

Cell 5

```
Using training root: /content/data/raw/tmp_extract/training/training
Using validation root: /content/data/raw/tmp_extract/validation/validation
Detected classes: ['n0', 'n1', 'n2', 'n3', 'n4', 'n5', 'n6', 'n7', 'n8', 'n9']
Combined pool ready at: /content/data/raw/monkeys_combined
Prepared dataset at: /content/data/prepared
```

Cell 6

```
Found 953 files belonging to 10 classes.
Found 207 files belonging to 10 classes.
Found 209 files belonging to 10 classes.
Classes: ['n0', 'n1', 'n2', 'n3', 'n4', 'n5', 'n6', 'n7', 'n8', 'n9']
```

Cell 7

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/mobilenet_v2/mobilenet_v2_weights_tf_dim_ordering_tf_kernels_1.0_224_no_top.h5
9406464/9406464   0s 0us/step
Model: "f1_mobilenetv2_kerasapp"
Layer (type)          Output Shape         Param #
input_layer_2 (InputLayer)     (None, 224, 224, 3)           0
true_divide (TrueDivide)      (None, 224, 224, 3)           0
subtract (Subtract)          (None, 224, 224, 3)           0
mobilenetv2_1.00_224
  (Functional)                (None, 7, 7, 1280)        2,257,984
global_average_pooling2d
  (GlobalAveragePooling2D)    (None, 1280)             0
dropout (Dropout)            (None, 1280)             0
dense (Dense)                (None, 10)              12,810
Total params: 2,270,794 (8.66 MB)
Trainable params: 12,810 (50.04 KB)
Non-trainable params: 2,257,984 (8.61 MB)
```

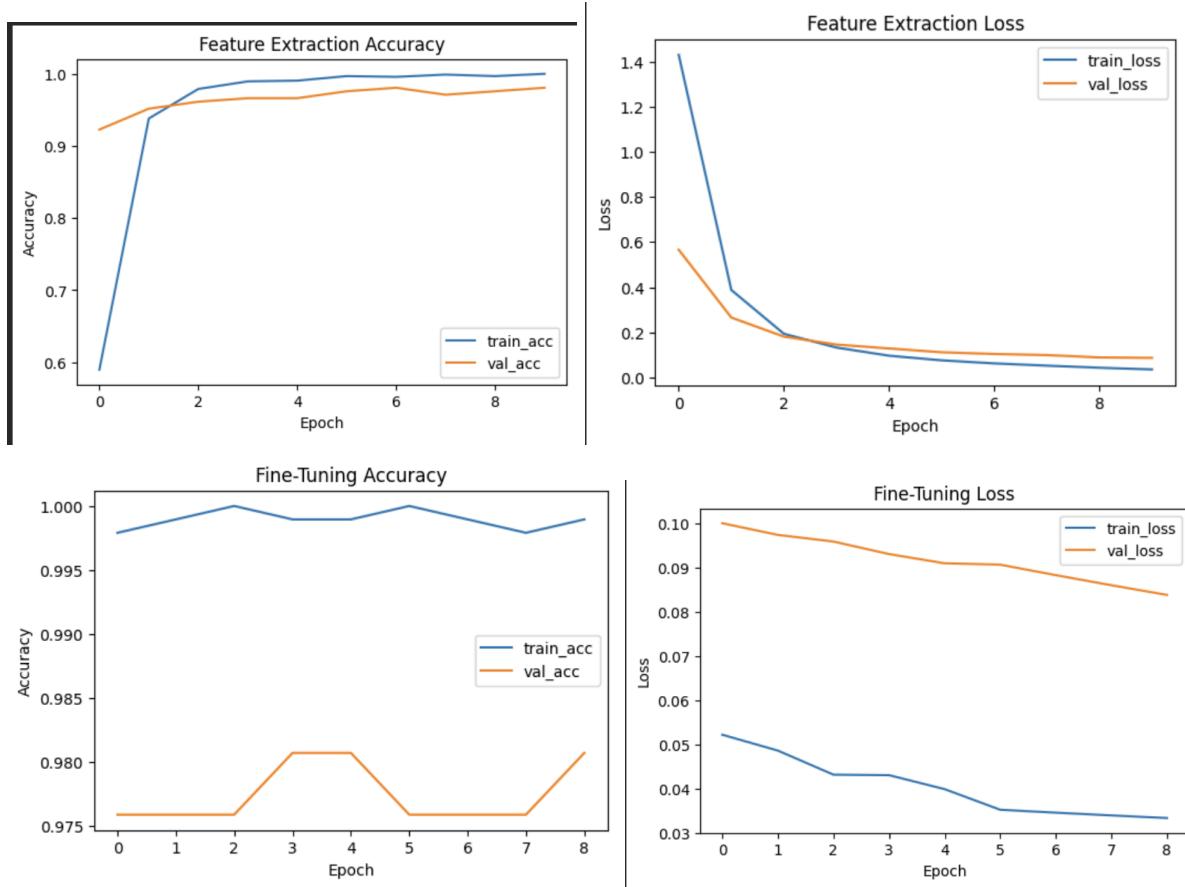
Cell 9

```
Epoch 1/10
30/30      67s 2s/step - accuracy: 0.3840 - loss: 1.8982 - val_accuracy: 0.9227 - val_loss: 0.5658 - learning_rate: 0.0010
Epoch 2/10
30/30      2s 65ms/step - accuracy: 0.9312 - loss: 0.4394 - val_accuracy: 0.9517 - val_loss: 0.2654 - learning_rate: 0.0010
Epoch 3/10
30/30      2s 49ms/step - accuracy: 0.9810 - loss: 0.2033 - val_accuracy: 0.9614 - val_loss: 0.1811 - learning_rate: 0.0010
Epoch 4/10
30/30      1s 49ms/step - accuracy: 0.9902 - loss: 0.1362 - val_accuracy: 0.9662 - val_loss: 0.1457 - learning_rate: 0.0010
Epoch 5/10
30/30      1s 33ms/step - accuracy: 0.9883 - loss: 0.0943 - val_accuracy: 0.9662 - val_loss: 0.1286 - learning_rate: 0.0010
Epoch 6/10
30/30      1s 49ms/step - accuracy: 0.9975 - loss: 0.0738 - val_accuracy: 0.9758 - val_loss: 0.1117 - learning_rate: 0.0010
Epoch 7/10
30/30      1s 50ms/step - accuracy: 0.9948 - loss: 0.0595 - val_accuracy: 0.9887 - val_loss: 0.1041 - learning_rate: 0.0010
Epoch 8/10
30/30      1s 34ms/step - accuracy: 0.9993 - loss: 0.0504 - val_accuracy: 0.9710 - val_loss: 0.0992 - learning_rate: 0.0010
Epoch 9/10
30/30      1s 33ms/step - accuracy: 0.9991 - loss: 0.0409 - val_accuracy: 0.9758 - val_loss: 0.0889 - learning_rate: 0.0010
Epoch 10/10
30/30      1s 34ms/step - accuracy: 1.0000 - loss: 0.0358 - val_accuracy: 0.9807 - val_loss: 0.0868 - learning_rate: 0.0010
```

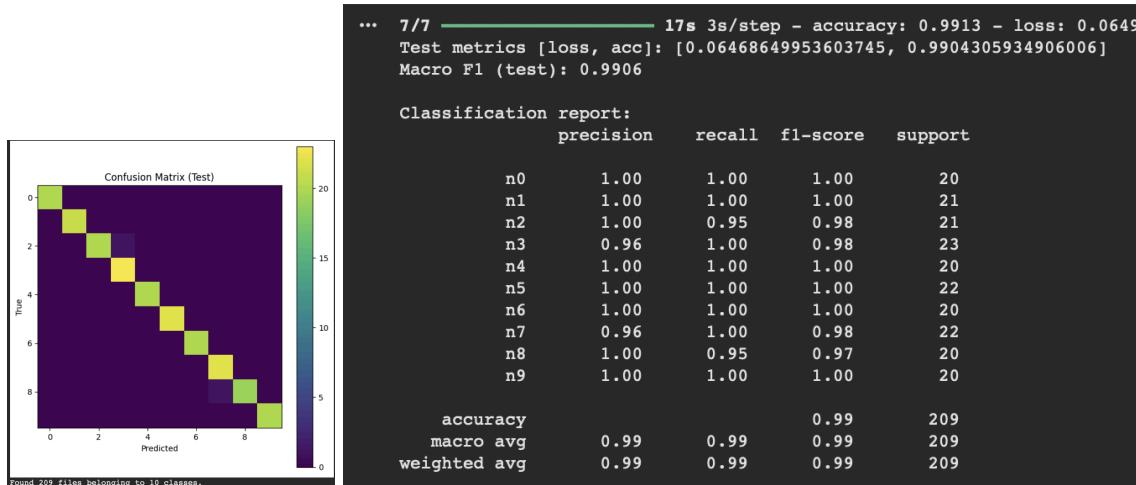
Cell 10

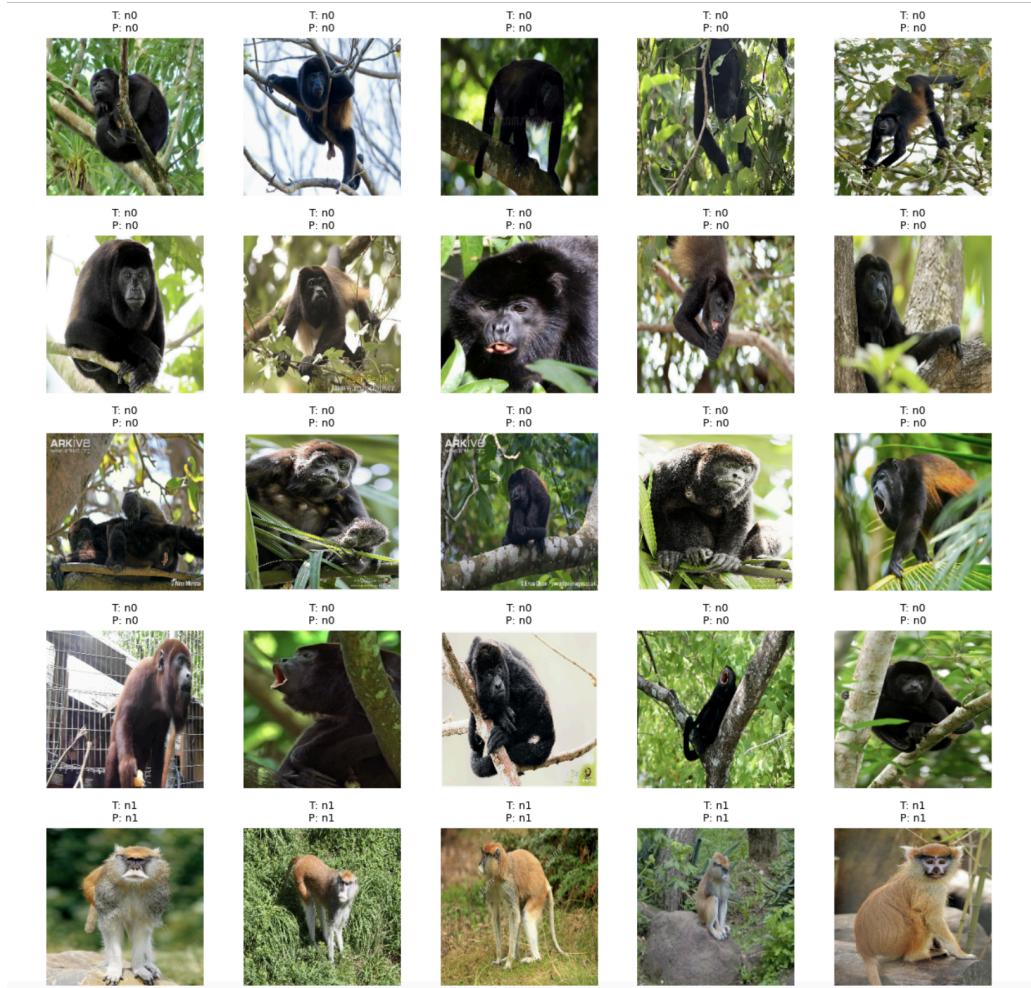
```
Epoch 1/10
30/30      22s 461ms/step - accuracy: 0.9989 - loss: 0.0498 - val_accuracy: 0.9758 - val_loss: 0.1001 - learning_rate: 1.0000e-04
Epoch 2/10
30/30      1s 36ms/step - accuracy: 0.9993 - loss: 0.0450 - val_accuracy: 0.9758 - val_loss: 0.0974 - learning_rate: 1.0000e-04
Epoch 3/10
30/30      1s 33ms/step - accuracy: 1.0000 - loss: 0.0400 - val_accuracy: 0.9758 - val_loss: 0.0959 - learning_rate: 1.0000e-04
Epoch 4/10
30/30      1s 50ms/step - accuracy: 0.9993 - loss: 0.0409 - val_accuracy: 0.9887 - val_loss: 0.0931 - learning_rate: 1.0000e-04
Epoch 5/10
30/30      1s 33ms/step - accuracy: 0.9988 - loss: 0.0371 - val_accuracy: 0.9887 - val_loss: 0.0910 - learning_rate: 1.0000e-04
Epoch 6/10
30/30      1s 34ms/step - accuracy: 1.0000 - loss: 0.0341 - val_accuracy: 0.9758 - val_loss: 0.0907 - learning_rate: 1.0000e-04
Epoch 7/10
30/30      1s 33ms/step - accuracy: 0.9993 - loss: 0.0324 - val_accuracy: 0.9758 - val_loss: 0.0883 - learning_rate: 1.0000e-04
Epoch 8/10
30/30      1s 33ms/step - accuracy: 0.9976 - loss: 0.0338 - val_accuracy: 0.9758 - val_loss: 0.0861 - learning_rate: 1.0000e-04
Epoch 9/10
30/30      1s 34ms/step - accuracy: 0.9993 - loss: 0.0317 - val_accuracy: 0.9807 - val_loss: 0.0839 - learning_rate: 1.0000e-04
```

Cell 11



Cell 12





| index | true_label | pred_label | correct |
|-------|------------|------------|---------|
| 0 | 0 | n0 | n0 |
| 1 | 1 | n0 | n0 |
| 2 | 2 | n0 | n0 |
| 3 | 3 | n0 | n0 |
| 4 | 4 | n0 | n0 |

Cell 13

```
===== Iteration 1: {'lr': 0.001, 'batch': 32, 'dropout': 0.2, 'epochs': 5} =====
Found 953 files belonging to 10 classes.
Found 207 files belonging to 10 classes.
Found 209 files belonging to 10 classes.

===== Iteration 2: {'lr': 0.0003, 'batch': 32, 'dropout': 0.3, 'epochs': 5} =====
Found 953 files belonging to 10 classes.
Found 207 files belonging to 10 classes.
Found 209 files belonging to 10 classes.
WARNING:tensorflow:5 out of the last 15 calls to <function TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_c
===== Iteration 3: {'lr': 0.0001, 'batch': 64, 'dropout': 0.2, 'epochs': 5} =====
Found 953 files belonging to 10 classes.
Found 207 files belonging to 10 classes.
Found 209 files belonging to 10 classes.
WARNING:tensorflow:5 out of the last 15 calls to <function TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_c

```

| Iteration | Params | Train_Accuracy | Val_Accuracy | Test_Accuracy | Test_MacroF1 |
|-----------|---|----------------|--------------|---------------|--------------|
| 0 | {'lr': 0.001, 'batch': 32, 'dropout': 0.2, 'ep... | 0.9895 | 0.9662 | 0.9809 | 0.9812 |
| 1 | {'lr': 0.0003, 'batch': 32, 'dropout': 0.3, 'e... | 0.9224 | 0.9710 | 0.9809 | 0.9805 |
| 2 | {'lr': 0.0001, 'batch': 64, 'dropout': 0.2, 'e... | 0.2970 | 0.4106 | 0.3876 | 0.3829 |