_loss: 1.2327 - val\_accuracy: 0.7241

Epoch 10/10

1557/1557 [=====] - 252s 162ms/step - loss: 1.5250 - accuracy: 0.7286 - val\_loss: 1.2160 - val\_accuracy: 0.7286

12/12 [=====] - 52s 4s/step - loss: 1.2187 - accuracy: 0.8412

Test loss:1.218685507774353, Test accuracy:0.8412256240844727

```
loss, acc = model.evaluate(test_data)
print(f'Test loss:{loss}, Test accuracy:{acc}')
```

```
12/12 [=====] - 52s 4s/step - loss: 1.2187 - accuracy: 0.8412
Test loss:1.218685507774353, Test accuracy:0.8412256240844727
```

```
model.export_model()
```

```
!ls exported_model
files.download('exported_model/veg_mobilenet_metadata.tflite')
```

```
checkpoint metadata.json model.tflite summaries
```

```
hparams=image_classifier.HParams(epochs=20, export_dir="exported_model_2")
options = image_classifier.ImageClassifierOptions(supported_model=spec, hparams=hparams)
options.model_options = image_classifier.ModelOptions(dropout_rate = 0.07)
model_2 = image_classifier.ImageClassifier.create(
    train_data = train_data,
    validation_data = validation_data,
    options=options,
)
```

WARNING:tensorflow:`period` argument is deprecated. Please use `save\_freq` to specify the frequency in number of batches see Model: "sequential\_2"

Layer (type)	Output Shape	Param #
keras_layer_2 (KerasLayer)	(None, 1280)	2257984
dropout_2 (Dropout)	(None, 1280)	0
dense_2 (Dense)	(None, 36)	46116

=====  
 Total params: 2304100 (8.79 MB)  
 Trainable params: 46116 (180.14 KB)  
 Non-trainable params: 2257984 (8.61 MB)

None

Resuming from exported\_model\_2/checkpoint/model-0015

Epoch 1/20

1557/1557 [=====] - 255s 159ms/step - loss: 1.3881 - accuracy: 0.7945 - val\_loss: 1.1330 - val\_accu

Epoch 2/20

1557/1557 [=====] - 246s 158ms/step - loss: 1.3785 - accuracy: 0.7961 - val\_loss: 1.1257 - val\_accu

Epoch 3/20

1557/1557 [=====] - 245s 157ms/step - loss: 1.3716 - accuracy: 0.7932 - val\_loss: 1.1264 - val\_accu

Epoch 4/20

1557/1557 [=====] - 244s 157ms/step - loss: 1.3667 - accuracy: 0.7974 - val\_loss: 1.1232 - val\_accu

Epoch 5/20

1557/1557 [=====] - 232s 149ms/step - loss: 1.3551 - accuracy: 0.8044 - val\_loss: 1.1181 - val\_accu

Epoch 6/20

1557/1557 [=====] - 234s 150ms/step - loss: 1.3470 - accuracy: 0.8096 - val\_loss: 1.1233 - val\_accu

Epoch 7/20

1557/1557 [=====] - 222s 143ms/step - loss: 1.3663 - accuracy: 0.8009 - val\_loss: 1.1202 - val\_accu

Epoch 8/20

1557/1557 [=====] - 224s 144ms/step - loss: 1.3570 - accuracy: 0.8121 - val\_loss: 1.1211 - val\_accu

Epoch 9/20

1557/1557 [=====] - 227s 146ms/step - loss: 1.3673 - accuracy: 0.8054 - val\_loss: 1.1202 - val\_accu

Epoch 10/20

1557/1557 [=====] - 242s 155ms/step - loss: 1.3528 - accuracy: 0.8070 - val\_loss: 1.1216 - val\_accu

Epoch 11/20

1557/1557 [=====] - 249s 160ms/step - loss: 1.3473 - accuracy: 0.8205 - val\_loss: 1.1199 - val\_accu

Epoch 12/20

1557/1557 [=====] - 245s 157ms/step - loss: 1.3721 - accuracy: 0.8147 - val\_loss: 1.1236 - val\_accu

Epoch 13/20

1557/1557 [=====] - 244s 157ms/step - loss: 1.3656 - accuracy: 0.8166 - val\_loss: 1.1239 - val\_accu

Epoch 14/20

1557/1557 [=====] - 243s 156ms/step - loss: 1.3552 - accuracy: 0.8224 - val\_loss: 1.1262 - val\_accu

Epoch 15/20

1557/1557 [=====] - 235s 151ms/step - loss: 1.3649 - accuracy: 0.8125 - val\_loss: 1.1312 - val\_accu

Epoch 16/20

1557/1557 [=====] - 235s 151ms/step - loss: 1.3554 - accuracy: 0.8224 - val\_loss: 1.1304 - val\_accu

Epoch 17/20

1557/1557 [=====] - 259s 166ms/step - loss: 1.3501 - accuracy: 0.8317 - val\_loss: 1.1329 - val\_accu

Epoch 18/20

1557/1557 [=====] - 240s 154ms/step - loss: 1.3659 - accuracy: 0.8240 - val\_loss: 1.1344 - val\_accu

Epoch 19/20

1557/1557 [=====] - 245s 157ms/step - loss: 1.3612 - accuracy: 0.8253 - val\_loss: 1.1386 - val\_accu

Epoch 20/20

loss, accuracy = model\_2.evaluate(test\_data)

12/12 [=====] - 45s 4s/step - loss: 1.1388 - accuracy: 0.9025

model.export\_model()