Personal Project_04_v10_test1_3conv-layer_run49_advanced control 5_autorun

May 6, 2025

```
[1]: from tensorflow.keras.callbacks import LearningRateScheduler
     from sklearn.metrics import classification_report, confusion_matrix
     import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     %matplotlib inline
     import matplotlib.image as mpimg
     import tensorflow as tf
     import os


     ACC=0.1
     try_num = 1

     while (ACC<0.90 and try_num<50):
         # DOE factors:
         learning_rate = 0.001
         dropout_value = 0.3
         # n-conv_layers = 3
         n_units_last_layer = 2048
         n_filters_l1 = 4
         n_filters_l2 = 32

         # other factors:
         img_size = 130
         batch_size = 32
         validation_split = 0.1   # 10% for validation
         test_split = 0.00  # 0% for testing
         shuffle_buffer_size = 1000
         seed_num = 101
         desired_accuracy = 0.99  # it should be active if EarlyStoppingCallback is␣
     ↪activated
         loss = 'binary_crossentropy'
         #optimizer = tf.keras.optimizers.RMSprop(learning_rate=learning_rate)
         optimizer = tf.keras.optimizers.Adam(learning_rate=learning_rate)
         metrics = ['accuracy']
```

```python
    epochs = 16
    f_mode = 'nearest'  # fill_mode in image augmentation

    #DATA_DIR = "D:\\CS online courses\\Free DataSets\\Free Images\\Easier␣
↪portrait images_GPU_03"
    DATA_DIR = "/Users/hossein/Downloads/Easier portrait images_GPU_03"

    # Subdirectories for each class
    data_dir_woman = os.path.join(DATA_DIR, 'woman')
    data_dir_man = os.path.join(DATA_DIR, 'man')

    image_size = (img_size, img_size)  # Resize images to this size
    # Load train dataset (excluding validation & test set):
    train_dataset = tf.keras.utils.image_dataset_from_directory(
        directory = DATA_DIR,
        image_size = image_size,
        batch_size = batch_size,
        label_mode='binary',
        validation_split = validation_split + test_split,  # Total split for␣
↪val + test
        subset = "training",
        seed = seed_num
    )
    # Load validation dataset
    val_dataset = tf.keras.utils.image_dataset_from_directory(
        directory = DATA_DIR,
        image_size = image_size,
        batch_size = batch_size,
        label_mode='binary',
        validation_split = validation_split + test_split,
        subset = "validation",
        seed = seed_num
    )
    # Further manually split validation dataset to extract test dataset
    val_batches = tf.data.experimental.cardinality(val_dataset)
    # Compute test dataset size (number of batches)
    test_size = round(val_batches.numpy() * (test_split / (validation_split +␣
↪test_split)))
    # Split validation dataset into validation and test subsets
    test_dataset = val_dataset.take(test_size)
    val_dataset = val_dataset.skip(test_size)
    # Optimize for performance
    AUTOTUNE = tf.data.AUTOTUNE
    training_dataset = train_dataset.cache().shuffle(shuffle_buffer_size).
↪prefetch(buffer_size = AUTOTUNE)
    validation_dataset = val_dataset.cache().prefetch(buffer_size = AUTOTUNE)
    test_dataset = test_dataset.cache().prefetch(buffer_size = AUTOTUNE)
```

```python
    # Get the first batch of images and labels
    for images, labels in training_dataset.take(1):
            example_batch_images = images
            example_batch_labels = labels
    max_pixel = np.max(example_batch_images)

    def scheduler(epoch, lr):
        if epoch < 10:
            if epoch % 5 == 0 and epoch > 0:
                return lr / 1
            return lr
        elif epoch < 15:
            if epoch % 5 == 0 and epoch > 0:
                return lr / 2
            return lr
        elif epoch < 30:
            if epoch % 5 == 0 and epoch > 0:
                return lr / 1
            return lr
        return lr
    lr_callback = LearningRateScheduler(scheduler)

    # augmentation_model
    def augment_model():
        augmentation_model = tf.keras.Sequential([
            # Specify the input shape.
            tf.keras.Input(shape = (img_size, img_size, 3)),
            tf.keras.layers.RandomFlip("horizontal"),
            tf.keras.layers.RandomRotation(0.1, fill_mode = f_mode),
            #tf.keras.layers.RandomTranslation(0.1, 0.1, fill_mode = f_mode),
            #tf.keras.layers.RandomZoom(0.1, fill_mode=f_mode)
            ])
        return augmentation_model

    def create_and_compile_model():
        augmentation_layers = augment_model()
        model = tf.keras.Sequential([
            # Note: the input shape is the desired size of the image: 150x150
→with 3 bytes for color
            tf.keras.layers.InputLayer(shape = (img_size, img_size, 3)),
            augmentation_layers,
            tf.keras.layers.Rescaling(1./255),
            #####    CONV_LAYER_1:    #####
            tf.keras.layers.Conv2D(n_filters_l1, (4, 4), activation = 'linear'),
            tf.keras.layers.MaxPooling2D(2, 2),
            #####    CONV_LAYER_2:    #####
```

```python
        tf.keras.layers.Conv2D(n_filters_l2, (3, 3), activation = 'relu'),
        tf.keras.layers.MaxPooling2D(2, 2),
        #####    CONV_LAYER_3:    #####
        tf.keras.layers.Conv2D(64, (3, 3), activation = 'relu'),
        tf.keras.layers.MaxPooling2D(2, 2),
        tf.keras.layers.Flatten(),
        tf.keras.layers.Dropout(dropout_value),
        #####    BEFORE_LAST_LAYER:    #####
        tf.keras.layers.Dense(n_units_last_layer, activation = 'relu'),
        # It will contain a value from 0-1 where 0 for the class 'female'
↪and 1 for the 'male'
        tf.keras.layers.Dense(1, activation = 'sigmoid')])
    model.compile(
        loss = loss,
        optimizer = optimizer,
        metrics = metrics
    )
    return model


# Create the compiled but untrained model
def reset_weights(model):
    for layer in model.layers:
        if hasattr(layer, 'kernel_initializer'):
            layer.kernel.assign(layer.kernel_initializer(layer.kernel.
↪shape))
        if hasattr(layer, 'bias_initializer'):
            layer.bias.assign(layer.bias_initializer(layer.bias.shape))

model = create_and_compile_model()
reset_weights(model)  # Reset all layer weights
training_history = model.fit(training_dataset,
                             epochs=epochs,
                             validation_data=validation_dataset,
                             callbacks=[lr_callback],
                             verbose=2)
result_history = pd.DataFrame(model.history.history)
ACC = result_history['val_accuracy'].iloc[-1]
print(f"Current validation accuracy: {ACC}")
model.save('trained_model_run49_advanced_control.h5')
# Restart script
print("Reseting all weights...")
print(f'Current number of trials: {try_num}')
try_num += 1
result_history[['loss', 'val_loss']].plot(figsize=(5, 3))
result_history[['accuracy', 'val_accuracy']].plot(figsize=(5, 3))
plt.show()
print(model.metrics_names)
```

```
    print(model.evaluate(validation_dataset))
    y_true = np.concatenate([y.numpy() for _, y in validation_dataset])
    y_pred_prob = model.predict(validation_dataset)
    # Convert probabilities to class labels (0:Female or 1:Male)
    y_pred = (y_pred_prob > 0.5).astype(int).flatten()
    print("Classification Report:\n", classification_report(y_true, y_pred,
 ↪target_names=['Female', 'Male']))

result_history.head(15)
```

```
Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16

2025-05-06 09:50:50.930432: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

27/27 - 2s - 88ms/step - accuracy: 0.6690 - loss: 0.6535 - val_accuracy: 0.7128
- val_loss: 0.5310 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7527 - loss: 0.5157 - val_accuracy: 0.7660
- val_loss: 0.5428 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7986 - loss: 0.4515 - val_accuracy: 0.8191
- val_loss: 0.4753 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8210 - loss: 0.3976 - val_accuracy: 0.7872
- val_loss: 0.4179 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 64ms/step - accuracy: 0.8375 - loss: 0.3676 - val_accuracy: 0.8298
- val_loss: 0.4005 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8610 - loss: 0.3525 - val_accuracy: 0.8191
- val_loss: 0.3725 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 64ms/step - accuracy: 0.8516 - loss: 0.3440 - val_accuracy: 0.8511
- val_loss: 0.4465 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 64ms/step - accuracy: 0.8610 - loss: 0.3269 - val_accuracy: 0.8404
- val_loss: 0.4465 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8551 - loss: 0.3338 - val_accuracy: 0.8511
- val_loss: 0.3896 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8751 - loss: 0.2984 - val_accuracy: 0.8723
- val_loss: 0.3290 - learning_rate: 1.0000e-03
Epoch 11/16
```

```
27/27 - 2s - 65ms/step - accuracy: 0.8846 - loss: 0.2679 - val_accuracy: 0.8617
- val_loss: 0.3619 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8869 - loss: 0.2590 - val_accuracy: 0.8511
- val_loss: 0.3791 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8975 - loss: 0.2575 - val_accuracy: 0.8298
- val_loss: 0.4104 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.9058 - loss: 0.2211 - val_accuracy: 0.8404
- val_loss: 0.3950 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8952 - loss: 0.2491 - val_accuracy: 0.7979
- val_loss: 0.4008 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8940 - loss: 0.2376 - val_accuracy: 0.7979
- val_loss: 0.4801 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.7978723645210266
Reseting all weights…
Current number of trials: 1
```
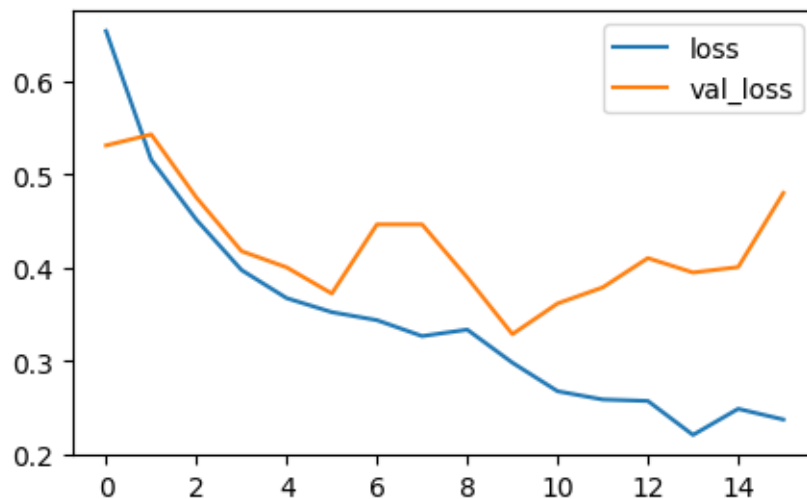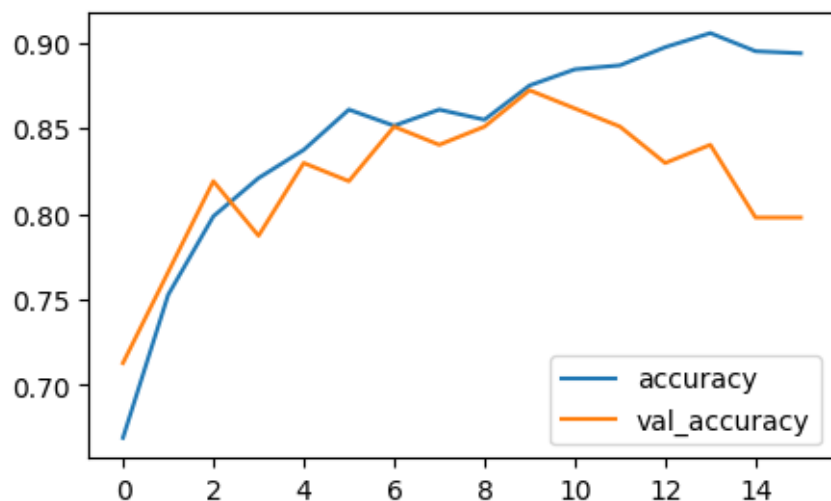
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.7661 - loss: 0.5627
[0.4801311194896698, 0.7978723645210266]
3/3              0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.79      0.73      0.76        41
        Male       0.80      0.85      0.83        53

    accuracy                           0.80        94
   macro avg       0.80      0.79      0.79        94
weighted avg       0.80      0.80      0.80        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.

2025-05-06 09:51:19.902563: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/16
27/27 - 2s - 90ms/step - accuracy: 0.5112 - loss: 0.9849 - val_accuracy: 0.6383
- val_loss: 0.6743 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6914 - loss: 0.6032 - val_accuracy: 0.7660
- val_loss: 0.4953 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7338 - loss: 0.5702 - val_accuracy: 0.7660
```

```
- val_loss: 0.5198 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7503 - loss: 0.5194 - val_accuracy: 0.8085
- val_loss: 0.4867 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7774 - loss: 0.4717 - val_accuracy: 0.8085
- val_loss: 0.4186 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.7927 - loss: 0.4485 - val_accuracy: 0.8936
- val_loss: 0.3759 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8233 - loss: 0.3921 - val_accuracy: 0.8617
- val_loss: 0.4178 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8198 - loss: 0.3976 - val_accuracy: 0.8298
- val_loss: 0.4092 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8127 - loss: 0.4083 - val_accuracy: 0.8511
- val_loss: 0.3736 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8363 - loss: 0.3738 - val_accuracy: 0.8191
- val_loss: 0.5083 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8516 - loss: 0.3336 - val_accuracy: 0.8511
- val_loss: 0.3986 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8645 - loss: 0.3126 - val_accuracy: 0.8085
- val_loss: 0.5006 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8445 - loss: 0.3533 - val_accuracy: 0.8404
- val_loss: 0.3641 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8810 - loss: 0.2893 - val_accuracy: 0.8298
- val_loss: 0.4111 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8669 - loss: 0.3059 - val_accuracy: 0.8830
- val_loss: 0.3350 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8822 - loss: 0.2744 - val_accuracy: 0.8511
- val_loss: 0.3384 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8510638475418091
Reseting all weights…
```
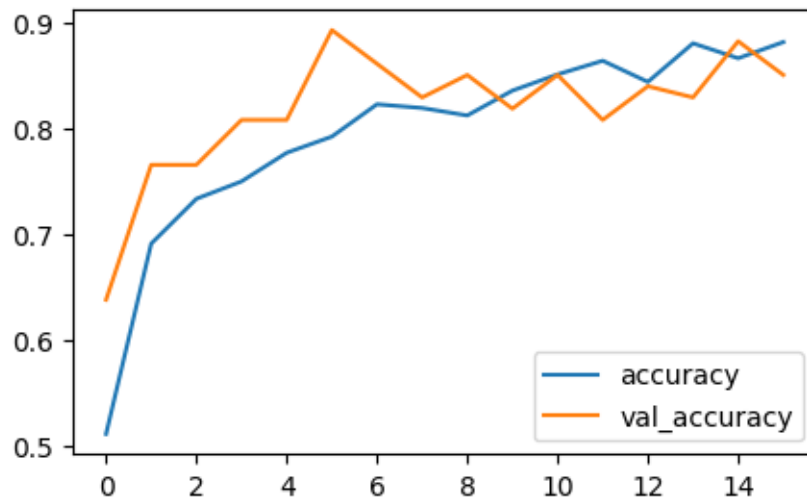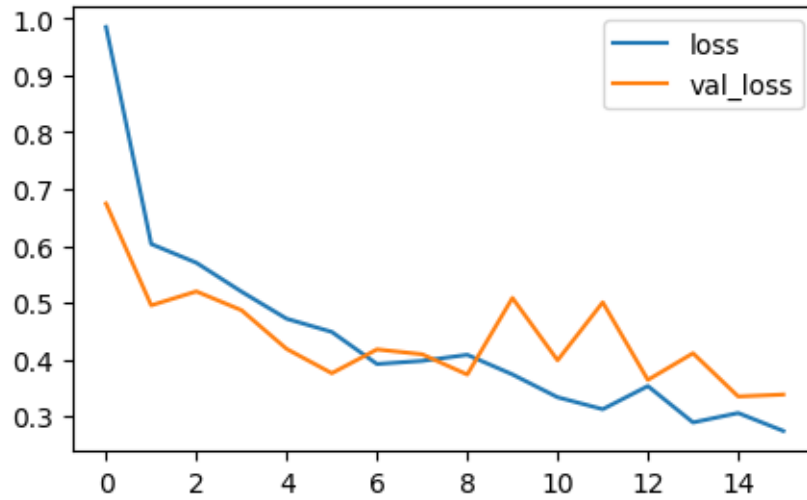
Current number of trials: 2


```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8318 - loss: 0.3826
[0.33839839696884155, 0.8510638475418091]

2025-05-06 09:51:49.476171: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

3/3              0s 26ms/step
Classification Report:
             precision     recall  f1-score     support
```

```
       Female        0.85       0.80       0.82        41
         Male        0.85       0.89       0.87        53

     accuracy                              0.85        94
    macro avg        0.85       0.85       0.85        94
 weighted avg        0.85       0.85       0.85        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.6196 - loss: 0.6936 - val_accuracy: 0.7447
- val_loss: 0.5699 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7550 - loss: 0.5303 - val_accuracy: 0.7660
- val_loss: 0.5888 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7762 - loss: 0.4803 - val_accuracy: 0.8298
- val_loss: 0.4841 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8009 - loss: 0.4378 - val_accuracy: 0.8191
- val_loss: 0.4213 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8316 - loss: 0.3881 - val_accuracy: 0.8298
- val_loss: 0.4679 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8327 - loss: 0.3978 - val_accuracy: 0.8298
- val_loss: 0.4548 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8433 - loss: 0.3711 - val_accuracy: 0.8191
- val_loss: 0.3714 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8363 - loss: 0.3672 - val_accuracy: 0.8511
- val_loss: 0.3868 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8551 - loss: 0.3309 - val_accuracy: 0.8511
- val_loss: 0.4394 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8445 - loss: 0.3473 - val_accuracy: 0.8191
- val_loss: 0.4564 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8728 - loss: 0.2965 - val_accuracy: 0.8723
- val_loss: 0.3592 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 67ms/step - accuracy: 0.8787 - loss: 0.2932 - val_accuracy: 0.8404
- val_loss: 0.3965 - learning_rate: 5.0000e-04
```

```
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8999 - loss: 0.2586 - val_accuracy: 0.8511
- val_loss: 0.4594 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8822 - loss: 0.2690 - val_accuracy: 0.8830
- val_loss: 0.3044 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8963 - loss: 0.2445 - val_accuracy: 0.8298
- val_loss: 0.3468 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8940 - loss: 0.2411 - val_accuracy: 0.8298
- val_loss: 0.3450 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8297872543334961
Resetting all weights…
Current number of trials: 3
```
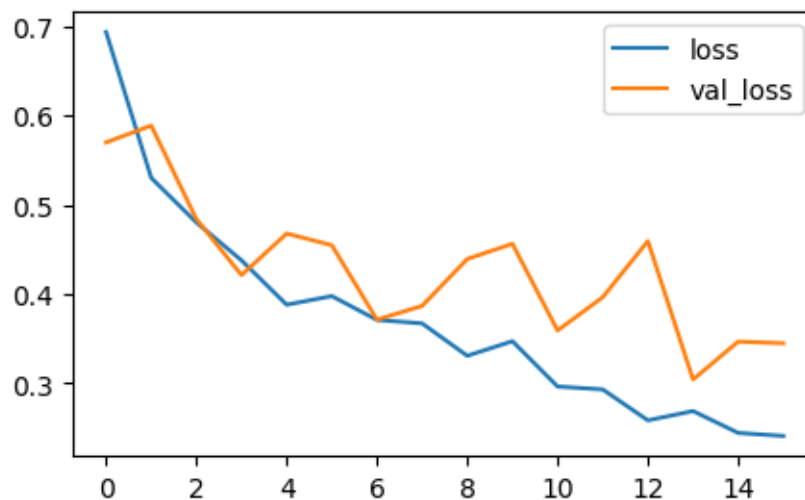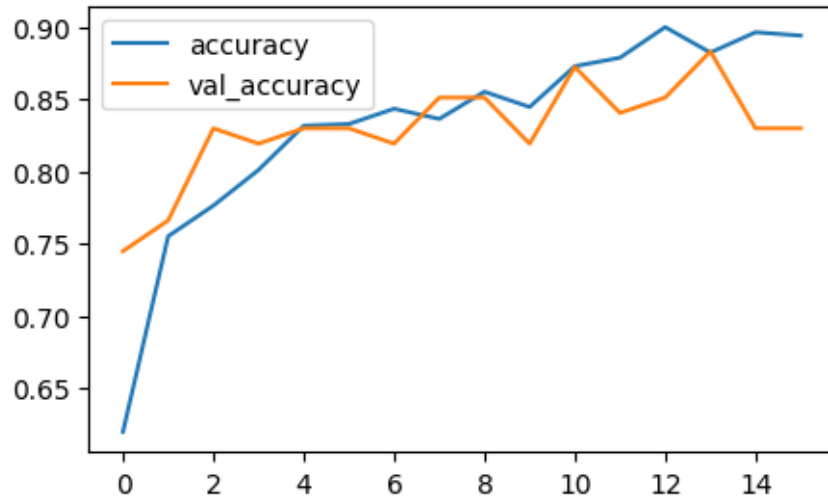
```
['loss', 'compile_metrics']
3/3               0s 15ms/step -
accuracy: 0.8250 - loss: 0.3924
[0.3450041115283966, 0.8297872543334961]
WARNING:tensorflow:5 out of the last 7 calls to <function
TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed at
0x173a7cea0> triggered tf.function retracing. Tracing is expensive and the
excessive number of tracings could be due to (1) creating @tf.function
repeatedly in a loop, (2) passing tensors with different shapes, (3) passing
Python objects instead of tensors. For (1), please define your @tf.function
outside of the loop. For (2), @tf.function has reduce_retracing=True option that
can avoid unnecessary retracing. For (3), please refer to
https://www.tensorflow.org/guide/function#controlling_retracing and
https://www.tensorflow.org/api_docs/python/tf/function for  more details.

WARNING:tensorflow:5 out of the last 7 calls to <function
TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed at
0x173a7cea0> triggered tf.function retracing. Tracing is expensive and the
excessive number of tracings could be due to (1) creating @tf.function
repeatedly in a loop, (2) passing tensors with different shapes, (3) passing
Python objects instead of tensors. For (1), please define your @tf.function
outside of the loop. For (2), @tf.function has reduce_retracing=True option that
can avoid unnecessary retracing. For (3), please refer to
https://www.tensorflow.org/guide/function#controlling_retracing and
https://www.tensorflow.org/api_docs/python/tf/function for  more details.

1/3               0s
34ms/stepWARNING:tensorflow:6 out of the last 9 calls to <function
TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed at
0x173a7cea0> triggered tf.function retracing. Tracing is expensive and the
excessive number of tracings could be due to (1) creating @tf.function
```

repeatedly in a loop, (2) passing tensors with different shapes, (3) passing
Python objects instead of tensors. For (1), please define your @tf.function
outside of the loop. For (2), @tf.function has reduce_retracing=True option that
can avoid unnecessary retracing. For (3), please refer to
https://www.tensorflow.org/guide/function#controlling_retracing and
https://www.tensorflow.org/api_docs/python/tf/function for more details.

WARNING:tensorflow:6 out of the last 9 calls to <function
TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed at
0x173a7cea0> triggered tf.function retracing. Tracing is expensive and the
excessive number of tracings could be due to (1) creating @tf.function
repeatedly in a loop, (2) passing tensors with different shapes, (3) passing
Python objects instead of tensors. For (1), please define your @tf.function
outside of the loop. For (2), @tf.function has reduce_retracing=True option that
can avoid unnecessary retracing. For (3), please refer to
https://www.tensorflow.org/guide/function#controlling_retracing and
https://www.tensorflow.org/api_docs/python/tf/function for more details.

```
3/3              0s 26ms/step
Classification Report:
            precision    recall  f1-score   support

     Female      0.79      0.83      0.81        41
       Male      0.86      0.83      0.85        53

   accuracy                          0.83        94
  macro avg      0.83      0.83      0.83        94
weighted avg     0.83      0.83      0.83        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5359 - loss: 0.7915 - val_accuracy: 0.5319
- val_loss: 0.6879 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6360 - loss: 0.6410 - val_accuracy: 0.6915
- val_loss: 0.6520 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.6973 - loss: 0.5582 - val_accuracy: 0.7128
- val_loss: 0.5481 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7409 - loss: 0.5287 - val_accuracy: 0.7766
- val_loss: 0.4900 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7703 - loss: 0.4808 - val_accuracy: 0.7447
- val_loss: 0.4920 - learning_rate: 1.0000e-03
Epoch 6/16
```

```
27/27 - 2s - 66ms/step - accuracy: 0.7951 - loss: 0.4488 - val_accuracy: 0.7872
- val_loss: 0.4503 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8033 - loss: 0.4144 - val_accuracy: 0.8298
- val_loss: 0.4631 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8115 - loss: 0.3965 - val_accuracy: 0.7979
- val_loss: 0.4380 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8151 - loss: 0.3863 - val_accuracy: 0.8404
- val_loss: 0.4380 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8551 - loss: 0.3223 - val_accuracy: 0.8404
- val_loss: 0.5237 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8492 - loss: 0.3369 - val_accuracy: 0.8404
- val_loss: 0.4532 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8810 - loss: 0.2836 - val_accuracy: 0.8298
- val_loss: 0.4003 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.8940 - loss: 0.2830 - val_accuracy: 0.8617
- val_loss: 0.3418 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8869 - loss: 0.2668 - val_accuracy: 0.8298
- val_loss: 0.3958 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8857 - loss: 0.2618 - val_accuracy: 0.8511
- val_loss: 0.3587 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8846 - loss: 0.2490 - val_accuracy: 0.7979
- val_loss: 0.3974 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.7978723645210266
Reseting all weights…
Current number of trials: 4
```
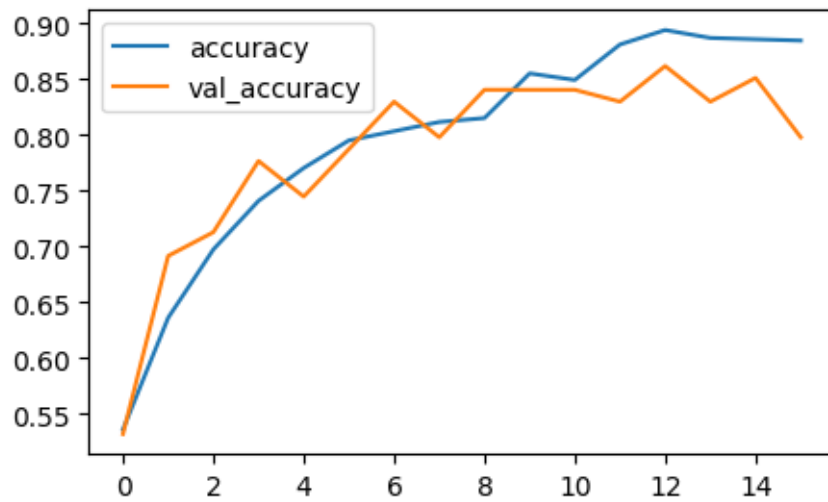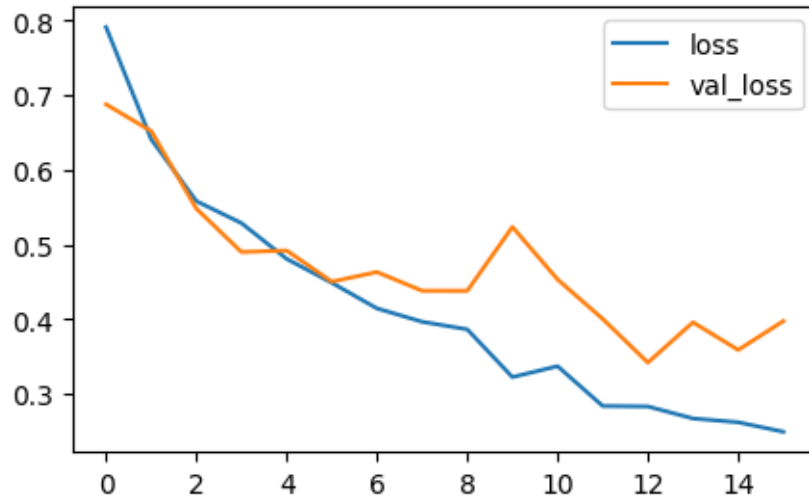
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.7739 - loss: 0.4481
[0.39742136001586914, 0.7978723645210266]
3/3                0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.76      0.78      0.77        41
        Male       0.83      0.81      0.82        53

    accuracy                           0.80        94
```

```
    macro avg        0.79      0.80      0.80        94
weighted avg         0.80      0.80      0.80        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.

2025-05-06 09:52:48.599291: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/16
27/27 - 2s - 86ms/step - accuracy: 0.5677 - loss: 0.7535 - val_accuracy: 0.6596
- val_loss: 0.6459 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7138 - loss: 0.5523 - val_accuracy: 0.6915
- val_loss: 0.6132 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7385 - loss: 0.5261 - val_accuracy: 0.7660
- val_loss: 0.4875 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7468 - loss: 0.4898 - val_accuracy: 0.8085
- val_loss: 0.5251 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8139 - loss: 0.4333 - val_accuracy: 0.7979
- val_loss: 0.5891 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7998 - loss: 0.4353 - val_accuracy: 0.8085
- val_loss: 0.4864 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8280 - loss: 0.4119 - val_accuracy: 0.8511
- val_loss: 0.4255 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8021 - loss: 0.4286 - val_accuracy: 0.8511
- val_loss: 0.3851 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8316 - loss: 0.3881 - val_accuracy: 0.7979
- val_loss: 0.4719 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8292 - loss: 0.3756 - val_accuracy: 0.8617
- val_loss: 0.3394 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8539 - loss: 0.3401 - val_accuracy: 0.8723
- val_loss: 0.3995 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8622 - loss: 0.3193 - val_accuracy: 0.8191
- val_loss: 0.3695 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8810 - loss: 0.3170 - val_accuracy: 0.8404
```

```
- val_loss: 0.3835 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8587 - loss: 0.3074 - val_accuracy: 0.8298
- val_loss: 0.3584 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8693 - loss: 0.3045 - val_accuracy: 0.8298
- val_loss: 0.3585 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8751 - loss: 0.3044 - val_accuracy: 0.8404
- val_loss: 0.4027 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 5
```
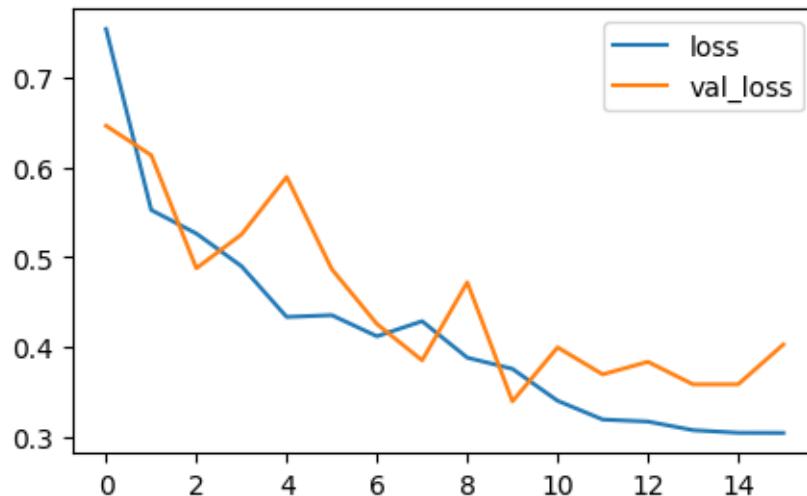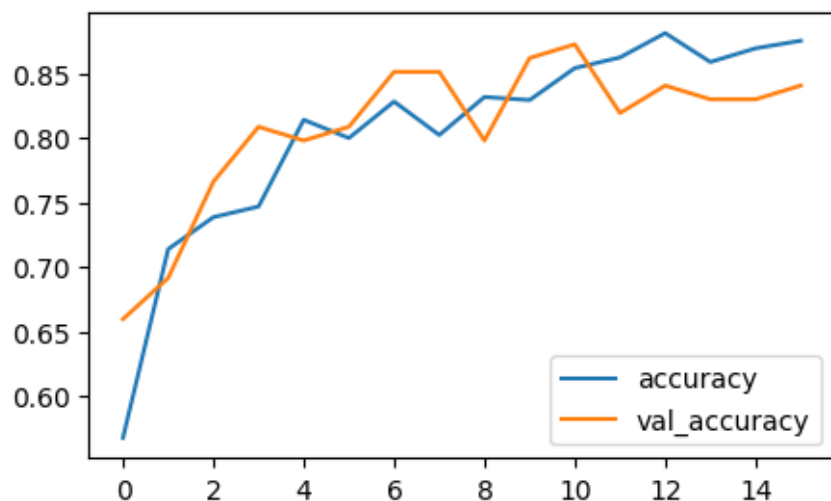
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8382 - loss: 0.4227
[0.4026811420917511, 0.8404255509376526]
3/3                0s 24ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.88      0.83        41
        Male       0.90      0.81      0.85        53

    accuracy                           0.84        94
   macro avg       0.84      0.84      0.84        94
weighted avg       0.85      0.84      0.84        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.6584 - loss: 0.6327 - val_accuracy: 0.7766
- val_loss: 0.5621 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7644 - loss: 0.4927 - val_accuracy: 0.8298
- val_loss: 0.5145 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7927 - loss: 0.4397 - val_accuracy: 0.8723
- val_loss: 0.3769 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8115 - loss: 0.4322 - val_accuracy: 0.8617
```

```
- val_loss: 0.3589 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8151 - loss: 0.3850 - val_accuracy: 0.8617
- val_loss: 0.3425 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8351 - loss: 0.3773 - val_accuracy: 0.8191
- val_loss: 0.4077 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8622 - loss: 0.3447 - val_accuracy: 0.8298
- val_loss: 0.4116 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8693 - loss: 0.3081 - val_accuracy: 0.8617
- val_loss: 0.4584 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8386 - loss: 0.3588 - val_accuracy: 0.8404
- val_loss: 0.3987 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8787 - loss: 0.2851 - val_accuracy: 0.8085
- val_loss: 0.3721 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8869 - loss: 0.2733 - val_accuracy: 0.8511
- val_loss: 0.2929 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8905 - loss: 0.2586 - val_accuracy: 0.8617
- val_loss: 0.3508 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8975 - loss: 0.2582 - val_accuracy: 0.8617
- val_loss: 0.3821 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.9069 - loss: 0.2305 - val_accuracy: 0.8404
- val_loss: 0.3484 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.9081 - loss: 0.2134 - val_accuracy: 0.8511
- val_loss: 0.3138 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.8975 - loss: 0.2389 - val_accuracy: 0.8298
- val_loss: 0.2893 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 6
```
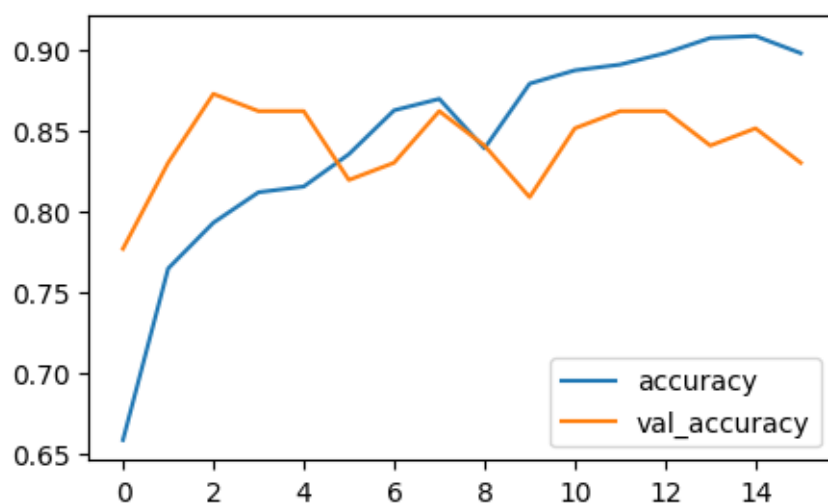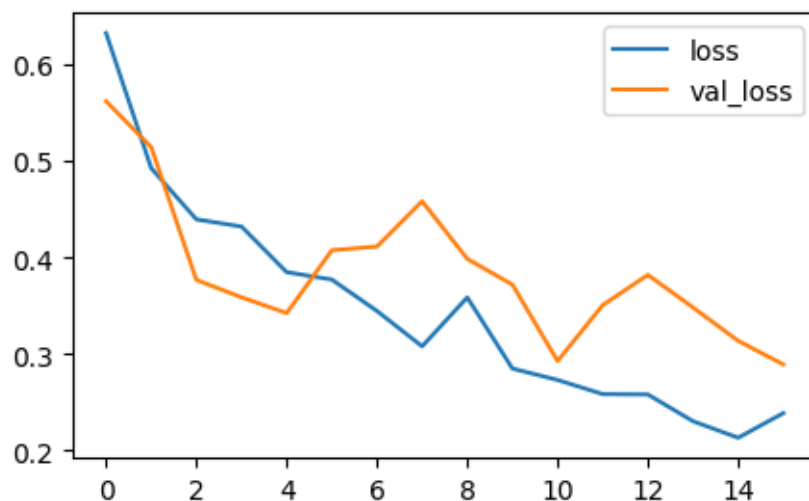
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8133 - loss: 0.3359
[0.2893228828907013, 0.8297872543334961]
3/3              0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.82      0.78      0.80        41
        Male       0.84      0.87      0.85        53

    accuracy                          0.83        94
```

```
   macro avg        0.83      0.82      0.83        94
weighted avg        0.83      0.83      0.83        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5453 - loss: 1.2045 - val_accuracy: 0.4574
- val_loss: 0.6976 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6325 - loss: 0.6546 - val_accuracy: 0.6702
- val_loss: 0.6402 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7267 - loss: 0.5334 - val_accuracy: 0.8191
- val_loss: 0.5081 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7456 - loss: 0.5089 - val_accuracy: 0.8191
- val_loss: 0.4448 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7880 - loss: 0.4643 - val_accuracy: 0.7766
- val_loss: 0.4788 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7962 - loss: 0.4494 - val_accuracy: 0.8191
- val_loss: 0.5357 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8057 - loss: 0.4292 - val_accuracy: 0.8191
- val_loss: 0.3876 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.7903 - loss: 0.4498 - val_accuracy: 0.8191
- val_loss: 0.4583 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8127 - loss: 0.4364 - val_accuracy: 0.8723
- val_loss: 0.3722 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8174 - loss: 0.3991 - val_accuracy: 0.8404
- val_loss: 0.4558 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8457 - loss: 0.3559 - val_accuracy: 0.8936
- val_loss: 0.3431 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8292 - loss: 0.3680 - val_accuracy: 0.8723
- val_loss: 0.3693 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8445 - loss: 0.3514 - val_accuracy: 0.8191
- val_loss: 0.4323 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8575 - loss: 0.3381 - val_accuracy: 0.8723
```

```
- val_loss: 0.3343 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8469 - loss: 0.3317 - val_accuracy: 0.8617
- val_loss: 0.4061 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8598 - loss: 0.3319 - val_accuracy: 0.8723
- val_loss: 0.3383 - learning_rate: 5.0000e-04
```

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

```
Current validation accuracy: 0.8723404407501221
Reseting all weights…
Current number of trials: 7
```
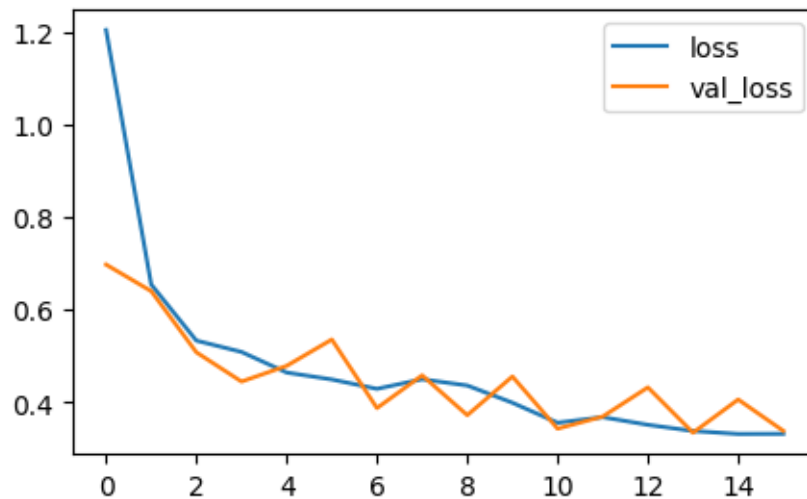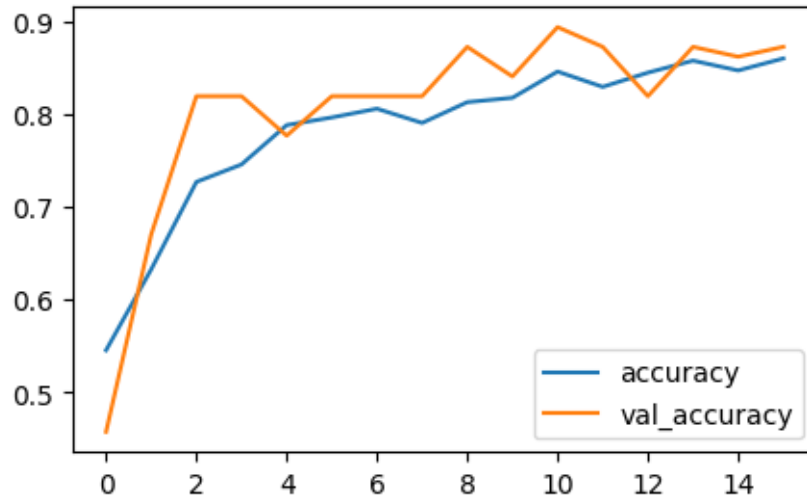
```
['loss', 'compile_metrics']
3/3                0s 16ms/step -
accuracy: 0.8580 - loss: 0.3651
[0.33825576305389404, 0.8723404407501221]
3/3                0s 25ms/step
Classification Report:
            precision    recall  f1-score   support

     Female       0.84      0.88      0.86        41
       Male       0.90      0.87      0.88        53

   accuracy                           0.87        94
  macro avg       0.87      0.87      0.87        94
weighted avg      0.87      0.87      0.87        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 89ms/step - accuracy: 0.5701 - loss: 0.9478 - val_accuracy: 0.5532
- val_loss: 0.6610 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7091 - loss: 0.5732 - val_accuracy: 0.7447
- val_loss: 0.5332 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 67ms/step - accuracy: 0.7503 - loss: 0.5160 - val_accuracy: 0.8191
- val_loss: 0.4910 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7856 - loss: 0.4607 - val_accuracy: 0.8191
```

```
- val_loss: 0.4088 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8021 - loss: 0.4256 - val_accuracy: 0.8617
- val_loss: 0.4144 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8104 - loss: 0.4115 - val_accuracy: 0.8830
- val_loss: 0.4077 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8221 - loss: 0.3909 - val_accuracy: 0.7979
- val_loss: 0.3885 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 67ms/step - accuracy: 0.8221 - loss: 0.3964 - val_accuracy: 0.8830
- val_loss: 0.3866 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8351 - loss: 0.3609 - val_accuracy: 0.8617
- val_loss: 0.3727 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8245 - loss: 0.3965 - val_accuracy: 0.8511
- val_loss: 0.3384 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8457 - loss: 0.3275 - val_accuracy: 0.8936
- val_loss: 0.3488 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8634 - loss: 0.3155 - val_accuracy: 0.8723
- val_loss: 0.3351 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8716 - loss: 0.2994 - val_accuracy: 0.8830
- val_loss: 0.3291 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8799 - loss: 0.2965 - val_accuracy: 0.8936
- val_loss: 0.3294 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8799 - loss: 0.2897 - val_accuracy: 0.8617
- val_loss: 0.3665 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8751 - loss: 0.2906 - val_accuracy: 0.8830
- val_loss: 0.3034 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8829787373542786
Reseting all weights…
Current number of trials: 8
```
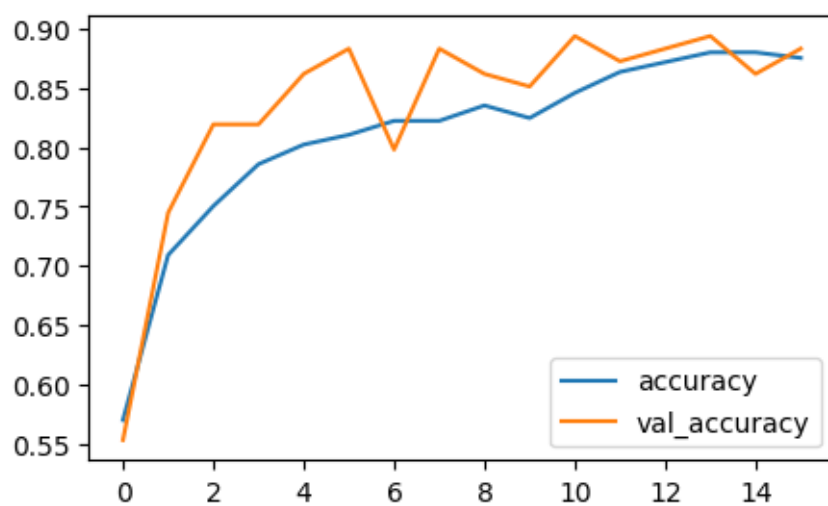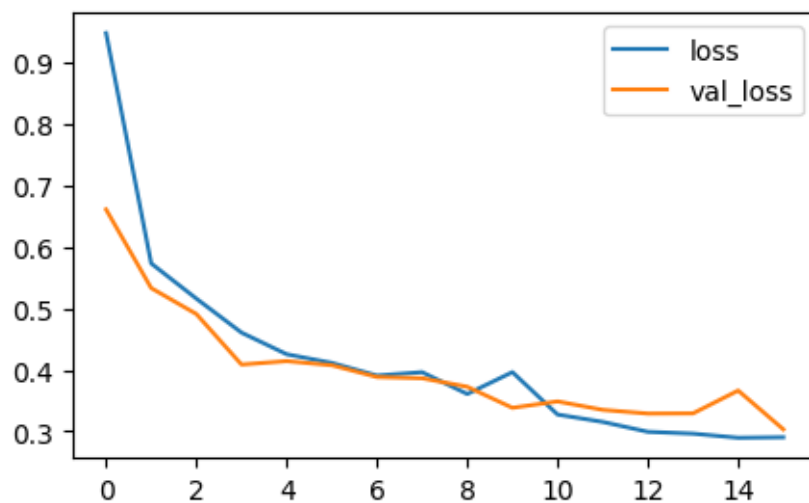
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8751 - loss: 0.3298
[0.303437739610672, 0.8829787373542786]
3/3                 0s 24ms/step
Classification Report:
              precision    recall   f1-score    support

      Female       0.84       0.90       0.87         41
        Male       0.92       0.87       0.89         53

    accuracy                             0.88         94
```

```
    macro avg         0.88      0.89      0.88          94
weighted avg          0.89      0.88      0.88          94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.

2025-05-06 09:54:46.988793: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5218 - loss: 0.8558 - val_accuracy: 0.4362
- val_loss: 0.7059 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 67ms/step - accuracy: 0.6160 - loss: 0.6465 - val_accuracy: 0.7128
- val_loss: 0.6035 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7420 - loss: 0.5377 - val_accuracy: 0.7660
- val_loss: 0.5429 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7774 - loss: 0.4831 - val_accuracy: 0.8404
- val_loss: 0.4539 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7915 - loss: 0.4545 - val_accuracy: 0.8191
- val_loss: 0.4644 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8092 - loss: 0.4251 - val_accuracy: 0.8511
- val_loss: 0.3943 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8292 - loss: 0.3929 - val_accuracy: 0.8191
- val_loss: 0.4788 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8257 - loss: 0.3946 - val_accuracy: 0.7979
- val_loss: 0.4222 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 67ms/step - accuracy: 0.8598 - loss: 0.3481 - val_accuracy: 0.8298
- val_loss: 0.5185 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8210 - loss: 0.3933 - val_accuracy: 0.8404
- val_loss: 0.4310 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 67ms/step - accuracy: 0.8528 - loss: 0.3371 - val_accuracy: 0.8191
- val_loss: 0.3944 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8704 - loss: 0.3084 - val_accuracy: 0.8298
- val_loss: 0.4538 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.8740 - loss: 0.3116 - val_accuracy: 0.8191
```

```
- val_loss: 0.4663 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8763 - loss: 0.2991 - val_accuracy: 0.8191
- val_loss: 0.4419 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8822 - loss: 0.2812 - val_accuracy: 0.8511
- val_loss: 0.4632 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8775 - loss: 0.2731 - val_accuracy: 0.8085
- val_loss: 0.4071 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8085106611251831
Reseting all weights…
Current number of trials: 9
```
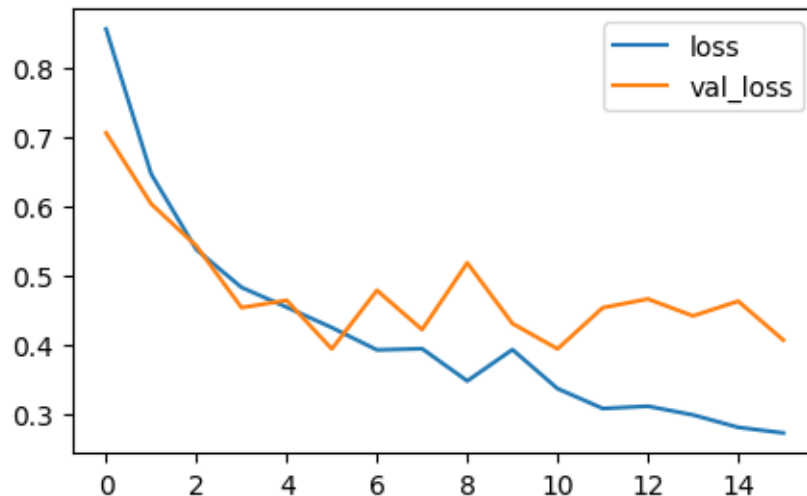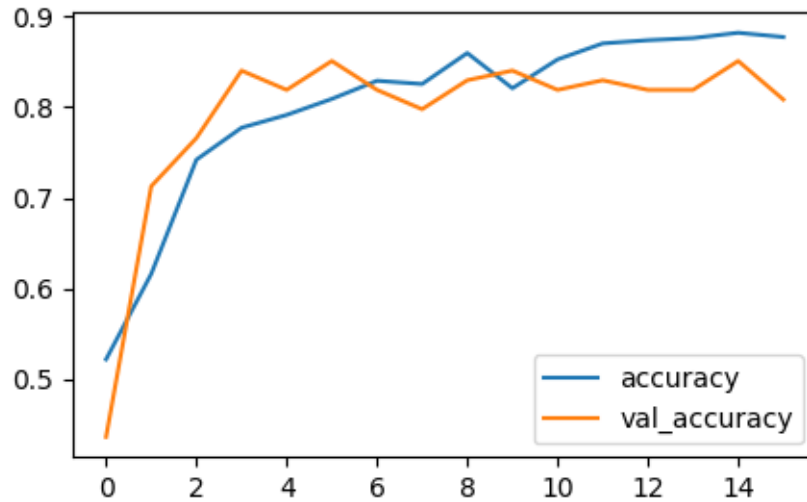
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.7988 - loss: 0.4447
[0.4070797264575958, 0.8085106611251831]
3/3              0s 26ms/step
Classification Report:
             precision    recall  f1-score   support

      Female       0.77      0.80      0.79        41
        Male       0.84      0.81      0.83        53

    accuracy                           0.81        94
   macro avg       0.81      0.81      0.81        94
weighted avg       0.81      0.81      0.81        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 86ms/step - accuracy: 0.5418 - loss: 0.9679 - val_accuracy: 0.5532
- val_loss: 0.6835 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6702 - loss: 0.6081 - val_accuracy: 0.6702
- val_loss: 0.5952 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7256 - loss: 0.5406 - val_accuracy: 0.8191
- val_loss: 0.4753 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7326 - loss: 0.5407 - val_accuracy: 0.7872
```

```
- val_loss: 0.6783 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7774 - loss: 0.4936 - val_accuracy: 0.7660
- val_loss: 0.5469 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7774 - loss: 0.4943 - val_accuracy: 0.7660
- val_loss: 0.4995 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.7927 - loss: 0.4633 - val_accuracy: 0.8085
- val_loss: 0.5357 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8045 - loss: 0.4334 - val_accuracy: 0.8085
- val_loss: 0.5327 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8163 - loss: 0.4125 - val_accuracy: 0.8085
- val_loss: 0.5860 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 64ms/step - accuracy: 0.8092 - loss: 0.4341 - val_accuracy: 0.7872
- val_loss: 0.5400 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 64ms/step - accuracy: 0.8151 - loss: 0.3930 - val_accuracy: 0.8085
- val_loss: 0.4732 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8327 - loss: 0.3772 - val_accuracy: 0.8298
- val_loss: 0.4520 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8410 - loss: 0.3432 - val_accuracy: 0.8191
- val_loss: 0.4956 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8363 - loss: 0.3565 - val_accuracy: 0.8404
- val_loss: 0.4658 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8422 - loss: 0.3537 - val_accuracy: 0.8404
- val_loss: 0.4906 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8422 - loss: 0.3451 - val_accuracy: 0.8617
- val_loss: 0.4604 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 10
```
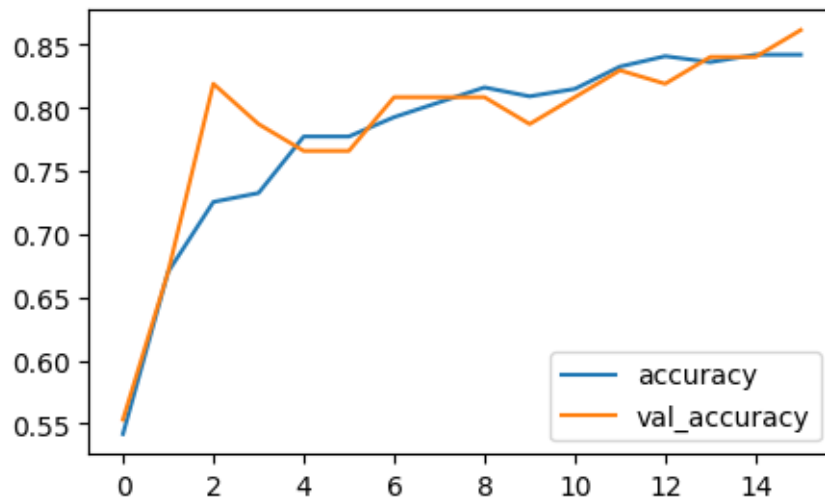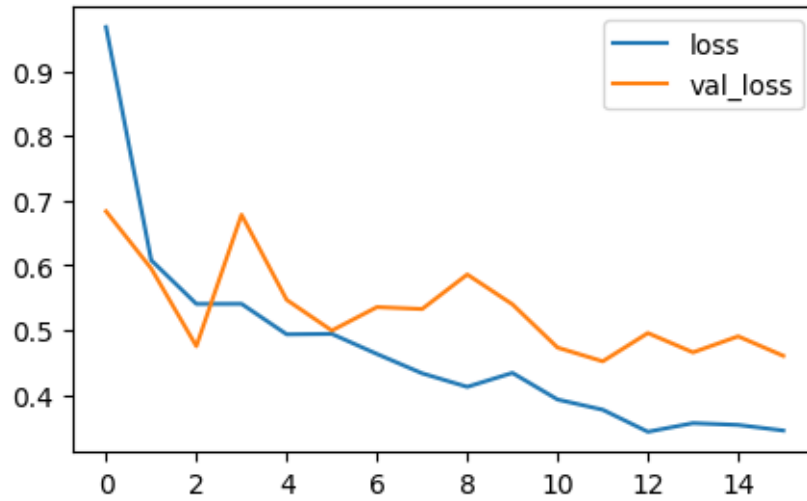
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8527 - loss: 0.5031
[0.46043136715888977, 0.8617021441459656]
3/3                0s 25ms/step
Classification Report:
            precision    recall  f1-score    support

    Female       0.80      0.90      0.85         41
      Male       0.92      0.83      0.87         53

  accuracy                          0.86         94
```

```
   macro avg         0.86       0.87       0.86          94
weighted avg         0.87       0.86       0.86          94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.6113 - loss: 0.8831 - val_accuracy: 0.7021
- val_loss: 0.6163 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7079 - loss: 0.5676 - val_accuracy: 0.7979
- val_loss: 0.5007 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7644 - loss: 0.4801 - val_accuracy: 0.7872
- val_loss: 0.4758 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7739 - loss: 0.4782 - val_accuracy: 0.7447
- val_loss: 0.6809 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8104 - loss: 0.4116 - val_accuracy: 0.8191
- val_loss: 0.5603 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8398 - loss: 0.3786 - val_accuracy: 0.7979
- val_loss: 0.4728 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8327 - loss: 0.3805 - val_accuracy: 0.8085
- val_loss: 0.4968 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8457 - loss: 0.3855 - val_accuracy: 0.7872
- val_loss: 0.6634 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8245 - loss: 0.3726 - val_accuracy: 0.8511
- val_loss: 0.4579 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8634 - loss: 0.3168 - val_accuracy: 0.8298
- val_loss: 0.4583 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8775 - loss: 0.2941 - val_accuracy: 0.8191
- val_loss: 0.5339 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8751 - loss: 0.2883 - val_accuracy: 0.8298
- val_loss: 0.4368 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8810 - loss: 0.2762 - val_accuracy: 0.8191
- val_loss: 0.5031 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8893 - loss: 0.2619 - val_accuracy: 0.8404
```

```
- val_loss: 0.4667 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.9069 - loss: 0.2336 - val_accuracy: 0.8085
- val_loss: 0.4557 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8881 - loss: 0.2640 - val_accuracy: 0.8511
- val_loss: 0.5673 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 11
```
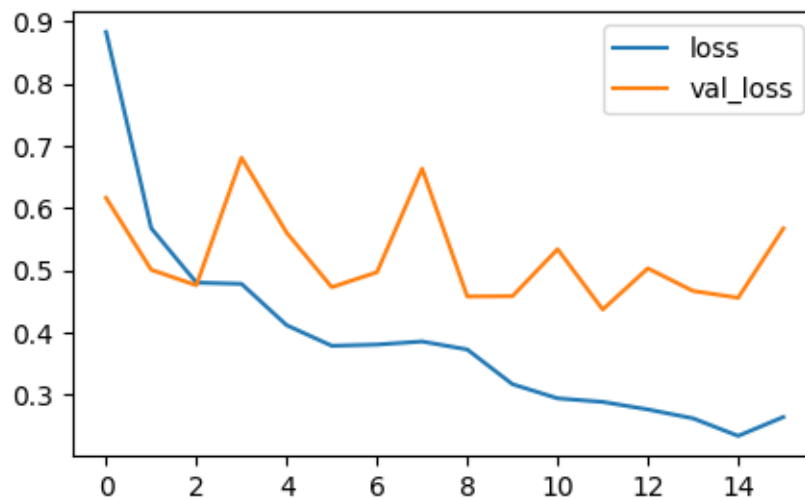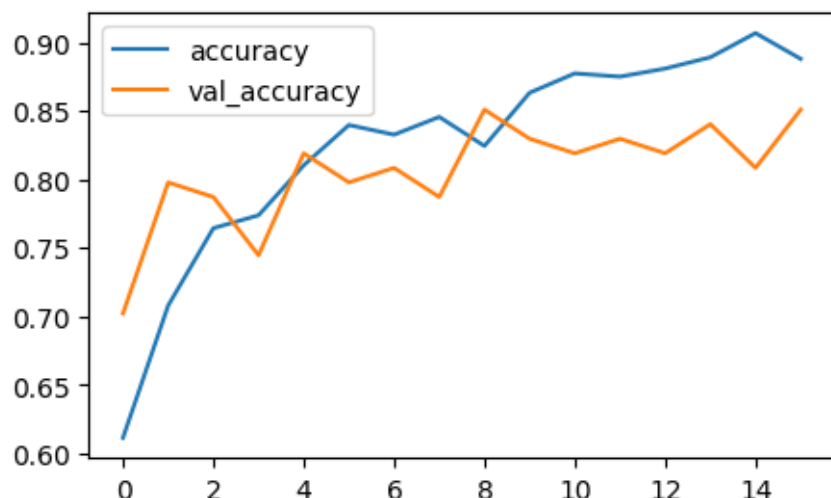
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8435 - loss: 0.6490
[0.5672635436058044, 0.8510638475418091]
3/3                0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.93      0.84        41
        Male       0.93      0.79      0.86        53

    accuracy                           0.85        94
   macro avg       0.85      0.86      0.85        94
weighted avg       0.86      0.85      0.85        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5442 - loss: 0.8314 - val_accuracy: 0.6702
- val_loss: 0.6689 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7102 - loss: 0.5819 - val_accuracy: 0.7447
- val_loss: 0.6168 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7633 - loss: 0.4916 - val_accuracy: 0.7766
- val_loss: 0.5210 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8080 - loss: 0.4427 - val_accuracy: 0.8404
```

```
- val_loss: 0.4449 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7762 - loss: 0.4521 - val_accuracy: 0.8404
- val_loss: 0.4495 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 67ms/step - accuracy: 0.8163 - loss: 0.4235 - val_accuracy: 0.8085
- val_loss: 0.5648 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8363 - loss: 0.3886 - val_accuracy: 0.8723
- val_loss: 0.3790 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8375 - loss: 0.3758 - val_accuracy: 0.8511
- val_loss: 0.4147 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8481 - loss: 0.3627 - val_accuracy: 0.8191
- val_loss: 0.3971 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 67ms/step - accuracy: 0.8457 - loss: 0.3891 - val_accuracy: 0.8191
- val_loss: 0.5608 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8516 - loss: 0.3405 - val_accuracy: 0.8617
- val_loss: 0.4992 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8728 - loss: 0.3180 - val_accuracy: 0.8723
- val_loss: 0.4242 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8610 - loss: 0.3142 - val_accuracy: 0.8617
- val_loss: 0.3588 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8846 - loss: 0.2798 - val_accuracy: 0.8617
- val_loss: 0.4916 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 67ms/step - accuracy: 0.8728 - loss: 0.3067 - val_accuracy: 0.8723
- val_loss: 0.4222 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8822 - loss: 0.2918 - val_accuracy: 0.8723
- val_loss: 0.3130 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8723404407501221
Reseting all weights…
Current number of trials: 12
```
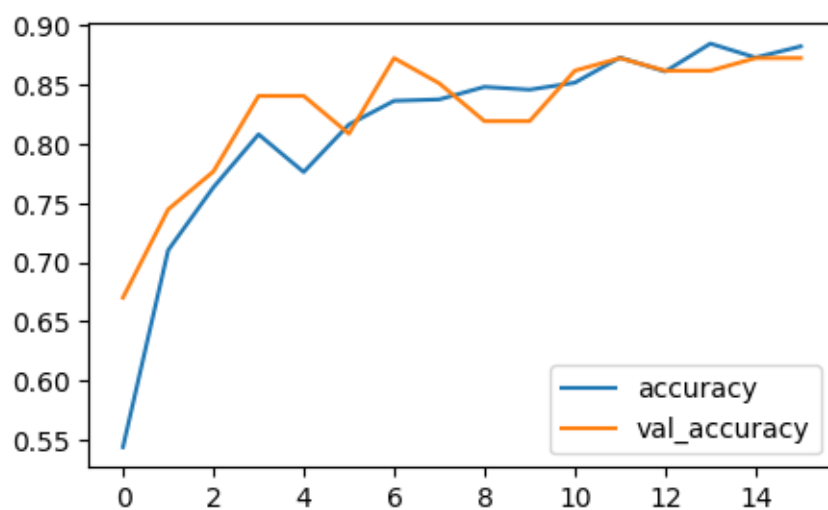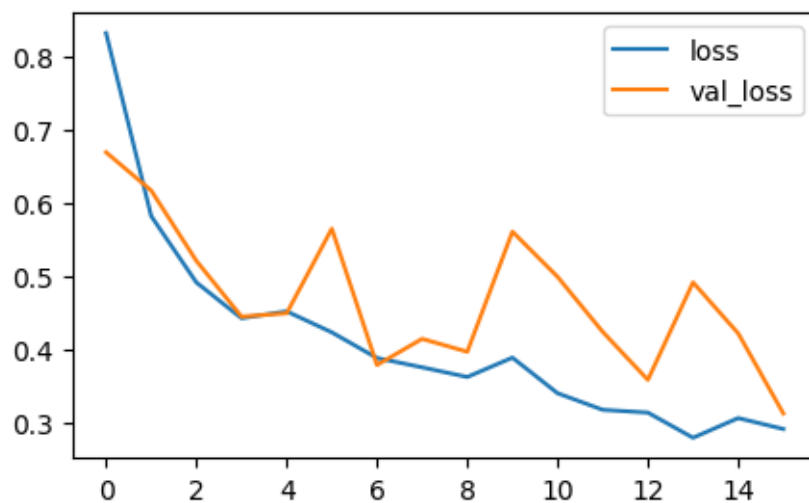
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8620 - loss: 0.3311
[0.3129649758338928, 0.8723404407501221]
3/3              0s 26ms/step
Classification Report:
            precision    recall  f1-score    support

    Female        0.81      0.93      0.86         41
      Male        0.94      0.83      0.88         53

  accuracy                            0.87         94
```

```
    macro avg        0.87      0.88      0.87          94
weighted avg        0.88      0.87      0.87          94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5630 - loss: 0.9303 - val_accuracy: 0.6064
- val_loss: 0.6623 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6855 - loss: 0.5893 - val_accuracy: 0.7234
- val_loss: 0.6195 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7244 - loss: 0.5234 - val_accuracy: 0.7766
- val_loss: 0.5165 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7656 - loss: 0.4999 - val_accuracy: 0.6383
- val_loss: 0.7831 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7527 - loss: 0.5093 - val_accuracy: 0.7660
- val_loss: 0.5513 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.7809 - loss: 0.4679 - val_accuracy: 0.7766
- val_loss: 0.4597 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.7974 - loss: 0.4523 - val_accuracy: 0.8617
- val_loss: 0.4651 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8104 - loss: 0.4164 - val_accuracy: 0.8085
- val_loss: 0.4579 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8186 - loss: 0.4018 - val_accuracy: 0.8404
- val_loss: 0.4163 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8304 - loss: 0.3937 - val_accuracy: 0.7979
- val_loss: 0.4205 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8410 - loss: 0.3801 - val_accuracy: 0.8830
- val_loss: 0.3879 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8375 - loss: 0.3592 - val_accuracy: 0.8511
- val_loss: 0.3603 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8363 - loss: 0.3459 - val_accuracy: 0.8404
- val_loss: 0.3750 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8492 - loss: 0.3458 - val_accuracy: 0.8617
```

```
- val_loss: 0.3824 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8445 - loss: 0.3450 - val_accuracy: 0.8191
- val_loss: 0.4782 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.8751 - loss: 0.3041 - val_accuracy: 0.8617
- val_loss: 0.3592 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 13
```
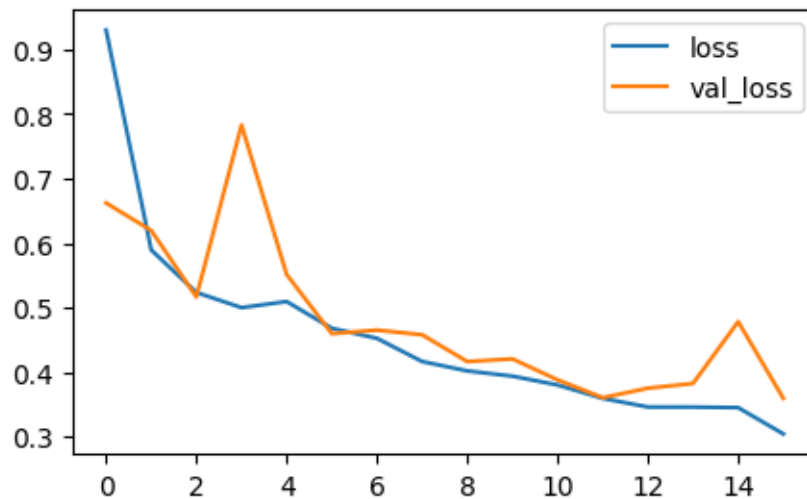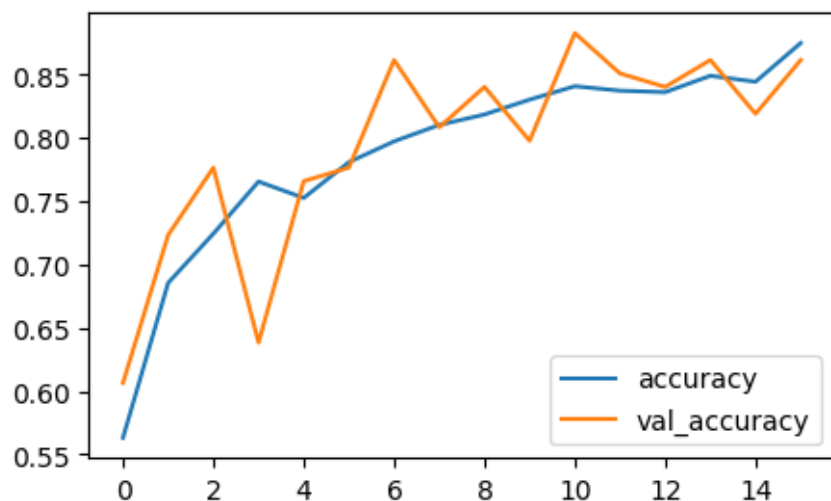
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8488 - loss: 0.4035
[0.35923299193382263, 0.8617021441459656]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.82      0.88      0.85        41
        Male       0.90      0.85      0.87        53

    accuracy                           0.86        94
   macro avg       0.86      0.86      0.86        94
weighted avg       0.86      0.86      0.86        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 3s - 93ms/step - accuracy: 0.5618 - loss: 0.9518 - val_accuracy: 0.6596
- val_loss: 0.6191 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 67ms/step - accuracy: 0.7303 - loss: 0.5404 - val_accuracy: 0.7447
- val_loss: 0.5291 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7727 - loss: 0.4927 - val_accuracy: 0.8511
- val_loss: 0.4441 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7715 - loss: 0.4755 - val_accuracy: 0.7872
```

```
- val_loss: 0.5152 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7797 - loss: 0.4689 - val_accuracy: 0.8298
- val_loss: 0.4304 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8009 - loss: 0.4425 - val_accuracy: 0.8085
- val_loss: 0.4487 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.7974 - loss: 0.4411 - val_accuracy: 0.8404
- val_loss: 0.4123 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 67ms/step - accuracy: 0.8386 - loss: 0.3823 - val_accuracy: 0.8404
- val_loss: 0.3808 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 67ms/step - accuracy: 0.8386 - loss: 0.3713 - val_accuracy: 0.8085
- val_loss: 0.3947 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 67ms/step - accuracy: 0.8339 - loss: 0.3692 - val_accuracy: 0.8191
- val_loss: 0.3558 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8563 - loss: 0.3481 - val_accuracy: 0.8404
- val_loss: 0.3777 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8598 - loss: 0.3124 - val_accuracy: 0.8298
- val_loss: 0.3565 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8657 - loss: 0.3083 - val_accuracy: 0.8298
- val_loss: 0.3492 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8716 - loss: 0.2940 - val_accuracy: 0.8404
- val_loss: 0.3920 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8775 - loss: 0.2840 - val_accuracy: 0.8404
- val_loss: 0.3952 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8787 - loss: 0.2842 - val_accuracy: 0.8511
- val_loss: 0.3335 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 14
```
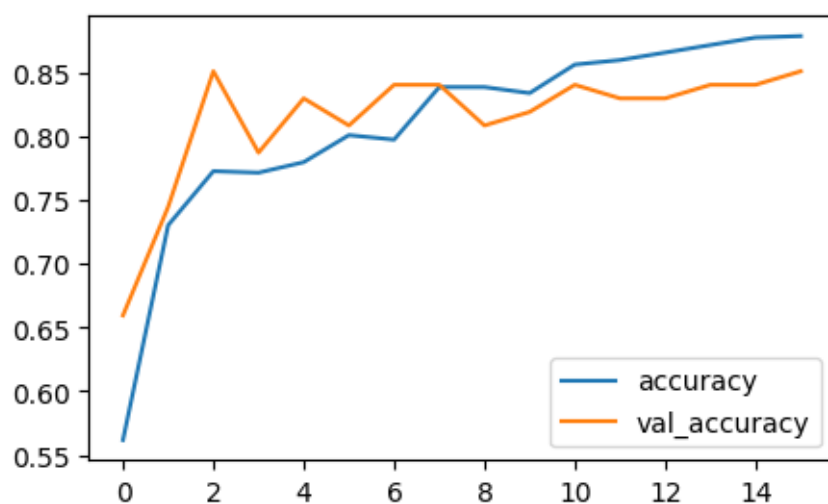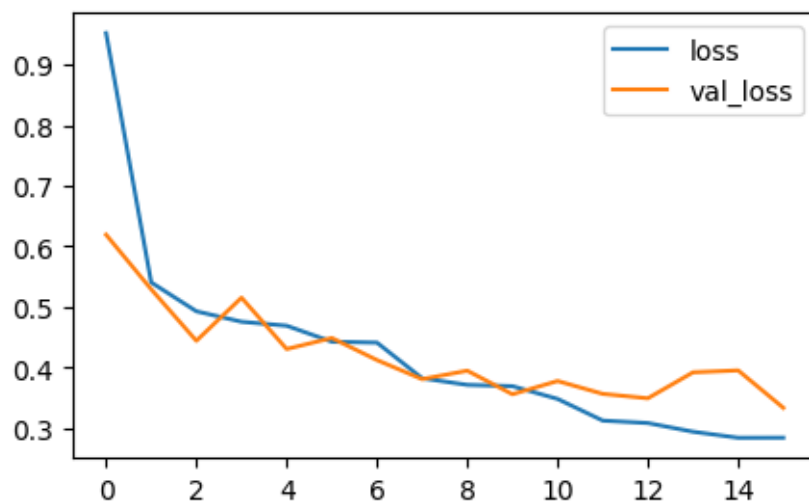
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8357 - loss: 0.3669
[0.3334622383117676, 0.8510638475418091]
3/3                 0s 25ms/step
Classification Report:
            precision    recall  f1-score    support

    Female       0.83      0.83      0.83         41
      Male       0.87      0.87      0.87         53

  accuracy                           0.85         94
```

```
   macro avg        0.85      0.85      0.85         94
weighted avg        0.85      0.85      0.85         94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5548 - loss: 0.8021 - val_accuracy: 0.5957
- val_loss: 0.6594 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6914 - loss: 0.5898 - val_accuracy: 0.7128
- val_loss: 0.6862 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7727 - loss: 0.4828 - val_accuracy: 0.7979
- val_loss: 0.5692 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7927 - loss: 0.4537 - val_accuracy: 0.7979
- val_loss: 0.4952 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8139 - loss: 0.4197 - val_accuracy: 0.8298
- val_loss: 0.4655 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8163 - loss: 0.4118 - val_accuracy: 0.8085
- val_loss: 0.4660 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8481 - loss: 0.3530 - val_accuracy: 0.8085
- val_loss: 0.3928 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8751 - loss: 0.3156 - val_accuracy: 0.8298
- val_loss: 0.4134 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8610 - loss: 0.3335 - val_accuracy: 0.8617
- val_loss: 0.4494 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8551 - loss: 0.3242 - val_accuracy: 0.7766
- val_loss: 0.3892 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8740 - loss: 0.3011 - val_accuracy: 0.8298
- val_loss: 0.4146 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.9046 - loss: 0.2499 - val_accuracy: 0.8511
- val_loss: 0.4632 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8893 - loss: 0.2645 - val_accuracy: 0.8511
- val_loss: 0.4218 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8975 - loss: 0.2467 - val_accuracy: 0.8298
```

```
- val_loss: 0.4665 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8893 - loss: 0.2602 - val_accuracy: 0.8298
- val_loss: 0.4141 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.9011 - loss: 0.2302 - val_accuracy: 0.8511
- val_loss: 0.3442 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 15
```
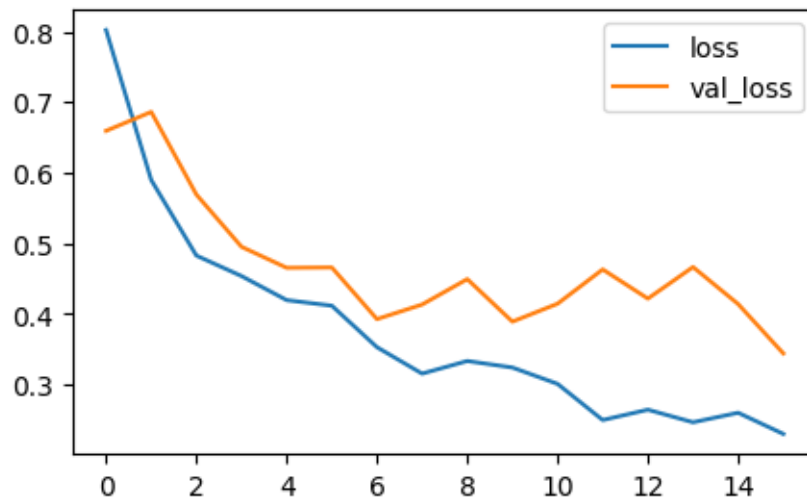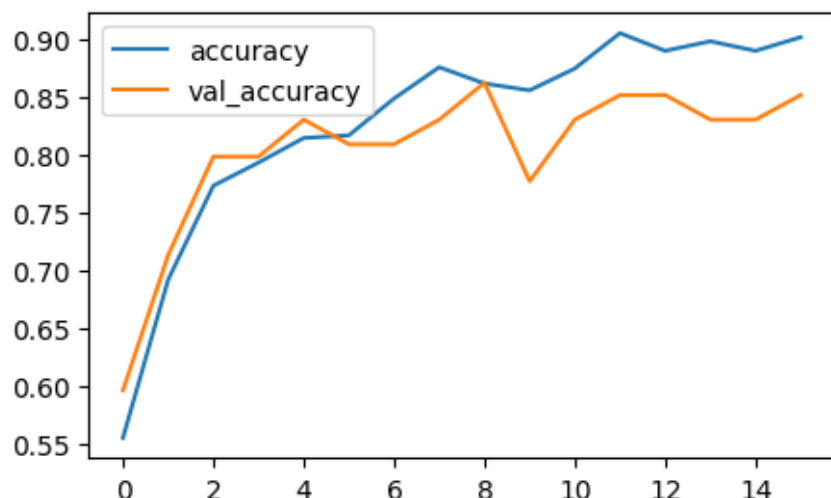
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8474 - loss: 0.3801
[0.34417724609375, 0.8510638475418091]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.81      0.85      0.83        41
        Male       0.88      0.85      0.87        53

    accuracy                           0.85        94
   macro avg       0.85      0.85      0.85        94
weighted avg       0.85      0.85      0.85        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5654 - loss: 0.9402 - val_accuracy: 0.6064
- val_loss: 0.6798 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 67ms/step - accuracy: 0.7055 - loss: 0.5646 - val_accuracy: 0.7553
- val_loss: 0.5744 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7491 - loss: 0.5299 - val_accuracy: 0.7553
- val_loss: 0.5484 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7715 - loss: 0.4742 - val_accuracy: 0.7660
```

```
- val_loss: 0.4767 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7774 - loss: 0.4719 - val_accuracy: 0.7447
- val_loss: 0.6970 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 67ms/step - accuracy: 0.8104 - loss: 0.4367 - val_accuracy: 0.8085
- val_loss: 0.4638 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8174 - loss: 0.4030 - val_accuracy: 0.8723
- val_loss: 0.4268 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8163 - loss: 0.4019 - val_accuracy: 0.8404
- val_loss: 0.4212 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8492 - loss: 0.3722 - val_accuracy: 0.8191
- val_loss: 0.5006 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8186 - loss: 0.3715 - val_accuracy: 0.8723
- val_loss: 0.4376 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 68ms/step - accuracy: 0.8551 - loss: 0.3219 - val_accuracy: 0.8723
- val_loss: 0.4023 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8587 - loss: 0.3106 - val_accuracy: 0.8617
- val_loss: 0.3807 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8751 - loss: 0.3042 - val_accuracy: 0.8617
- val_loss: 0.3763 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 67ms/step - accuracy: 0.8610 - loss: 0.3109 - val_accuracy: 0.8511
- val_loss: 0.4496 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8775 - loss: 0.3035 - val_accuracy: 0.8617
- val_loss: 0.4150 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.8893 - loss: 0.2826 - val_accuracy: 0.8404
- val_loss: 0.4293 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 16
```
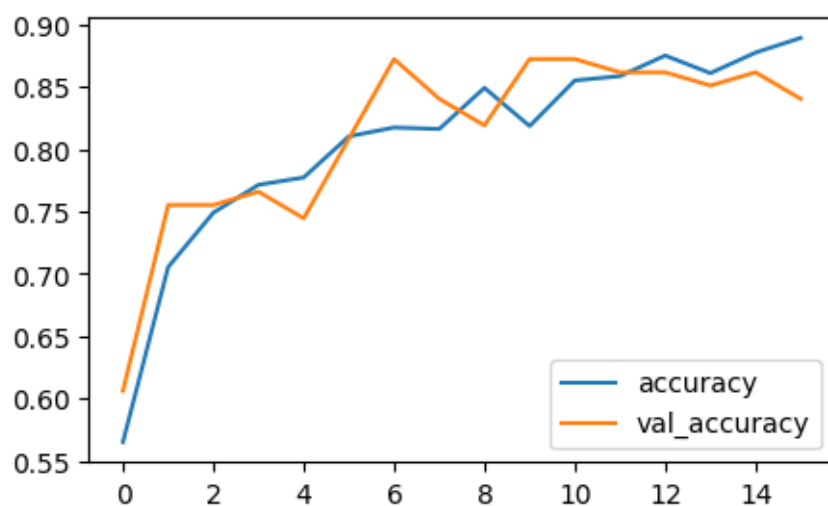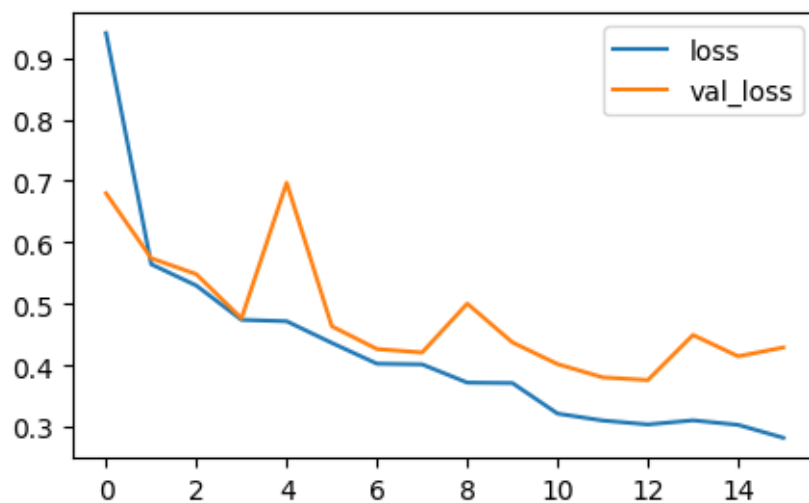
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8226 - loss: 0.4639
[0.4293292760848999, 0.8404255509376526]
3/3              0s 26ms/step
Classification Report:
            precision    recall  f1-score    support

    Female       0.80      0.85      0.82        41
      Male       0.88      0.83      0.85        53

  accuracy                           0.84        94
```

```
      macro avg       0.84      0.84      0.84        94
  weighted avg        0.84      0.84      0.84        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.

2025-05-06 09:58:44.751291: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.6125 - loss: 0.8633 - val_accuracy: 0.6383
- val_loss: 0.6384 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7432 - loss: 0.5143 - val_accuracy: 0.7234
- val_loss: 0.6071 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 67ms/step - accuracy: 0.7656 - loss: 0.4725 - val_accuracy: 0.8830
- val_loss: 0.4236 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8045 - loss: 0.4271 - val_accuracy: 0.8723
- val_loss: 0.3871 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8269 - loss: 0.4081 - val_accuracy: 0.8298
- val_loss: 0.4211 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8339 - loss: 0.3773 - val_accuracy: 0.8511
- val_loss: 0.4937 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8386 - loss: 0.3845 - val_accuracy: 0.8511
- val_loss: 0.3439 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8587 - loss: 0.3255 - val_accuracy: 0.8404
- val_loss: 0.3593 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8645 - loss: 0.3328 - val_accuracy: 0.8298
- val_loss: 0.4683 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8716 - loss: 0.3198 - val_accuracy: 0.8617
- val_loss: 0.3831 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8893 - loss: 0.2829 - val_accuracy: 0.8511
- val_loss: 0.3658 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8693 - loss: 0.2870 - val_accuracy: 0.8617
- val_loss: 0.3789 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8881 - loss: 0.2769 - val_accuracy: 0.8298
```

```
- val_loss: 0.3456 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8799 - loss: 0.2920 - val_accuracy: 0.8617
- val_loss: 0.3221 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.9105 - loss: 0.2437 - val_accuracy: 0.8511
- val_loss: 0.3706 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8963 - loss: 0.2561 - val_accuracy: 0.8830
- val_loss: 0.3771 - learning_rate: 5.0000e-04
```

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

```
Current validation accuracy: 0.8829787373542786
Reseting all weights…
Current number of trials: 17
```
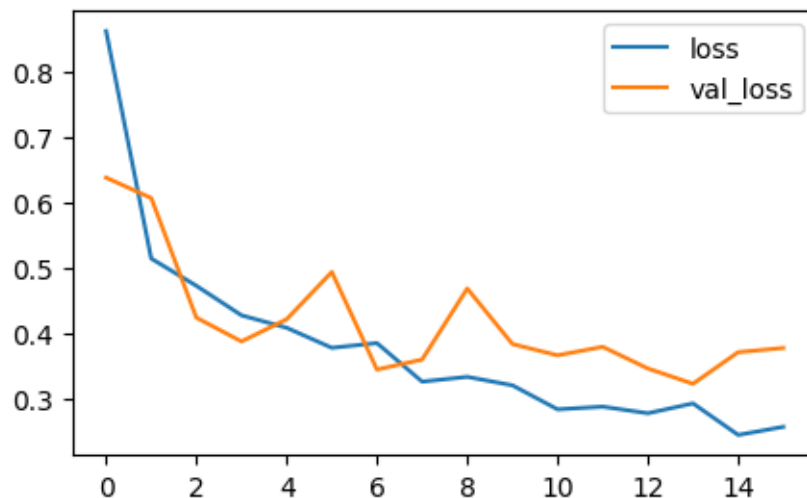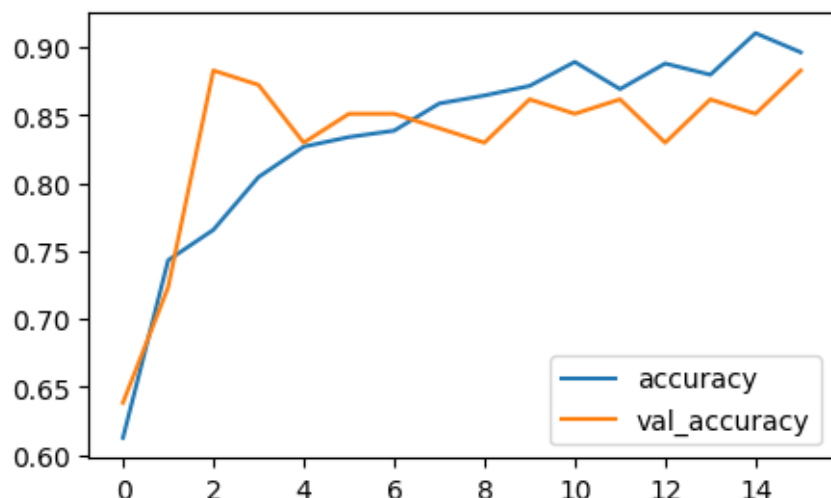
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8712 - loss: 0.4334
[0.37708744406700134, 0.8829787373542786]
3/3                0s 26ms/step
Classification Report:
              precision   recall  f1-score   support

      Female      0.84      0.90      0.87        41
        Male      0.92      0.87      0.89        53

    accuracy                          0.88        94
   macro avg      0.88      0.89      0.88        94
weighted avg      0.89      0.88      0.88        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5689 - loss: 0.9364 - val_accuracy: 0.6170
- val_loss: 0.6768 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6514 - loss: 0.6198 - val_accuracy: 0.7234
- val_loss: 0.5877 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7161 - loss: 0.5679 - val_accuracy: 0.6702
- val_loss: 0.6291 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 67ms/step - accuracy: 0.7444 - loss: 0.5197 - val_accuracy: 0.8085
```

```
- val_loss: 0.6349 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7338 - loss: 0.5180 - val_accuracy: 0.7128
- val_loss: 0.6147 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7892 - loss: 0.4664 - val_accuracy: 0.7660
- val_loss: 0.4855 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.7986 - loss: 0.4406 - val_accuracy: 0.7766
- val_loss: 0.5416 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8127 - loss: 0.4255 - val_accuracy: 0.7979
- val_loss: 0.5721 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8304 - loss: 0.4005 - val_accuracy: 0.8191
- val_loss: 0.4236 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8304 - loss: 0.3945 - val_accuracy: 0.8404
- val_loss: 0.5044 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8457 - loss: 0.3556 - val_accuracy: 0.8298
- val_loss: 0.4211 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8622 - loss: 0.3145 - val_accuracy: 0.8404
- val_loss: 0.3916 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.8657 - loss: 0.3151 - val_accuracy: 0.8404
- val_loss: 0.4688 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8716 - loss: 0.3147 - val_accuracy: 0.8511
- val_loss: 0.4376 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8810 - loss: 0.2925 - val_accuracy: 0.8404
- val_loss: 0.4780 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8728 - loss: 0.2863 - val_accuracy: 0.8511
- val_loss: 0.5285 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 18
```
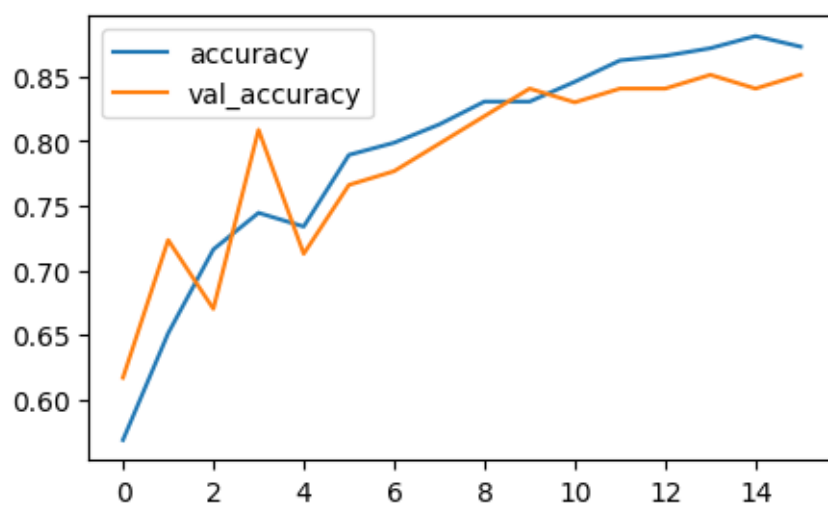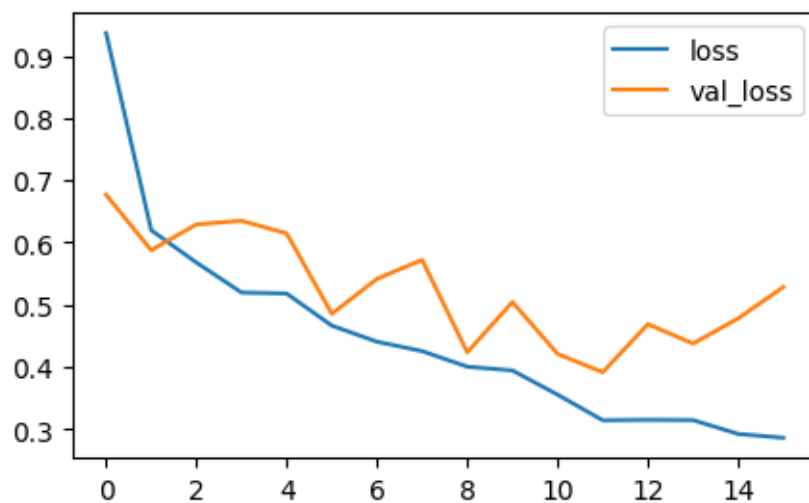
```
['loss', 'compile_metrics']
3/3             0s 15ms/step -
accuracy: 0.8318 - loss: 0.5759
[0.5284665822982788, 0.8510638475418091]
3/3             0s 26ms/step
Classification Report:
             precision    recall  f1-score   support

     Female       0.79      0.90      0.84        41
       Male       0.91      0.81      0.86        53

   accuracy                           0.85        94
```

```
   macro avg       0.85      0.86      0.85         94
weighted avg       0.86      0.85      0.85         94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5395 - loss: 0.9563 - val_accuracy: 0.6809
- val_loss: 0.6808 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6843 - loss: 0.6328 - val_accuracy: 0.6915
- val_loss: 0.6209 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7585 - loss: 0.5176 - val_accuracy: 0.8085
- val_loss: 0.4669 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7809 - loss: 0.4780 - val_accuracy: 0.8085
- val_loss: 0.5113 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7597 - loss: 0.4841 - val_accuracy: 0.8404
- val_loss: 0.4280 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 67ms/step - accuracy: 0.7786 - loss: 0.4714 - val_accuracy: 0.8723
- val_loss: 0.3815 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8151 - loss: 0.4090 - val_accuracy: 0.8511
- val_loss: 0.3885 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8080 - loss: 0.4208 - val_accuracy: 0.8617
- val_loss: 0.3875 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8009 - loss: 0.4278 - val_accuracy: 0.8723
- val_loss: 0.3607 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8563 - loss: 0.3684 - val_accuracy: 0.8617
- val_loss: 0.3512 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8339 - loss: 0.3529 - val_accuracy: 0.8404
- val_loss: 0.3934 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8469 - loss: 0.3581 - val_accuracy: 0.8723
- val_loss: 0.3427 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8622 - loss: 0.3379 - val_accuracy: 0.8617
- val_loss: 0.4151 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8492 - loss: 0.3226 - val_accuracy: 0.8404
```

```
- val_loss: 0.3808 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 68ms/step - accuracy: 0.8822 - loss: 0.3030 - val_accuracy: 0.8191
- val_loss: 0.3886 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8751 - loss: 0.2969 - val_accuracy: 0.8617
- val_loss: 0.3505 - learning_rate: 5.0000e-04
```

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 19
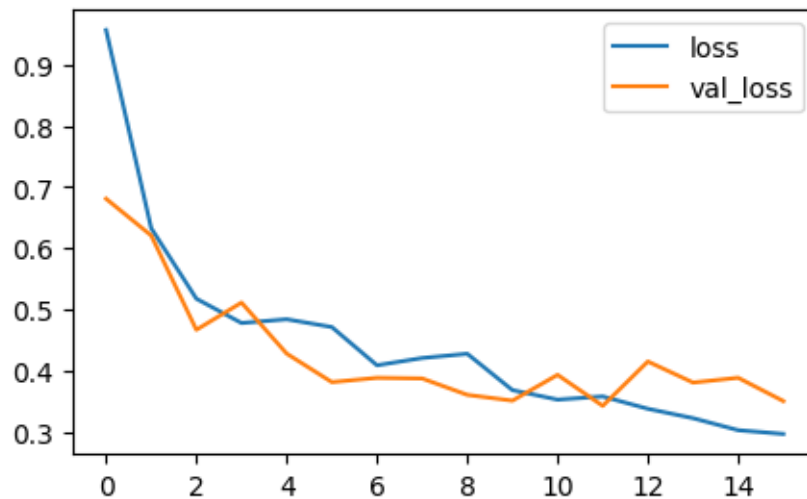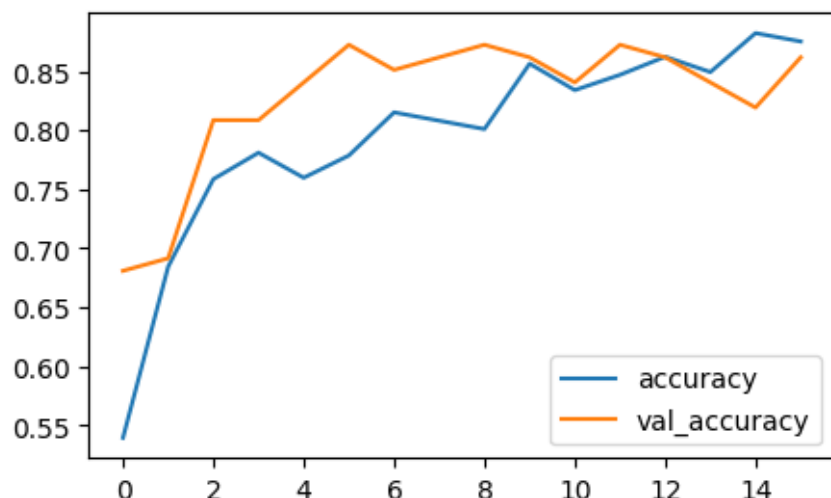
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8644 - loss: 0.3762
[0.3505155146121979, 0.8617021441459656]
3/3                0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.82      0.88      0.85        41
        Male       0.90      0.85      0.87        53

    accuracy                           0.86        94
   macro avg       0.86      0.86      0.86        94
weighted avg       0.86      0.86      0.86        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5430 - loss: 0.8172 - val_accuracy: 0.7660
- val_loss: 0.5890 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7055 - loss: 0.5770 - val_accuracy: 0.7660
- val_loss: 0.5031 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7420 - loss: 0.5231 - val_accuracy: 0.7553
- val_loss: 0.4270 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7821 - loss: 0.4920 - val_accuracy: 0.8191
```

```
- val_loss: 0.4894 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7703 - loss: 0.4679 - val_accuracy: 0.8298
- val_loss: 0.3776 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.7951 - loss: 0.4103 - val_accuracy: 0.8617
- val_loss: 0.3631 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8186 - loss: 0.4011 - val_accuracy: 0.8404
- val_loss: 0.4002 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8221 - loss: 0.3905 - val_accuracy: 0.8830
- val_loss: 0.3666 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 67ms/step - accuracy: 0.8351 - loss: 0.3709 - val_accuracy: 0.8404
- val_loss: 0.4004 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8457 - loss: 0.3601 - val_accuracy: 0.8191
- val_loss: 0.3596 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8551 - loss: 0.3187 - val_accuracy: 0.8511
- val_loss: 0.3781 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8587 - loss: 0.3177 - val_accuracy: 0.8404
- val_loss: 0.4084 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.8787 - loss: 0.3078 - val_accuracy: 0.8511
- val_loss: 0.3671 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8810 - loss: 0.2934 - val_accuracy: 0.8617
- val_loss: 0.3978 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8751 - loss: 0.3035 - val_accuracy: 0.8404
- val_loss: 0.4222 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.8952 - loss: 0.2697 - val_accuracy: 0.8511
- val_loss: 0.3645 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 20
```
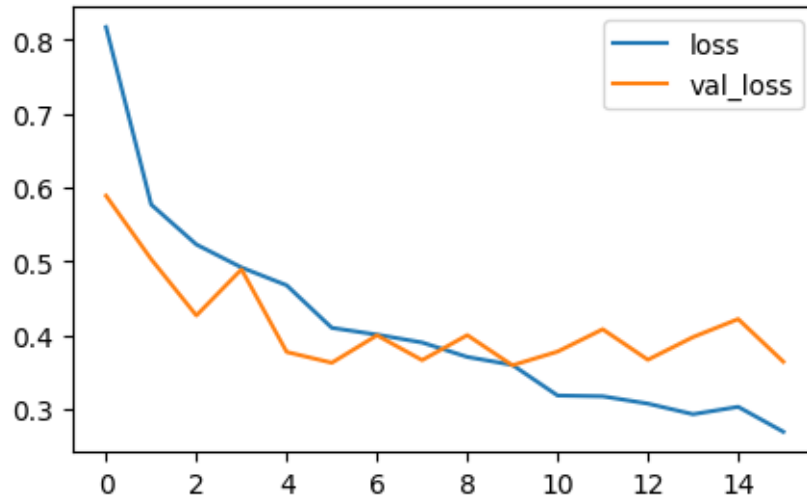
```
['loss', 'compile_metrics']
3/3                0s 16ms/step -
accuracy: 0.8318 - loss: 0.4174
[0.3644586503505707, 0.8510638475418091]
3/3                0s 26ms/step
Classification Report:
              precision   recall  f1-score   support

      Female       0.79     0.90      0.84        41
        Male       0.91     0.81      0.86        53

    accuracy                          0.85        94
```

```
   macro avg        0.85       0.86       0.85           94
weighted avg        0.86       0.85       0.85           94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 86ms/step - accuracy: 0.5383 - loss: 0.8595 - val_accuracy: 0.6064
- val_loss: 0.6517 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 64ms/step - accuracy: 0.7314 - loss: 0.5522 - val_accuracy: 0.7872
- val_loss: 0.5155 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7880 - loss: 0.4649 - val_accuracy: 0.8404
- val_loss: 0.4138 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 64ms/step - accuracy: 0.7786 - loss: 0.4669 - val_accuracy: 0.8085
- val_loss: 0.5673 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8127 - loss: 0.4196 - val_accuracy: 0.8617
- val_loss: 0.3928 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8233 - loss: 0.3978 - val_accuracy: 0.8191
- val_loss: 0.4353 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8292 - loss: 0.3783 - val_accuracy: 0.8298
- val_loss: 0.3671 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8139 - loss: 0.4090 - val_accuracy: 0.8830
- val_loss: 0.3591 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8622 - loss: 0.3350 - val_accuracy: 0.8617
- val_loss: 0.3089 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8669 - loss: 0.3238 - val_accuracy: 0.7766
- val_loss: 0.4478 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 64ms/step - accuracy: 0.8445 - loss: 0.3285 - val_accuracy: 0.8723
- val_loss: 0.3165 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 64ms/step - accuracy: 0.8869 - loss: 0.2907 - val_accuracy: 0.8617
- val_loss: 0.3178 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8869 - loss: 0.2898 - val_accuracy: 0.8511
- val_loss: 0.3037 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8928 - loss: 0.2677 - val_accuracy: 0.8085
```

```
- val_loss: 0.3401 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8916 - loss: 0.2648 - val_accuracy: 0.8404
- val_loss: 0.3150 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 64ms/step - accuracy: 0.8775 - loss: 0.2655 - val_accuracy: 0.8723
- val_loss: 0.3297 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8723404407501221
Reseting all weights…
Current number of trials: 21
```
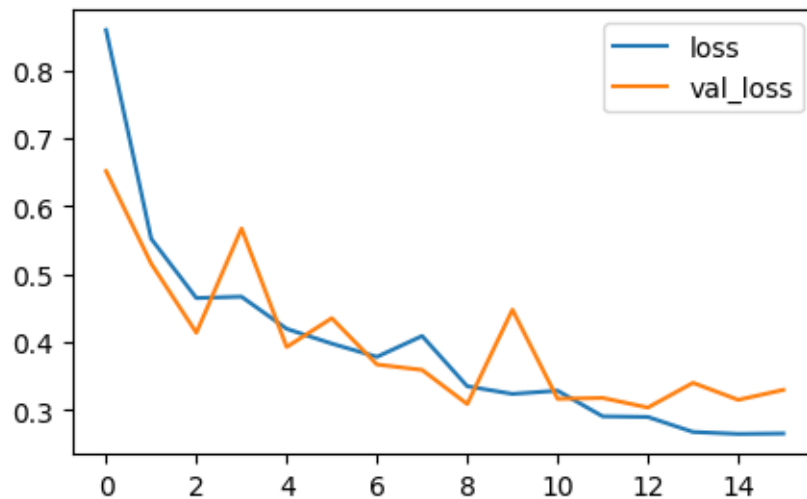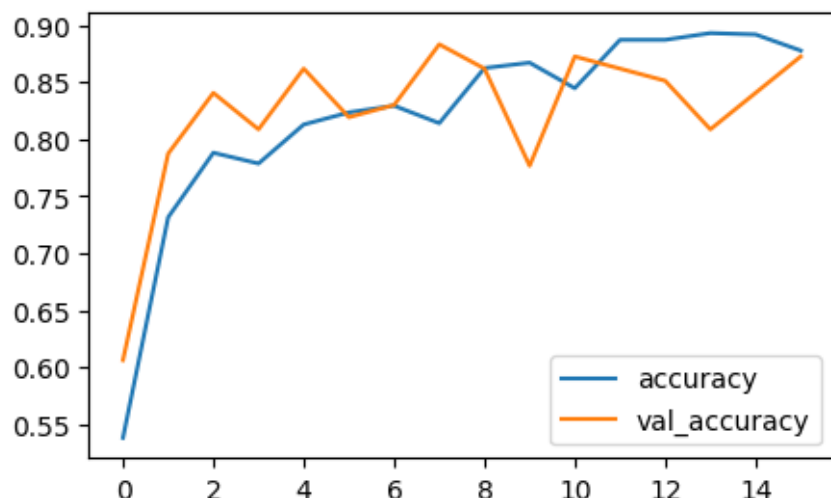
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8737 - loss: 0.3698
[0.3297137916088104, 0.8723404407501221]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.82      0.90      0.86        41
        Male       0.92      0.85      0.88        53

    accuracy                           0.87        94
   macro avg       0.87      0.88      0.87        94
weighted avg       0.88      0.87      0.87        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5783 - loss: 0.9799 - val_accuracy: 0.6170
- val_loss: 0.6719 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6667 - loss: 0.6140 - val_accuracy: 0.6915
- val_loss: 0.5812 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7420 - loss: 0.5319 - val_accuracy: 0.7660
- val_loss: 0.5438 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7774 - loss: 0.4554 - val_accuracy: 0.8085
```

```
- val_loss: 0.5113 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7809 - loss: 0.4817 - val_accuracy: 0.7872
- val_loss: 0.4702 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8057 - loss: 0.4468 - val_accuracy: 0.7872
- val_loss: 0.5109 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8245 - loss: 0.4039 - val_accuracy: 0.8511
- val_loss: 0.3958 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8198 - loss: 0.4000 - val_accuracy: 0.7660
- val_loss: 0.3873 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8339 - loss: 0.3837 - val_accuracy: 0.8511
- val_loss: 0.3389 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 67ms/step - accuracy: 0.8386 - loss: 0.3629 - val_accuracy: 0.8723
- val_loss: 0.3046 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8492 - loss: 0.3394 - val_accuracy: 0.8511
- val_loss: 0.3149 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8563 - loss: 0.3245 - val_accuracy: 0.8511
- val_loss: 0.3109 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8822 - loss: 0.3037 - val_accuracy: 0.8830
- val_loss: 0.2881 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8563 - loss: 0.3127 - val_accuracy: 0.8617
- val_loss: 0.3402 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8787 - loss: 0.2998 - val_accuracy: 0.8085
- val_loss: 0.3747 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8893 - loss: 0.2618 - val_accuracy: 0.8617
- val_loss: 0.3165 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 22
```
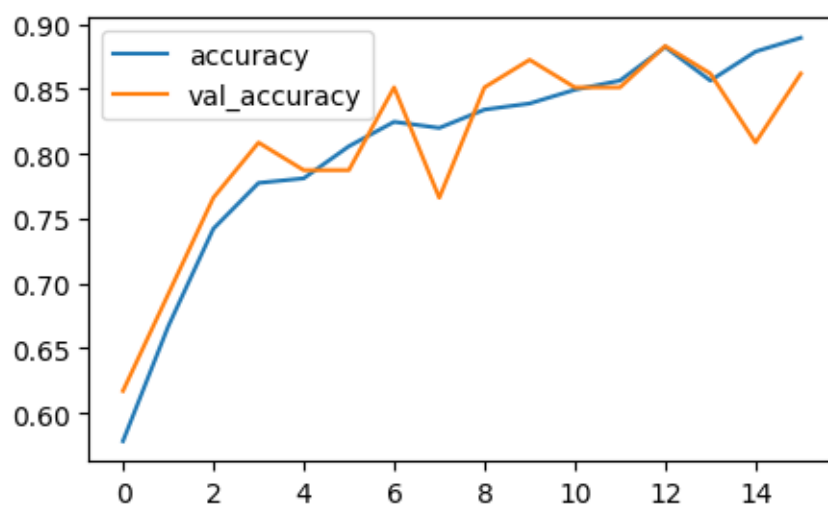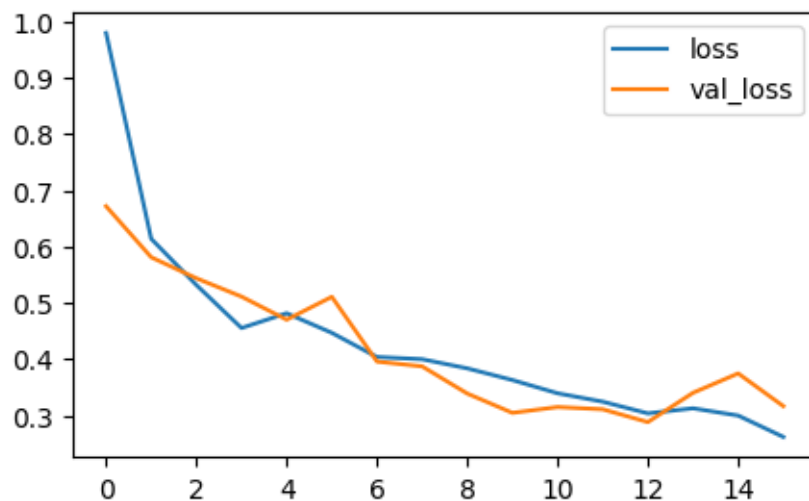
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8605 - loss: 0.3314
[0.3165314197540283, 0.8617021441459656]
3/3                 0s 26ms/step
Classification Report:
              precision    recall   f1-score    support

     Female       0.80       0.90       0.85         41
       Male       0.92       0.83       0.87         53

   accuracy                             0.86         94
```

```
   macro avg      0.86      0.87      0.86        94
weighted avg      0.87      0.86      0.86        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5289 - loss: 0.7936 - val_accuracy: 0.5638
- val_loss: 0.6638 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 67ms/step - accuracy: 0.7055 - loss: 0.5904 - val_accuracy: 0.8511
- val_loss: 0.4109 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7609 - loss: 0.4791 - val_accuracy: 0.8404
- val_loss: 0.4359 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.8033 - loss: 0.4559 - val_accuracy: 0.8617
- val_loss: 0.4207 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8033 - loss: 0.4551 - val_accuracy: 0.8298
- val_loss: 0.4888 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8127 - loss: 0.4125 - val_accuracy: 0.8617
- val_loss: 0.4322 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8210 - loss: 0.4145 - val_accuracy: 0.8511
- val_loss: 0.3763 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8269 - loss: 0.3821 - val_accuracy: 0.7660
- val_loss: 0.3999 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8245 - loss: 0.3957 - val_accuracy: 0.8298
- val_loss: 0.4365 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8433 - loss: 0.3567 - val_accuracy: 0.8511
- val_loss: 0.2964 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 67ms/step - accuracy: 0.8457 - loss: 0.3412 - val_accuracy: 0.8617
- val_loss: 0.3228 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8575 - loss: 0.3222 - val_accuracy: 0.8830
- val_loss: 0.3816 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8693 - loss: 0.3094 - val_accuracy: 0.8617
- val_loss: 0.3904 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8657 - loss: 0.3027 - val_accuracy: 0.8298
```

```
- val_loss: 0.3837 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8810 - loss: 0.2856 - val_accuracy: 0.8404
- val_loss: 0.3670 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8940 - loss: 0.2696 - val_accuracy: 0.8404
- val_loss: 0.3795 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 23
```
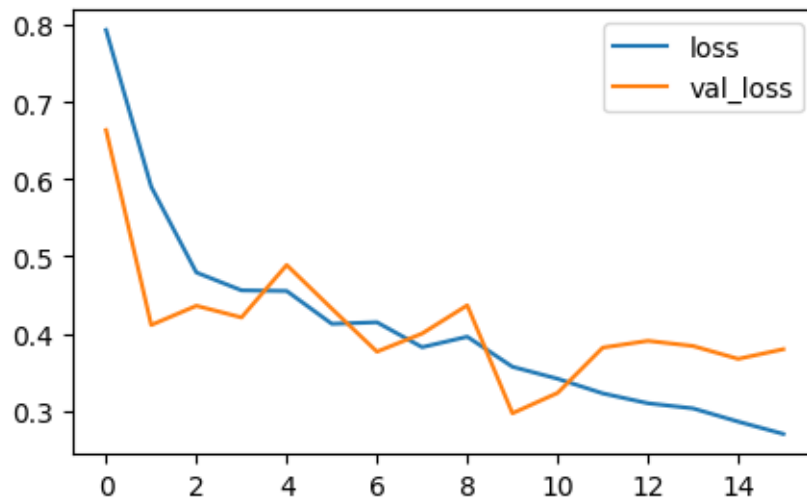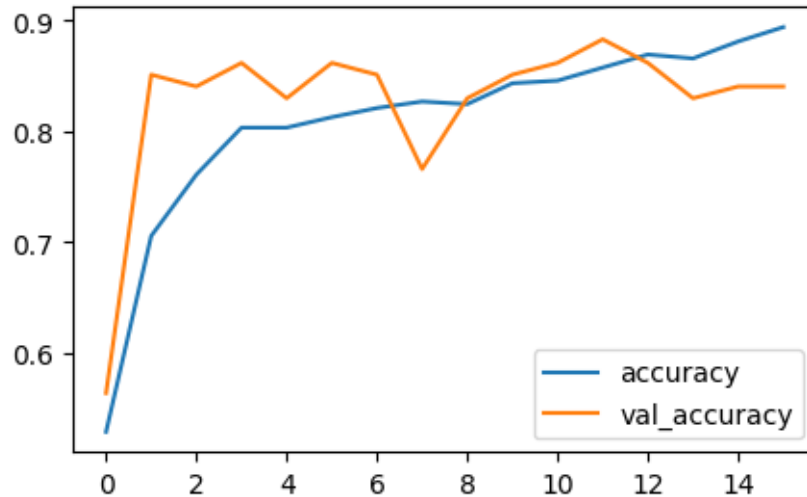
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8108 - loss: 0.4166
[0.37950238585472107, 0.8404255509376526]
3/3                0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.81      0.83      0.82        41
        Male       0.87      0.85      0.86        53

    accuracy                           0.84        94
   macro avg       0.84      0.84      0.84        94
weighted avg       0.84      0.84      0.84        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 86ms/step - accuracy: 0.5783 - loss: 0.7618 - val_accuracy: 0.6596
- val_loss: 0.7635 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7397 - loss: 0.5354 - val_accuracy: 0.7660
- val_loss: 0.6650 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7691 - loss: 0.4864 - val_accuracy: 0.8085
- val_loss: 0.6187 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7868 - loss: 0.4731 - val_accuracy: 0.8404
```

```
- val_loss: 0.4413 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 64ms/step - accuracy: 0.8257 - loss: 0.4083 - val_accuracy: 0.8085
- val_loss: 0.5017 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 64ms/step - accuracy: 0.8410 - loss: 0.3650 - val_accuracy: 0.8723
- val_loss: 0.3832 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8422 - loss: 0.3493 - val_accuracy: 0.8085
- val_loss: 0.4671 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8587 - loss: 0.3379 - val_accuracy: 0.8936
- val_loss: 0.2734 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8693 - loss: 0.3127 - val_accuracy: 0.7660
- val_loss: 0.6662 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8598 - loss: 0.3343 - val_accuracy: 0.8936
- val_loss: 0.3228 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8775 - loss: 0.3027 - val_accuracy: 0.8830
- val_loss: 0.2931 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8975 - loss: 0.2529 - val_accuracy: 0.8723
- val_loss: 0.2942 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8881 - loss: 0.2661 - val_accuracy: 0.8936
- val_loss: 0.3107 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8987 - loss: 0.2407 - val_accuracy: 0.8511
- val_loss: 0.4782 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8975 - loss: 0.2494 - val_accuracy: 0.9043
- val_loss: 0.3629 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8928 - loss: 0.2440 - val_accuracy: 0.8723
- val_loss: 0.4296 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8723404407501221
Reseting all weights…
Current number of trials: 24
```
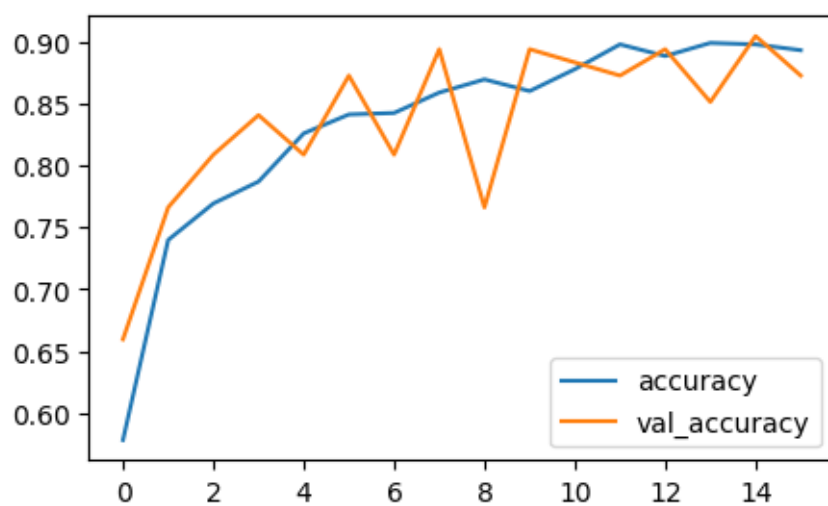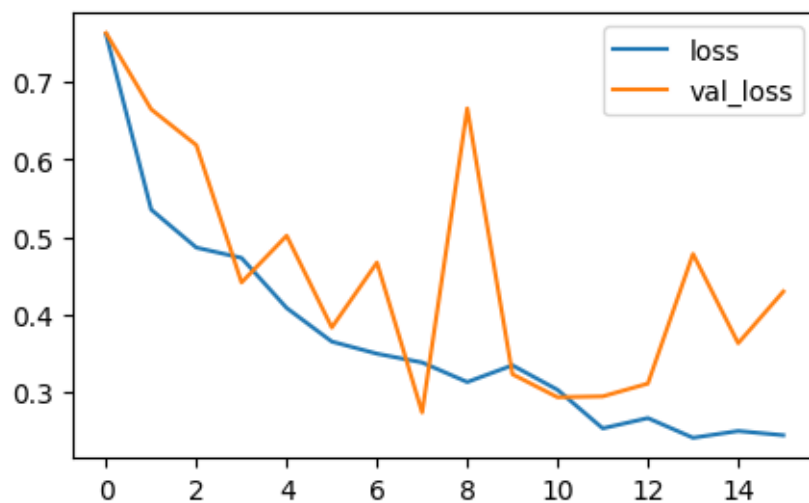
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8502 - loss: 0.4619
[0.42961397767066956, 0.8723404407501221]
3/3              0s 25ms/step
Classification Report:
             precision    recall  f1-score   support

     Female       0.80      0.95      0.87        41
       Male       0.96      0.81      0.88        53

   accuracy                          0.87        94
```

```
    macro avg       0.88      0.88      0.87        94
weighted avg        0.89      0.87      0.87        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 3s - 94ms/step - accuracy: 0.5654 - loss: 1.1055 - val_accuracy: 0.6383
- val_loss: 0.6770 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6902 - loss: 0.6053 - val_accuracy: 0.7340
- val_loss: 0.5465 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7491 - loss: 0.5138 - val_accuracy: 0.7553
- val_loss: 0.5210 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7809 - loss: 0.4672 - val_accuracy: 0.8191
- val_loss: 0.4351 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8009 - loss: 0.4509 - val_accuracy: 0.7979
- val_loss: 0.5115 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 64ms/step - accuracy: 0.8127 - loss: 0.4088 - val_accuracy: 0.8085
- val_loss: 0.5767 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8292 - loss: 0.4011 - val_accuracy: 0.8404
- val_loss: 0.4950 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8410 - loss: 0.3691 - val_accuracy: 0.8085
- val_loss: 0.5217 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8481 - loss: 0.3691 - val_accuracy: 0.8298
- val_loss: 0.4610 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8316 - loss: 0.3677 - val_accuracy: 0.8191
- val_loss: 0.4256 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8587 - loss: 0.3427 - val_accuracy: 0.8404
- val_loss: 0.3915 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8740 - loss: 0.3069 - val_accuracy: 0.8404
- val_loss: 0.3830 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8704 - loss: 0.3114 - val_accuracy: 0.8404
- val_loss: 0.4354 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 67ms/step - accuracy: 0.8810 - loss: 0.2865 - val_accuracy: 0.8298
```

```
- val_loss: 0.4352 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8575 - loss: 0.3147 - val_accuracy: 0.8085
- val_loss: 0.4720 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8751 - loss: 0.2799 - val_accuracy: 0.8085
- val_loss: 0.4099 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8085106611251831
Reseting all weights…
Current number of trials: 25
```
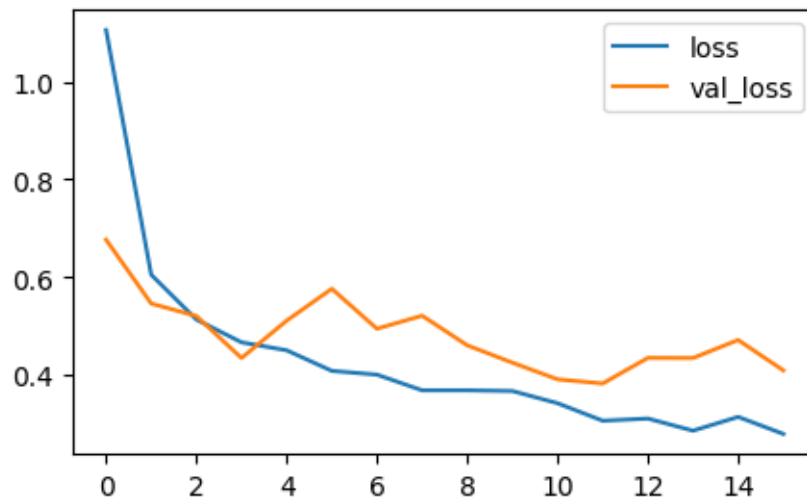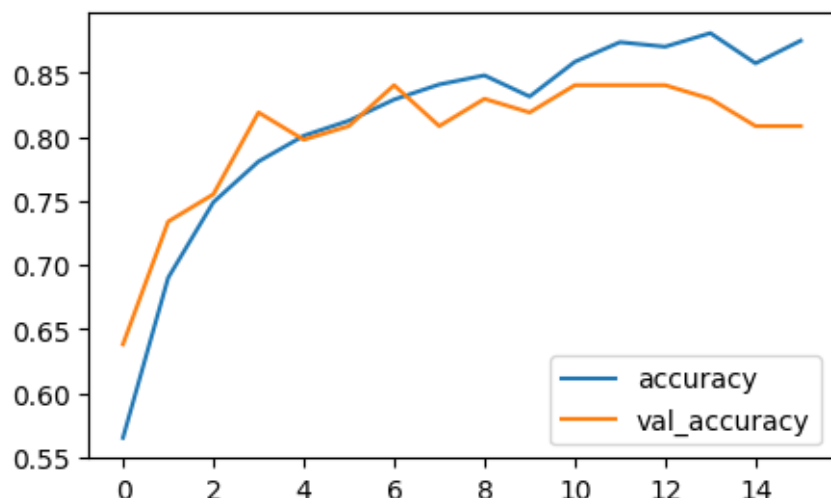
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8105 - loss: 0.4342
[0.4098578095436096, 0.8085106611251831]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.78      0.78        41
        Male       0.83      0.83      0.83        53

    accuracy                           0.81        94
   macro avg       0.81      0.81      0.81        94
weighted avg       0.81      0.81      0.81        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5347 - loss: 0.8504 - val_accuracy: 0.6383
- val_loss: 0.6643 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7197 - loss: 0.5676 - val_accuracy: 0.7660
- val_loss: 0.4720 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7750 - loss: 0.4925 - val_accuracy: 0.7979
- val_loss: 0.4764 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7939 - loss: 0.4592 - val_accuracy: 0.8511
```

```
- val_loss: 0.4073 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8304 - loss: 0.3912 - val_accuracy: 0.8298
- val_loss: 0.4164 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8516 - loss: 0.3585 - val_accuracy: 0.8404
- val_loss: 0.4272 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8445 - loss: 0.3488 - val_accuracy: 0.8191
- val_loss: 0.5338 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8539 - loss: 0.3397 - val_accuracy: 0.8298
- val_loss: 0.3870 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8610 - loss: 0.3283 - val_accuracy: 0.8511
- val_loss: 0.3565 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8822 - loss: 0.3021 - val_accuracy: 0.8511
- val_loss: 0.3564 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8928 - loss: 0.2778 - val_accuracy: 0.8404
- val_loss: 0.3321 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8987 - loss: 0.2662 - val_accuracy: 0.8617
- val_loss: 0.3536 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.9034 - loss: 0.2389 - val_accuracy: 0.8723
- val_loss: 0.3371 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.9034 - loss: 0.2456 - val_accuracy: 0.8617
- val_loss: 0.3892 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.9117 - loss: 0.2292 - val_accuracy: 0.8511
- val_loss: 0.4620 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.8928 - loss: 0.2463 - val_accuracy: 0.8617
- val_loss: 0.3377 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 26
```
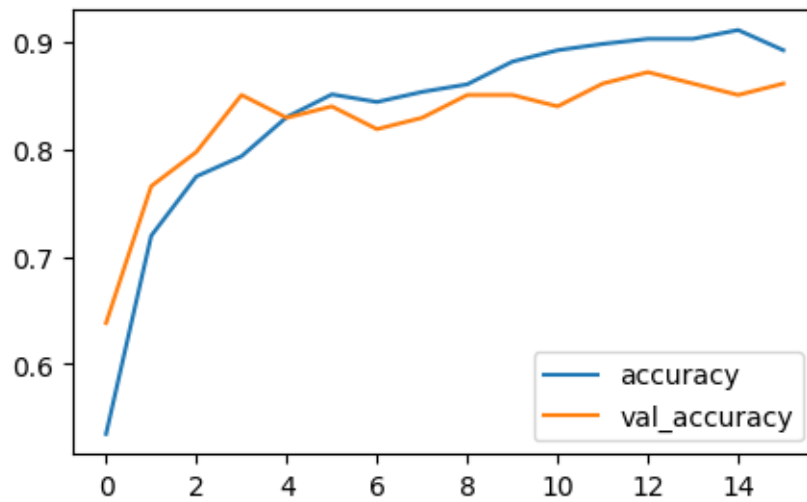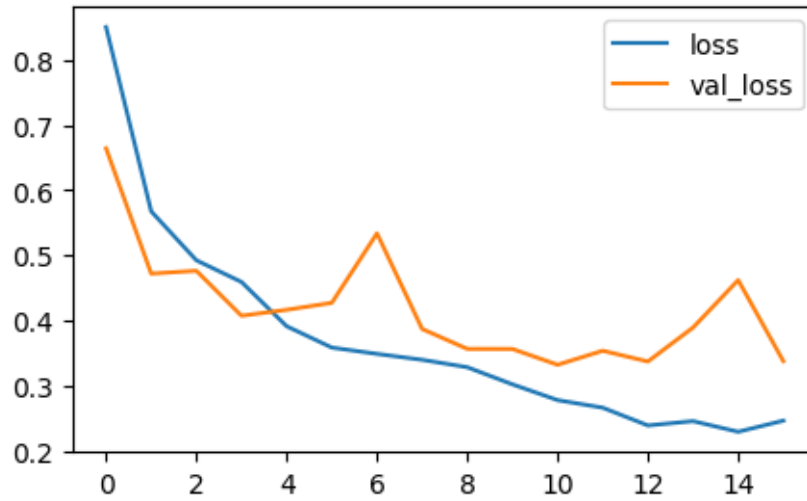
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8644 - loss: 0.3763
[0.33771589398384094, 0.8617021441459656]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.82      0.88      0.85        41
        Male       0.90      0.85      0.87        53

    accuracy                           0.86        94
```

```
   macro avg        0.86      0.86      0.86        94
weighted avg        0.86      0.86      0.86        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5842 - loss: 1.1010 - val_accuracy: 0.7021
- val_loss: 0.5724 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7479 - loss: 0.5425 - val_accuracy: 0.7872
- val_loss: 0.5122 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7715 - loss: 0.4818 - val_accuracy: 0.7979
- val_loss: 0.4608 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7621 - loss: 0.4800 - val_accuracy: 0.8191
- val_loss: 0.4829 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7856 - loss: 0.4457 - val_accuracy: 0.8191
- val_loss: 0.4535 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8045 - loss: 0.4195 - val_accuracy: 0.8085
- val_loss: 0.4633 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8257 - loss: 0.3912 - val_accuracy: 0.8298
- val_loss: 0.4599 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 67ms/step - accuracy: 0.8398 - loss: 0.3691 - val_accuracy: 0.8085
- val_loss: 0.5027 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8410 - loss: 0.3435 - val_accuracy: 0.8298
- val_loss: 0.3933 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8634 - loss: 0.3211 - val_accuracy: 0.8404
- val_loss: 0.4569 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8587 - loss: 0.3221 - val_accuracy: 0.8723
- val_loss: 0.3726 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8834 - loss: 0.3019 - val_accuracy: 0.8511
- val_loss: 0.4353 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8704 - loss: 0.3080 - val_accuracy: 0.8404
- val_loss: 0.4030 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8928 - loss: 0.2836 - val_accuracy: 0.8511
```

```
- val_loss: 0.3593 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8928 - loss: 0.2642 - val_accuracy: 0.8511
- val_loss: 0.3851 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8728 - loss: 0.2687 - val_accuracy: 0.8191
- val_loss: 0.4906 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8191489577293396
Reseting all weights…
Current number of trials: 27
```
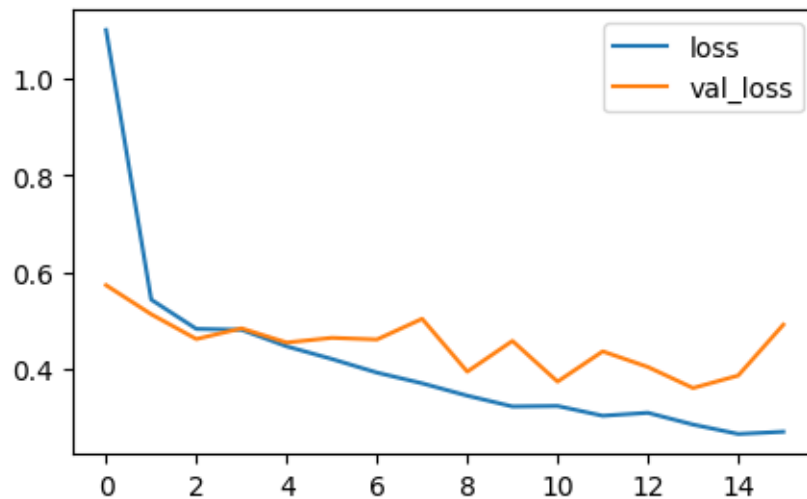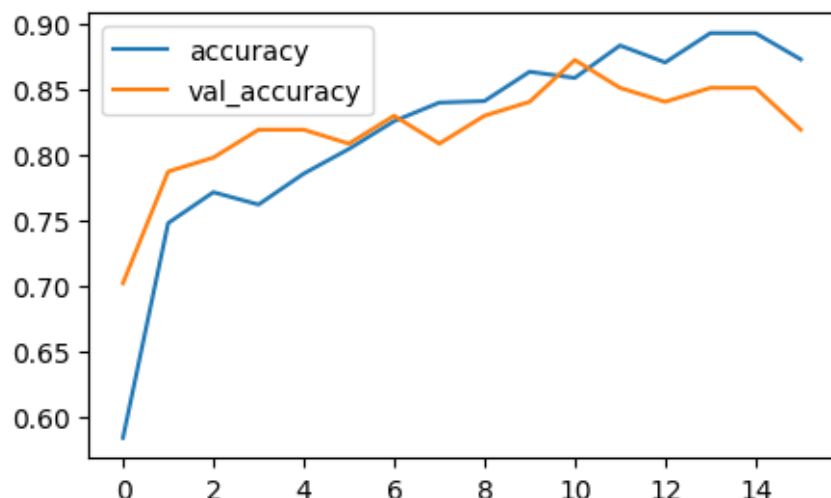
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8197 - loss: 0.5389
[0.49056196212768555, 0.8191489577293396]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.72      0.95      0.82        41
        Male       0.95      0.72      0.82        53

    accuracy                           0.82        94
   macro avg       0.84      0.83      0.82        94
weighted avg       0.85      0.82      0.82        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5630 - loss: 0.8870 - val_accuracy: 0.7234
- val_loss: 0.5685 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 67ms/step - accuracy: 0.7491 - loss: 0.5313 - val_accuracy: 0.7660
- val_loss: 0.5085 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7833 - loss: 0.4883 - val_accuracy: 0.7872
- val_loss: 0.5066 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7750 - loss: 0.4836 - val_accuracy: 0.7766
```

```
- val_loss: 0.5936 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7644 - loss: 0.5172 - val_accuracy: 0.7979
- val_loss: 0.4605 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8104 - loss: 0.4407 - val_accuracy: 0.7979
- val_loss: 0.4021 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8221 - loss: 0.3985 - val_accuracy: 0.8191
- val_loss: 0.4248 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8280 - loss: 0.3816 - val_accuracy: 0.7979
- val_loss: 0.4135 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 67ms/step - accuracy: 0.8363 - loss: 0.3703 - val_accuracy: 0.8191
- val_loss: 0.3670 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8504 - loss: 0.3391 - val_accuracy: 0.8404
- val_loss: 0.4325 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8834 - loss: 0.2935 - val_accuracy: 0.8085
- val_loss: 0.4650 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8763 - loss: 0.2976 - val_accuracy: 0.8404
- val_loss: 0.3923 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8846 - loss: 0.3098 - val_accuracy: 0.8191
- val_loss: 0.5055 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8916 - loss: 0.2737 - val_accuracy: 0.8191
- val_loss: 0.4271 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8928 - loss: 0.2681 - val_accuracy: 0.8511
- val_loss: 0.4101 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8787 - loss: 0.2934 - val_accuracy: 0.8404
- val_loss: 0.3915 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 28
```
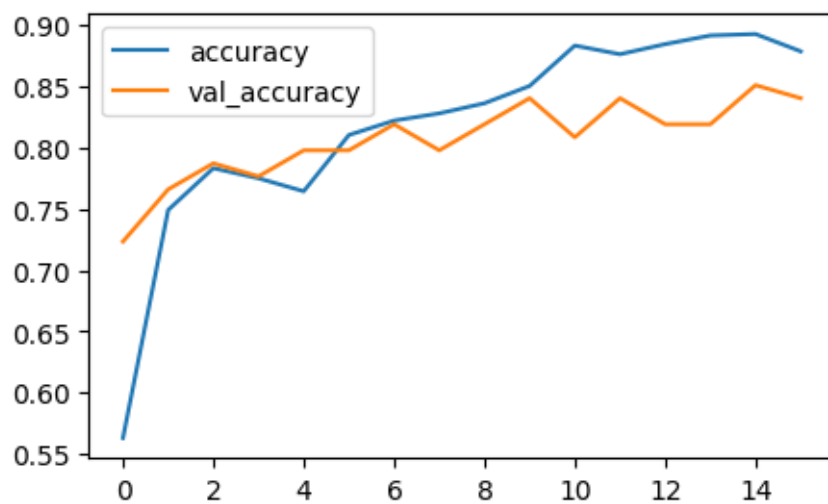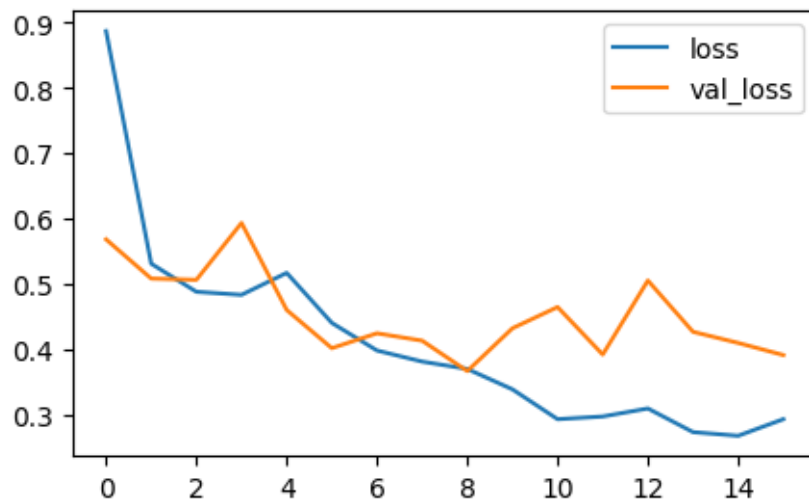
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8421 - loss: 0.4166
[0.39152365922927856, 0.8404255509376526]
3/3                0s 25ms/step
Classification Report:
             precision    recall  f1-score    support

     Female        0.76      0.93      0.84         41
       Male        0.93      0.77      0.85         53

   accuracy                            0.84         94
```

```
    macro avg          0.85       0.85       0.84         94
weighted avg           0.86       0.84       0.84         94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 89ms/step - accuracy: 0.5771 - loss: 0.8268 - val_accuracy: 0.6915
- val_loss: 0.6245 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6985 - loss: 0.5881 - val_accuracy: 0.7660
- val_loss: 0.5648 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7527 - loss: 0.5339 - val_accuracy: 0.8085
- val_loss: 0.5084 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.8021 - loss: 0.4563 - val_accuracy: 0.7979
- val_loss: 0.6649 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8057 - loss: 0.4202 - val_accuracy: 0.7979
- val_loss: 0.4607 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8163 - loss: 0.4075 - val_accuracy: 0.8085
- val_loss: 0.5584 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8339 - loss: 0.3883 - val_accuracy: 0.8723
- val_loss: 0.4049 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8351 - loss: 0.3757 - val_accuracy: 0.8404
- val_loss: 0.4770 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8316 - loss: 0.3778 - val_accuracy: 0.8830
- val_loss: 0.3358 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 67ms/step - accuracy: 0.8386 - loss: 0.3621 - val_accuracy: 0.9149
- val_loss: 0.2994 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8740 - loss: 0.3097 - val_accuracy: 0.8617
- val_loss: 0.3445 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8763 - loss: 0.2927 - val_accuracy: 0.8617
- val_loss: 0.3210 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8846 - loss: 0.2813 - val_accuracy: 0.8936
- val_loss: 0.3307 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8881 - loss: 0.2763 - val_accuracy: 0.8723
```

```
- val_loss: 0.4282 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8799 - loss: 0.2937 - val_accuracy: 0.8936
- val_loss: 0.3135 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.9022 - loss: 0.2468 - val_accuracy: 0.8511
- val_loss: 0.4588 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 29
```
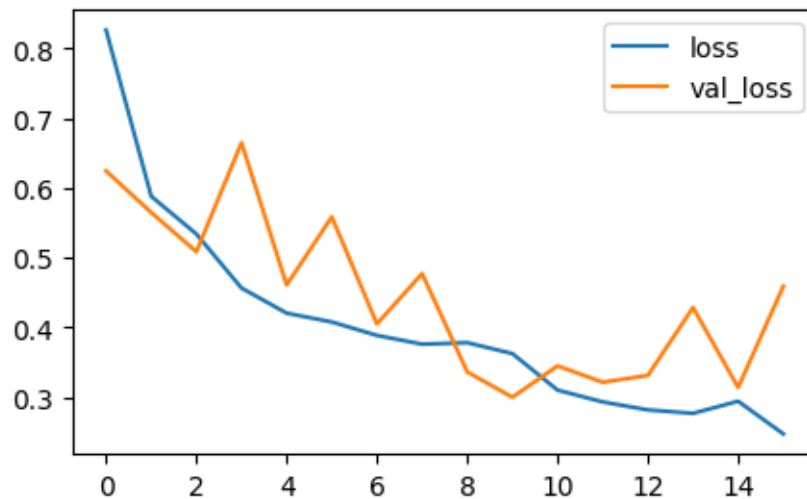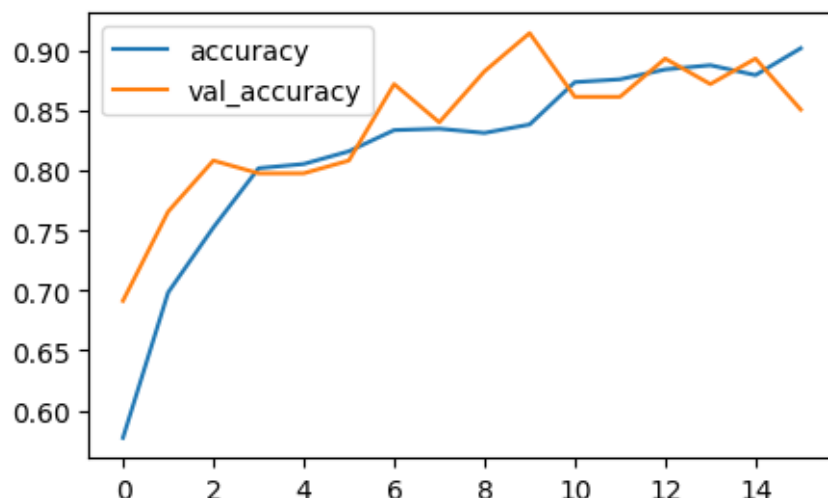
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8552 - loss: 0.4703
[0.45582171392440796, 0.8510638475418091]
3/3                0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.93      0.84        41
        Male       0.93      0.79      0.86        53

    accuracy                           0.85        94
   macro avg       0.85      0.86      0.85        94
weighted avg       0.86      0.85      0.85        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5771 - loss: 0.7392 - val_accuracy: 0.6489
- val_loss: 0.6474 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7479 - loss: 0.5456 - val_accuracy: 0.7979
- val_loss: 0.4366 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7868 - loss: 0.4849 - val_accuracy: 0.7340
- val_loss: 0.4969 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7691 - loss: 0.4873 - val_accuracy: 0.7766
```

```
- val_loss: 0.5532 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8045 - loss: 0.4318 - val_accuracy: 0.8298
- val_loss: 0.3958 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8057 - loss: 0.4357 - val_accuracy: 0.8085
- val_loss: 0.4147 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8410 - loss: 0.4046 - val_accuracy: 0.7979
- val_loss: 0.4151 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8410 - loss: 0.3855 - val_accuracy: 0.8404
- val_loss: 0.4457 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8292 - loss: 0.4012 - val_accuracy: 0.8298
- val_loss: 0.3598 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8316 - loss: 0.3728 - val_accuracy: 0.8191
- val_loss: 0.4894 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8551 - loss: 0.3181 - val_accuracy: 0.8404
- val_loss: 0.3507 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 67ms/step - accuracy: 0.8669 - loss: 0.3158 - val_accuracy: 0.8511
- val_loss: 0.4205 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8693 - loss: 0.3101 - val_accuracy: 0.8298
- val_loss: 0.3446 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8716 - loss: 0.2842 - val_accuracy: 0.8298
- val_loss: 0.3868 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8846 - loss: 0.2699 - val_accuracy: 0.8404
- val_loss: 0.4880 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8728 - loss: 0.2885 - val_accuracy: 0.8404
- val_loss: 0.3743 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 30
```
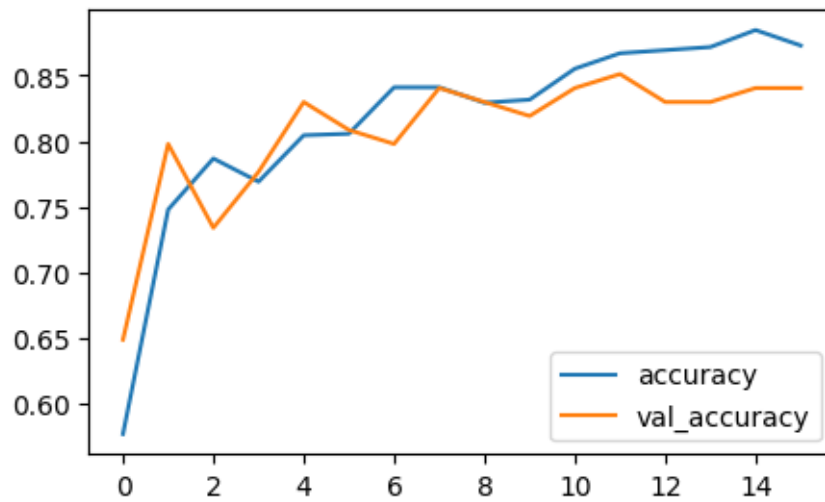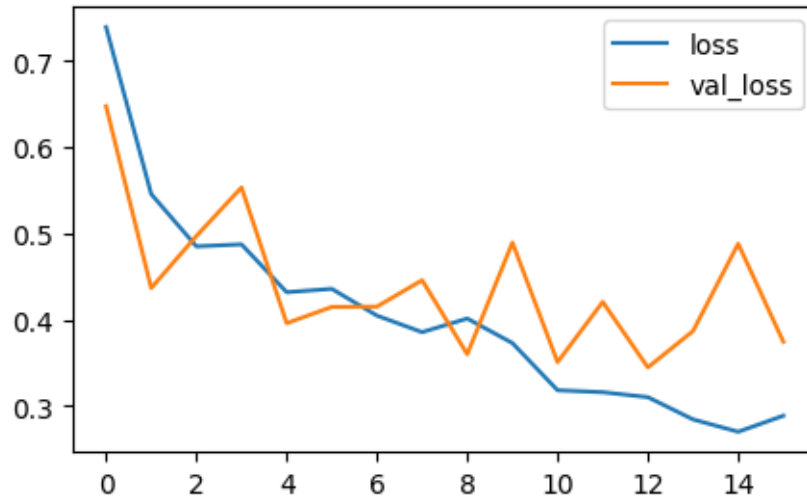
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8304 - loss: 0.4204
[0.37432730197906494, 0.8404255509376526]
3/3              0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.76      0.93      0.84        41
        Male       0.93      0.77      0.85        53

    accuracy                           0.84        94
```

```
    macro avg       0.85      0.85      0.84        94
weighted avg        0.86      0.84      0.84        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5559 - loss: 0.8713 - val_accuracy: 0.5638
- val_loss: 0.6784 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7138 - loss: 0.5755 - val_accuracy: 0.7766
- val_loss: 0.5535 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7503 - loss: 0.5013 - val_accuracy: 0.8085
- val_loss: 0.4889 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7962 - loss: 0.4667 - val_accuracy: 0.8191
- val_loss: 0.3769 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8186 - loss: 0.4104 - val_accuracy: 0.8511
- val_loss: 0.3465 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8398 - loss: 0.3829 - val_accuracy: 0.8617
- val_loss: 0.3623 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8327 - loss: 0.3739 - val_accuracy: 0.8191
- val_loss: 0.4429 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8622 - loss: 0.3315 - val_accuracy: 0.7979
- val_loss: 0.4611 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8693 - loss: 0.3161 - val_accuracy: 0.8191
- val_loss: 0.3943 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8775 - loss: 0.2945 - val_accuracy: 0.8511
- val_loss: 0.3923 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8905 - loss: 0.2637 - val_accuracy: 0.8404
- val_loss: 0.4085 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8881 - loss: 0.2597 - val_accuracy: 0.8404
- val_loss: 0.3544 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.9011 - loss: 0.2474 - val_accuracy: 0.8191
- val_loss: 0.3607 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.9117 - loss: 0.2321 - val_accuracy: 0.8617
```

```
- val_loss: 0.4492 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8987 - loss: 0.2409 - val_accuracy: 0.8404
- val_loss: 0.4231 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8928 - loss: 0.2463 - val_accuracy: 0.8404
- val_loss: 0.3890 - learning_rate: 5.0000e-04
```

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

```
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 31
```
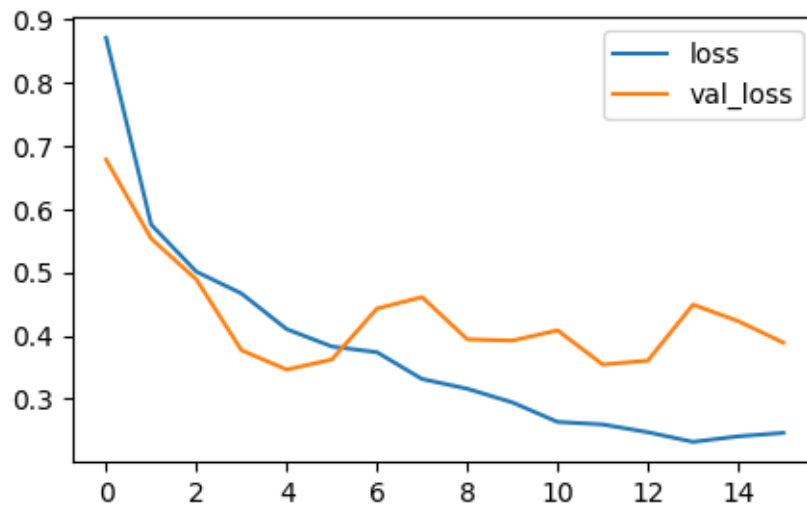
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8343 - loss: 0.4268
[0.38901445269584656, 0.8404255509376526]
3/3                0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.81      0.83      0.82        41
        Male       0.87      0.85      0.86        53

    accuracy                           0.84        94
   macro avg       0.84      0.84      0.84        94
weighted avg       0.84      0.84      0.84        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 3s - 96ms/step - accuracy: 0.6702 - loss: 0.6824 - val_accuracy: 0.6383
- val_loss: 0.6148 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7456 - loss: 0.5089 - val_accuracy: 0.7553
- val_loss: 0.5556 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7774 - loss: 0.4651 - val_accuracy: 0.8298
- val_loss: 0.4856 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 67ms/step - accuracy: 0.8009 - loss: 0.4220 - val_accuracy: 0.8298
```

```
- val_loss: 0.4459 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8045 - loss: 0.4110 - val_accuracy: 0.8191
- val_loss: 0.4595 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 67ms/step - accuracy: 0.8422 - loss: 0.3636 - val_accuracy: 0.8298
- val_loss: 0.4075 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8481 - loss: 0.3597 - val_accuracy: 0.8617
- val_loss: 0.4157 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8681 - loss: 0.3276 - val_accuracy: 0.8298
- val_loss: 0.3756 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8551 - loss: 0.3146 - val_accuracy: 0.8511
- val_loss: 0.4089 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8622 - loss: 0.3316 - val_accuracy: 0.8404
- val_loss: 0.3734 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8693 - loss: 0.2982 - val_accuracy: 0.8511
- val_loss: 0.3810 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8881 - loss: 0.2840 - val_accuracy: 0.8404
- val_loss: 0.3857 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.8881 - loss: 0.2501 - val_accuracy: 0.8617
- val_loss: 0.3626 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8928 - loss: 0.2535 - val_accuracy: 0.8404
- val_loss: 0.3834 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.9022 - loss: 0.2373 - val_accuracy: 0.8511
- val_loss: 0.4140 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.9022 - loss: 0.2461 - val_accuracy: 0.8404
- val_loss: 0.4089 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 32
```
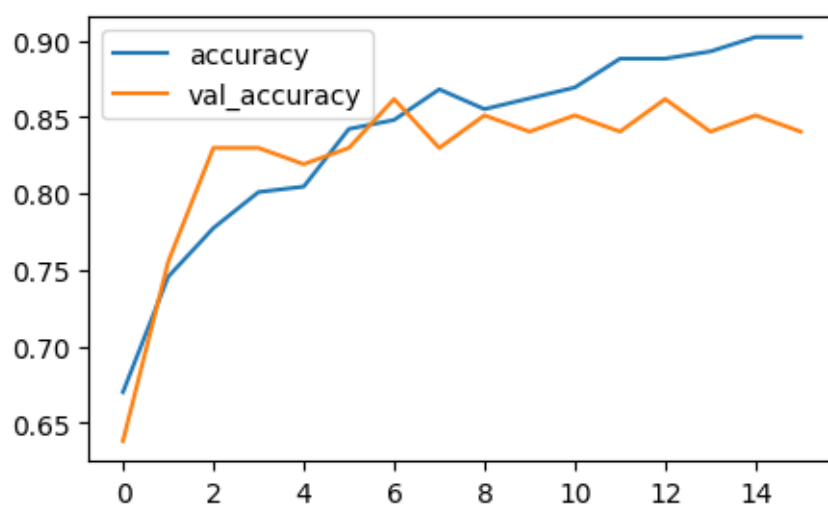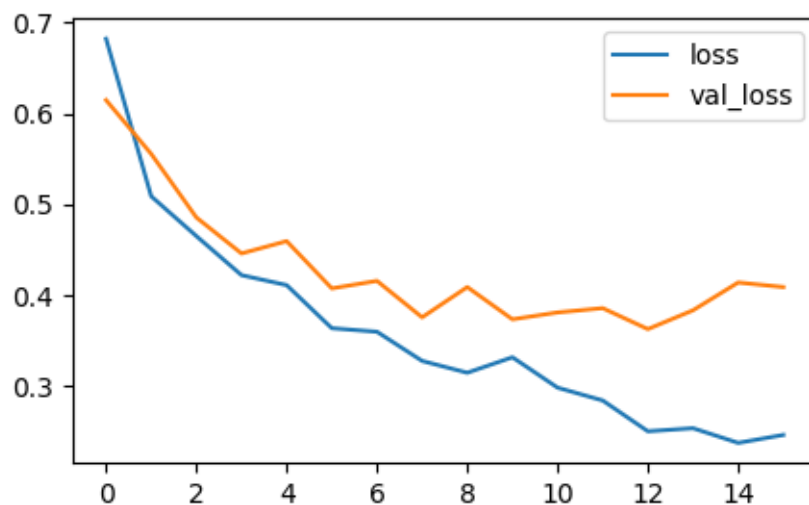
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8382 - loss: 0.4425
[0.40892907977104187, 0.8404255509376526]
3/3                0s 26ms/step
Classification Report:
            precision    recall  f1-score   support

    Female       0.76      0.93      0.84        41
      Male       0.93      0.77      0.85        53

  accuracy                          0.84        94
```

```
   macro avg       0.85      0.85      0.84        94
weighted avg       0.86      0.84      0.84        94
```

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.

2025-05-06 10:06:37.882226: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5465 - loss: 0.8277 - val_accuracy: 0.6277
- val_loss: 0.6860 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6985 - loss: 0.5914 - val_accuracy: 0.7128
- val_loss: 0.6013 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 67ms/step - accuracy: 0.7821 - loss: 0.4828 - val_accuracy: 0.7660
- val_loss: 0.5198 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.8174 - loss: 0.4202 - val_accuracy: 0.8617
- val_loss: 0.4589 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 67ms/step - accuracy: 0.8080 - loss: 0.4246 - val_accuracy: 0.8404
- val_loss: 0.3693 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8469 - loss: 0.3938 - val_accuracy: 0.8511
- val_loss: 0.3936 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8375 - loss: 0.3676 - val_accuracy: 0.7979
- val_loss: 0.4671 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8457 - loss: 0.3592 - val_accuracy: 0.7979
- val_loss: 0.4360 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8598 - loss: 0.3400 - val_accuracy: 0.8298
- val_loss: 0.4015 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8669 - loss: 0.3258 - val_accuracy: 0.8298
- val_loss: 0.4272 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8810 - loss: 0.2962 - val_accuracy: 0.8191
- val_loss: 0.4333 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8787 - loss: 0.2940 - val_accuracy: 0.8191
- val_loss: 0.4357 - learning_rate: 5.0000e-04
Epoch 13/16
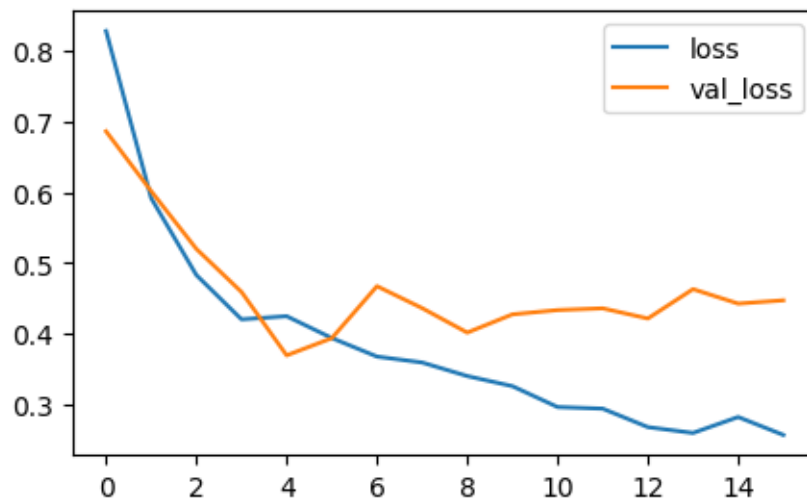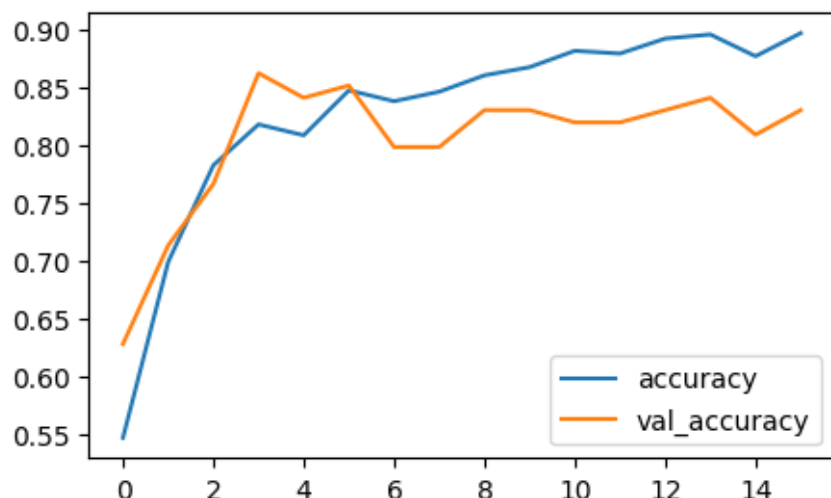27/27 - 2s - 66ms/step - accuracy: 0.8916 - loss: 0.2679 - val_accuracy: 0.8298
```

```
- val_loss: 0.4214 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8952 - loss: 0.2596 - val_accuracy: 0.8404
- val_loss: 0.4629 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8763 - loss: 0.2822 - val_accuracy: 0.8085
- val_loss: 0.4424 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.8963 - loss: 0.2568 - val_accuracy: 0.8298
- val_loss: 0.4471 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 33
```

```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8329 - loss: 0.4918
[0.4470723867416382, 0.8297872543334961]
3/3              0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.77      0.88      0.82        41
        Male       0.89      0.79      0.84        53

    accuracy                           0.83        94
   macro avg       0.83      0.84      0.83        94
weighted avg       0.84      0.83      0.83        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5430 - loss: 0.8439 - val_accuracy: 0.5426
- val_loss: 0.6663 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6796 - loss: 0.6190 - val_accuracy: 0.6702
- val_loss: 0.5809 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7397 - loss: 0.5132 - val_accuracy: 0.7660
- val_loss: 0.4889 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7939 - loss: 0.4733 - val_accuracy: 0.7766
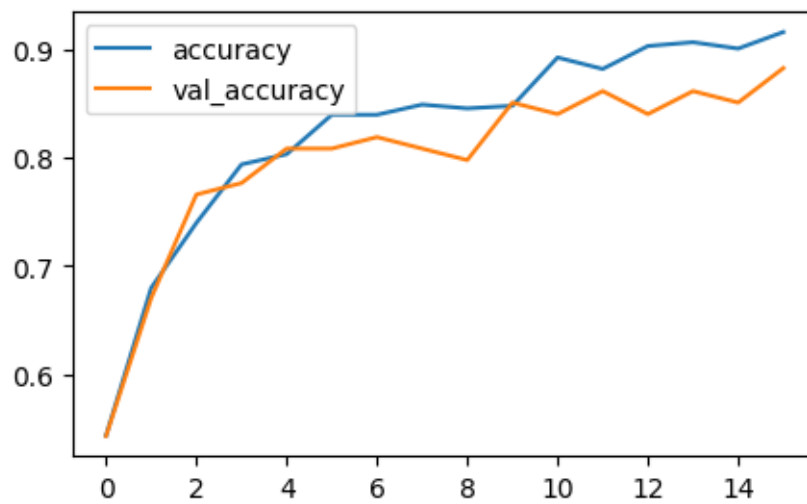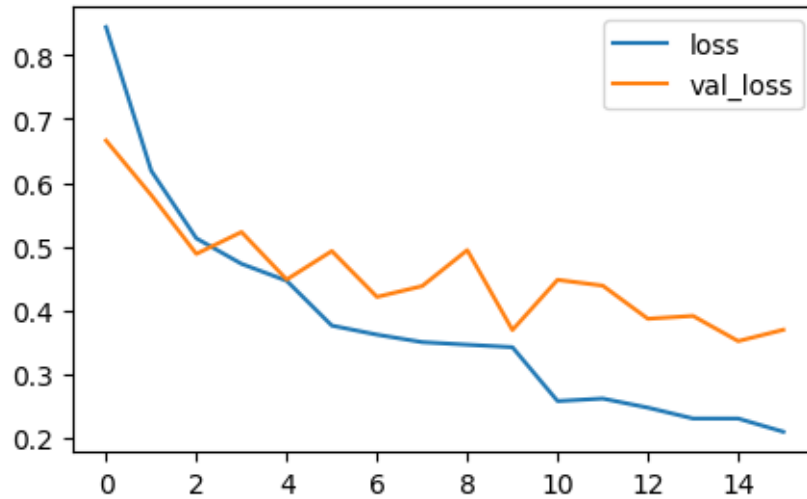```

```
- val_loss: 0.5231 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8033 - loss: 0.4468 - val_accuracy: 0.8085
- val_loss: 0.4487 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 67ms/step - accuracy: 0.8398 - loss: 0.3766 - val_accuracy: 0.8085
- val_loss: 0.4933 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8398 - loss: 0.3624 - val_accuracy: 0.8191
- val_loss: 0.4215 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 67ms/step - accuracy: 0.8492 - loss: 0.3507 - val_accuracy: 0.8085
- val_loss: 0.4384 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8457 - loss: 0.3467 - val_accuracy: 0.7979
- val_loss: 0.4947 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8481 - loss: 0.3428 - val_accuracy: 0.8511
- val_loss: 0.3697 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8928 - loss: 0.2584 - val_accuracy: 0.8404
- val_loss: 0.4482 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 67ms/step - accuracy: 0.8822 - loss: 0.2624 - val_accuracy: 0.8617
- val_loss: 0.4391 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.9034 - loss: 0.2481 - val_accuracy: 0.8404
- val_loss: 0.3873 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.9069 - loss: 0.2311 - val_accuracy: 0.8617
- val_loss: 0.3918 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.9011 - loss: 0.2311 - val_accuracy: 0.8511
- val_loss: 0.3523 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.9164 - loss: 0.2104 - val_accuracy: 0.8830
- val_loss: 0.3700 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8829787373542786
Reseting all weights…
Current number of trials: 34
```

```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8712 - loss: 0.4213
[0.3700350224971771, 0.8829787373542786]
3/3                0s 25ms/step
Classification Report:
              precision    recall  f1-score    support

      Female       0.83      0.93      0.87         41
        Male       0.94      0.85      0.89         53

    accuracy                           0.88         94
```

```
   macro avg          0.88       0.89       0.88           94
weighted avg          0.89       0.88       0.88           94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 89ms/step - accuracy: 0.5395 - loss: 0.8749 - val_accuracy: 0.6170
- val_loss: 0.6768 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7032 - loss: 0.5924 - val_accuracy: 0.7340
- val_loss: 0.5873 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7574 - loss: 0.5054 - val_accuracy: 0.7128
- val_loss: 0.5688 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7868 - loss: 0.4653 - val_accuracy: 0.7766
- val_loss: 0.5074 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7833 - loss: 0.4697 - val_accuracy: 0.7553
- val_loss: 0.5598 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 67ms/step - accuracy: 0.7986 - loss: 0.4500 - val_accuracy: 0.7872
- val_loss: 0.4934 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8033 - loss: 0.4222 - val_accuracy: 0.7872
- val_loss: 0.4583 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8221 - loss: 0.4073 - val_accuracy: 0.7766
- val_loss: 0.4803 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 68ms/step - accuracy: 0.8445 - loss: 0.3613 - val_accuracy: 0.7979
- val_loss: 0.4803 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8528 - loss: 0.3361 - val_accuracy: 0.8085
- val_loss: 0.5025 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8751 - loss: 0.2977 - val_accuracy: 0.8085
- val_loss: 0.4930 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 66ms/step - accuracy: 0.8681 - loss: 0.2968 - val_accuracy: 0.8191
- val_loss: 0.4223 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8799 - loss: 0.2761 - val_accuracy: 0.8191
- val_loss: 0.4981 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8857 - loss: 0.2664 - val_accuracy: 0.8085
```

```
- val_loss: 0.4802 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 67ms/step - accuracy: 0.8869 - loss: 0.2615 - val_accuracy: 0.8191
- val_loss: 0.4063 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8987 - loss: 0.2392 - val_accuracy: 0.8298
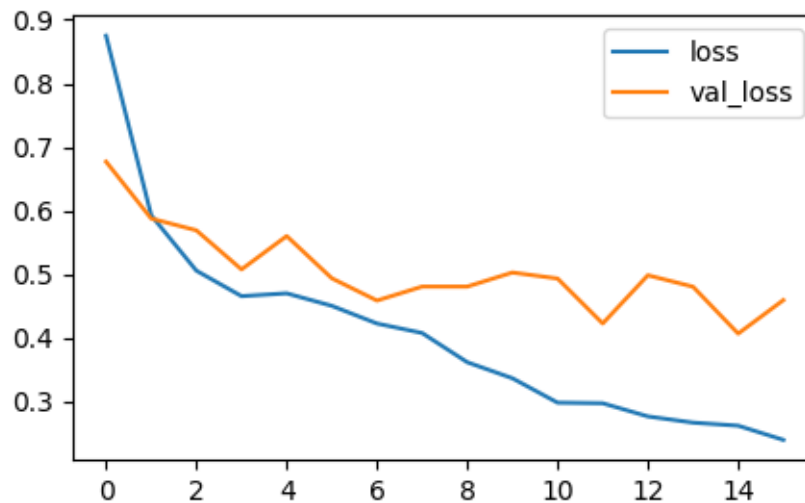- val_loss: 0.4590 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
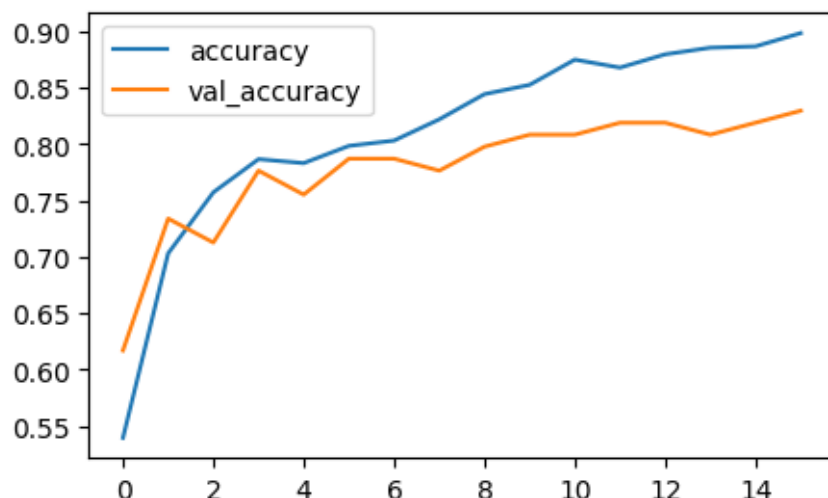recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8297872543334961
Reseting all weights...
Current number of trials: 35
```

```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8172 - loss: 0.4973
[0.45904651284217834, 0.8297872543334961]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.77      0.88      0.82        41
        Male       0.89      0.79      0.84        53

    accuracy                           0.83        94
   macro avg       0.83      0.84      0.83        94
weighted avg       0.84      0.83      0.83        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.4971 - loss: 1.2893 - val_accuracy: 0.5851
- val_loss: 0.6878 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6667 - loss: 0.6250 - val_accuracy: 0.6809
- val_loss: 0.6232 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7067 - loss: 0.5548 - val_accuracy: 0.7660
- val_loss: 0.5387 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7527 - loss: 0.5107 - val_accuracy: 0.8191
```

```
- val_loss: 0.5191 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7833 - loss: 0.4555 - val_accuracy: 0.8511
- val_loss: 0.5129 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8009 - loss: 0.4248 - val_accuracy: 0.8085
- val_loss: 0.6194 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8174 - loss: 0.4236 - val_accuracy: 0.8404
- val_loss: 0.4042 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8163 - loss: 0.4060 - val_accuracy: 0.8404
- val_loss: 0.3978 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8398 - loss: 0.3723 - val_accuracy: 0.8298
- val_loss: 0.4655 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8304 - loss: 0.3919 - val_accuracy: 0.8191
- val_loss: 0.4226 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 67ms/step - accuracy: 0.8363 - loss: 0.3718 - val_accuracy: 0.8191
- val_loss: 0.3909 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8528 - loss: 0.3390 - val_accuracy: 0.8404
- val_loss: 0.4201 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8622 - loss: 0.3286 - val_accuracy: 0.8511
- val_loss: 0.4381 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8645 - loss: 0.3188 - val_accuracy: 0.8617
- val_loss: 0.3646 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8657 - loss: 0.3151 - val_accuracy: 0.8723
- val_loss: 0.3791 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.8869 - loss: 0.2905 - val_accuracy: 0.8511
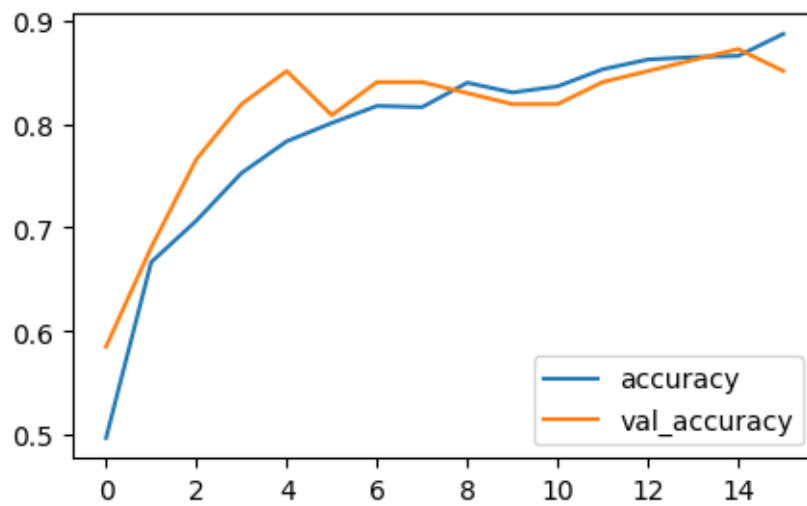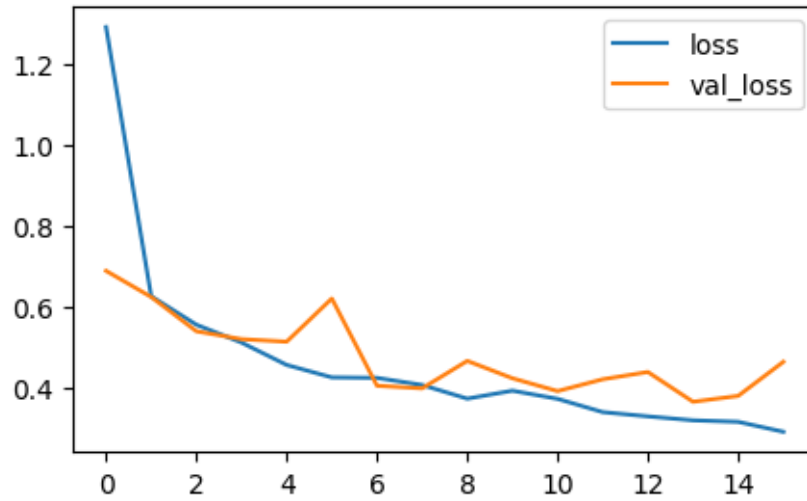- val_loss: 0.4632 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 36
```

```
['loss', 'compile_metrics']
3/3               0s 15ms/step –
accuracy: 0.8396 – loss: 0.5154
[0.46315959095954895, 0.8510638475418091]
3/3               0s 25ms/step
Classification Report:
            precision    recall  f1-score    support

    Female       0.79      0.90      0.84         41
      Male       0.91      0.81      0.86         53

  accuracy                          0.85         94
```

```
   macro avg        0.85      0.86      0.85        94
weighted avg        0.86      0.85      0.85        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5265 - loss: 0.8483 - val_accuracy: 0.7021
- val_loss: 0.6507 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7456 - loss: 0.5655 - val_accuracy: 0.7447
- val_loss: 0.5180 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 67ms/step - accuracy: 0.7562 - loss: 0.5031 - val_accuracy: 0.8298
- val_loss: 0.5100 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7680 - loss: 0.4844 - val_accuracy: 0.8723
- val_loss: 0.4063 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7880 - loss: 0.4457 - val_accuracy: 0.8830
- val_loss: 0.3544 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8104 - loss: 0.4302 - val_accuracy: 0.7979
- val_loss: 0.4012 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.7809 - loss: 0.4591 - val_accuracy: 0.8511
- val_loss: 0.3803 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8316 - loss: 0.4025 - val_accuracy: 0.8830
- val_loss: 0.3926 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8551 - loss: 0.3667 - val_accuracy: 0.8617
- val_loss: 0.3663 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8504 - loss: 0.3699 - val_accuracy: 0.9043
- val_loss: 0.3209 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8539 - loss: 0.3532 - val_accuracy: 0.9043
- val_loss: 0.3080 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 67ms/step - accuracy: 0.8375 - loss: 0.3469 - val_accuracy: 0.9043
- val_loss: 0.3076 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8834 - loss: 0.3053 - val_accuracy: 0.8617
- val_loss: 0.3340 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8716 - loss: 0.3044 - val_accuracy: 0.8511
```

```
- val_loss: 0.3250 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8610 - loss: 0.3199 - val_accuracy: 0.8617
- val_loss: 0.3004 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8728 - loss: 0.2986 - val_accuracy: 0.8617
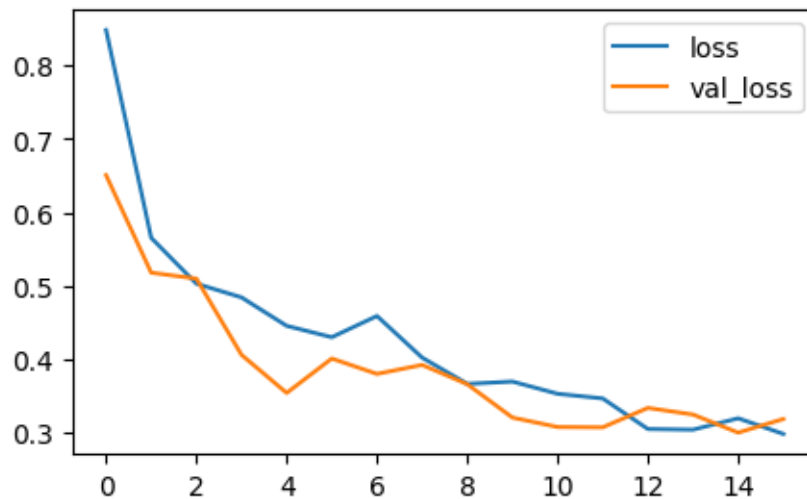- val_loss: 0.3189 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
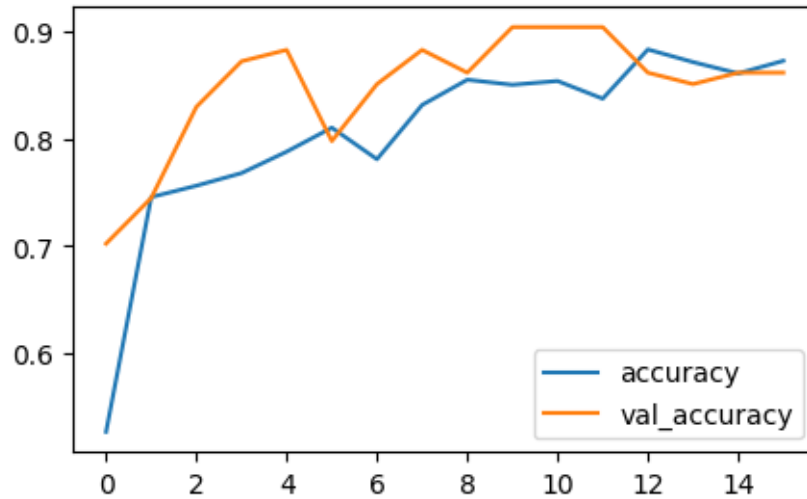recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 37
```

```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8410 - loss: 0.3494
[0.31889572739601135, 0.8617021441459656]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.80      0.90      0.85        41
        Male       0.92      0.83      0.87        53

    accuracy                           0.86        94
   macro avg       0.86      0.87      0.86        94
weighted avg       0.87      0.86      0.86        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5736 - loss: 0.8669 - val_accuracy: 0.5957
- val_loss: 0.6351 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.6820 - loss: 0.6080 - val_accuracy: 0.6383
- val_loss: 0.6958 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7515 - loss: 0.5266 - val_accuracy: 0.7553
- val_loss: 0.5313 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7809 - loss: 0.4682 - val_accuracy: 0.7660
```

```
- val_loss: 0.4649 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 64ms/step - accuracy: 0.7927 - loss: 0.4292 - val_accuracy: 0.7979
- val_loss: 0.4336 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7939 - loss: 0.4196 - val_accuracy: 0.8085
- val_loss: 0.4495 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8351 - loss: 0.3893 - val_accuracy: 0.8511
- val_loss: 0.3795 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8327 - loss: 0.3908 - val_accuracy: 0.8404
- val_loss: 0.4524 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8339 - loss: 0.3717 - val_accuracy: 0.8191
- val_loss: 0.3920 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8492 - loss: 0.3471 - val_accuracy: 0.8298
- val_loss: 0.3724 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8799 - loss: 0.2871 - val_accuracy: 0.8404
- val_loss: 0.3692 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8740 - loss: 0.3034 - val_accuracy: 0.8404
- val_loss: 0.3716 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 67ms/step - accuracy: 0.8822 - loss: 0.2854 - val_accuracy: 0.8191
- val_loss: 0.3341 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8645 - loss: 0.3014 - val_accuracy: 0.8298
- val_loss: 0.3751 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 66ms/step - accuracy: 0.8810 - loss: 0.2686 - val_accuracy: 0.8404
- val_loss: 0.3676 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.9022 - loss: 0.2581 - val_accuracy: 0.8617
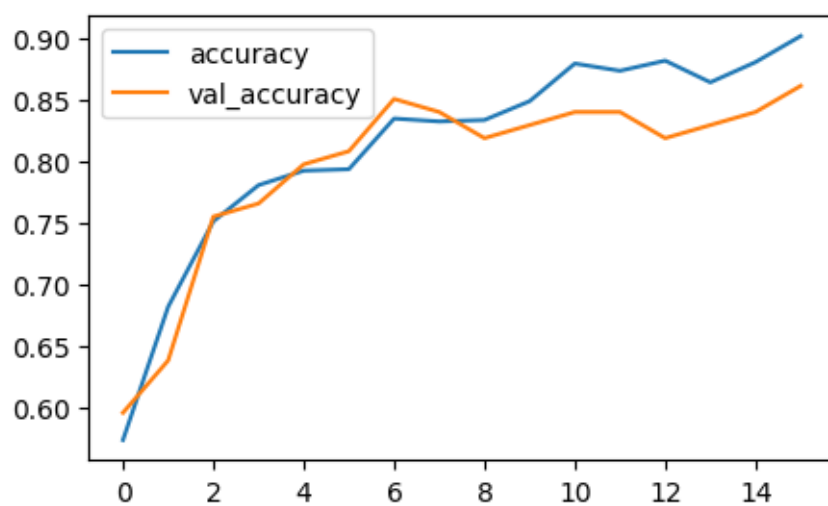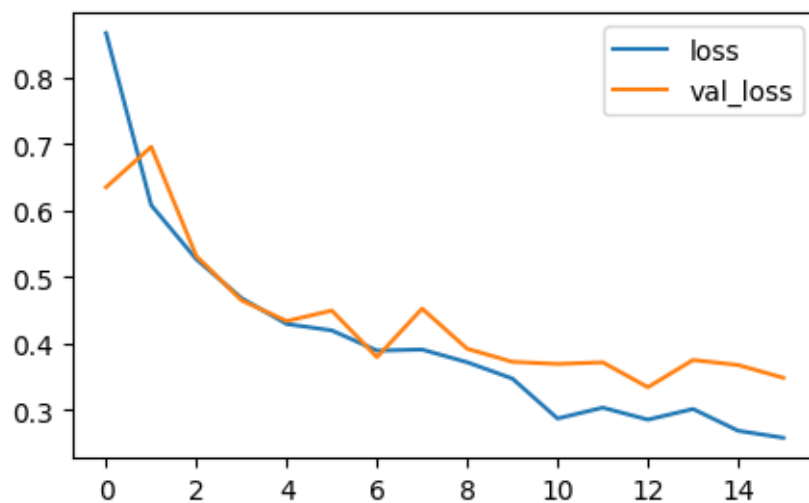- val_loss: 0.3483 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 38
```

```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8410 - loss: 0.3919
[0.34833988547325134, 0.8617021441459656]
3/3                 0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

     Female       0.80       0.90      0.85        41
       Male       0.92       0.83      0.87        53

   accuracy                            0.86        94
```

```
   macro avg        0.86      0.87      0.86        94
weighted avg        0.87      0.86      0.86        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5218 - loss: 0.8061 - val_accuracy: 0.7234
- val_loss: 0.6770 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7055 - loss: 0.6067 - val_accuracy: 0.7553
- val_loss: 0.5671 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 67ms/step - accuracy: 0.7750 - loss: 0.4881 - val_accuracy: 0.8191
- val_loss: 0.4622 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7903 - loss: 0.4673 - val_accuracy: 0.8511
- val_loss: 0.4408 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8092 - loss: 0.4171 - val_accuracy: 0.8298
- val_loss: 0.4224 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8398 - loss: 0.3876 - val_accuracy: 0.7979
- val_loss: 0.4623 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8269 - loss: 0.3871 - val_accuracy: 0.8404
- val_loss: 0.4041 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8339 - loss: 0.3717 - val_accuracy: 0.8298
- val_loss: 0.4099 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8292 - loss: 0.3641 - val_accuracy: 0.8191
- val_loss: 0.4418 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8575 - loss: 0.3161 - val_accuracy: 0.8511
- val_loss: 0.4098 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8645 - loss: 0.3041 - val_accuracy: 0.8404
- val_loss: 0.3404 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 64ms/step - accuracy: 0.8881 - loss: 0.2734 - val_accuracy: 0.8617
- val_loss: 0.3151 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8775 - loss: 0.2834 - val_accuracy: 0.8511
- val_loss: 0.3289 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8846 - loss: 0.2841 - val_accuracy: 0.8404
```

```
- val_loss: 0.3918 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 67ms/step - accuracy: 0.8869 - loss: 0.2681 - val_accuracy: 0.8617
- val_loss: 0.3832 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8799 - loss: 0.2975 - val_accuracy: 0.8511
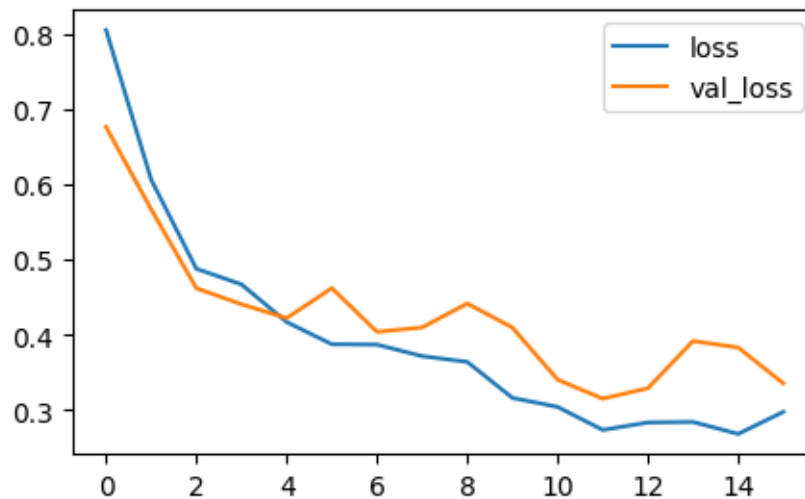- val_loss: 0.3355 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
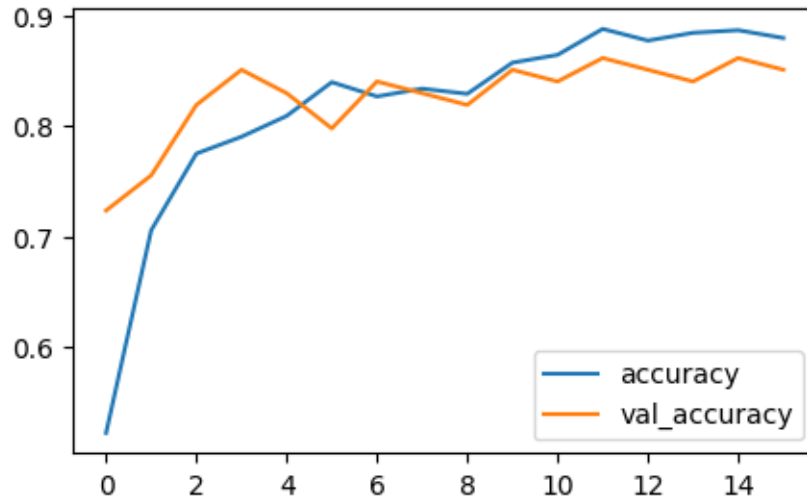recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 39
```

```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8552 - loss: 0.3539
[0.3355109393596649, 0.8510638475418091]
3/3              0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.81      0.85      0.83        41
        Male       0.88      0.85      0.87        53

    accuracy                           0.85        94
   macro avg       0.85      0.85      0.85        94
weighted avg       0.85      0.85      0.85        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 3s - 97ms/step - accuracy: 0.6101 - loss: 0.7539 - val_accuracy: 0.7340
- val_loss: 0.6162 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7550 - loss: 0.4950 - val_accuracy: 0.7872
- val_loss: 0.5589 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.8045 - loss: 0.4429 - val_accuracy: 0.7872
- val_loss: 0.4517 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8033 - loss: 0.4210 - val_accuracy: 0.7979
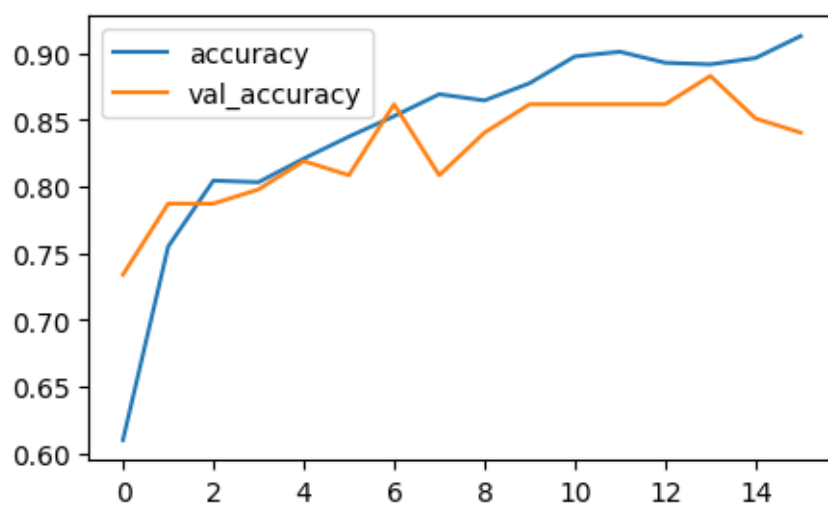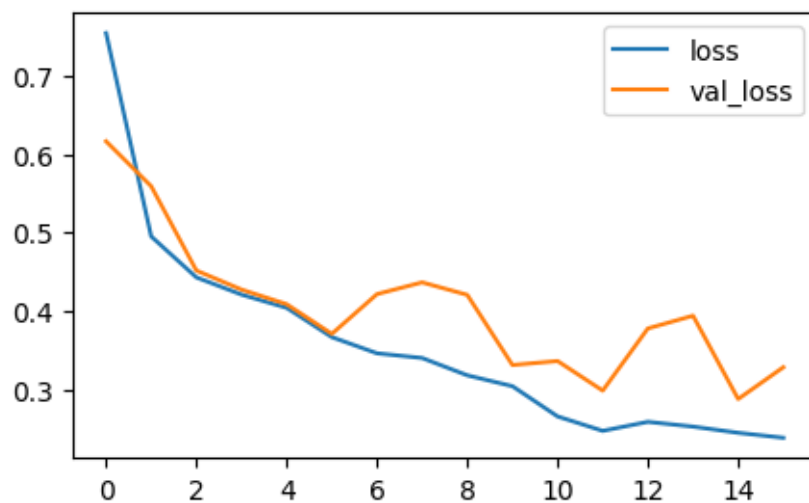```

```
- val_loss: 0.4274 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8210 - loss: 0.4042 - val_accuracy: 0.8191
- val_loss: 0.4088 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8375 - loss: 0.3669 - val_accuracy: 0.8085
- val_loss: 0.3710 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.8528 - loss: 0.3463 - val_accuracy: 0.8617
- val_loss: 0.4216 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8693 - loss: 0.3403 - val_accuracy: 0.8085
- val_loss: 0.4366 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8645 - loss: 0.3183 - val_accuracy: 0.8404
- val_loss: 0.4207 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8775 - loss: 0.3044 - val_accuracy: 0.8617
- val_loss: 0.3314 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8975 - loss: 0.2660 - val_accuracy: 0.8617
- val_loss: 0.3365 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.9011 - loss: 0.2476 - val_accuracy: 0.8617
- val_loss: 0.2988 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8928 - loss: 0.2591 - val_accuracy: 0.8617
- val_loss: 0.3779 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8916 - loss: 0.2530 - val_accuracy: 0.8830
- val_loss: 0.3941 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8963 - loss: 0.2451 - val_accuracy: 0.8511
- val_loss: 0.2881 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 66ms/step - accuracy: 0.9128 - loss: 0.2388 - val_accuracy: 0.8404
- val_loss: 0.3286 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 40
```

```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8265 - loss: 0.3502
[0.3285614550113678, 0.8404255509376526]
3/3                0s 25ms/step
Classification Report:
            precision   recall  f1-score   support

     Female      0.81      0.83      0.82        41
       Male      0.87      0.85      0.86        53

   accuracy                          0.84        94
```

```
   macro avg       0.84      0.84      0.84        94
weighted avg       0.84      0.84      0.84        94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5760 - loss: 0.9088 - val_accuracy: 0.6170
- val_loss: 0.6465 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7291 - loss: 0.5596 - val_accuracy: 0.6702
- val_loss: 0.5968 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7314 - loss: 0.5310 - val_accuracy: 0.7340
- val_loss: 0.5396 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7821 - loss: 0.4778 - val_accuracy: 0.7979
- val_loss: 0.4392 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.7868 - loss: 0.4602 - val_accuracy: 0.7872
- val_loss: 0.4771 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7797 - loss: 0.4592 - val_accuracy: 0.7872
- val_loss: 0.4642 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 66ms/step - accuracy: 0.7903 - loss: 0.4520 - val_accuracy: 0.7553
- val_loss: 0.5017 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8045 - loss: 0.4303 - val_accuracy: 0.7660
- val_loss: 0.4666 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8292 - loss: 0.3939 - val_accuracy: 0.8191
- val_loss: 0.3995 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8445 - loss: 0.3727 - val_accuracy: 0.8085
- val_loss: 0.4118 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8634 - loss: 0.3227 - val_accuracy: 0.8191
- val_loss: 0.3451 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8634 - loss: 0.3127 - val_accuracy: 0.8511
- val_loss: 0.3468 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8587 - loss: 0.3312 - val_accuracy: 0.8404
- val_loss: 0.3652 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8669 - loss: 0.2999 - val_accuracy: 0.8404
```

- val_loss: 0.3477 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8681 - loss: 0.3078 - val_accuracy: 0.8617
- val_loss: 0.3093 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8846 - loss: 0.2889 - val_accuracy: 0.8404
- val_loss: 0.3633 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 41

```
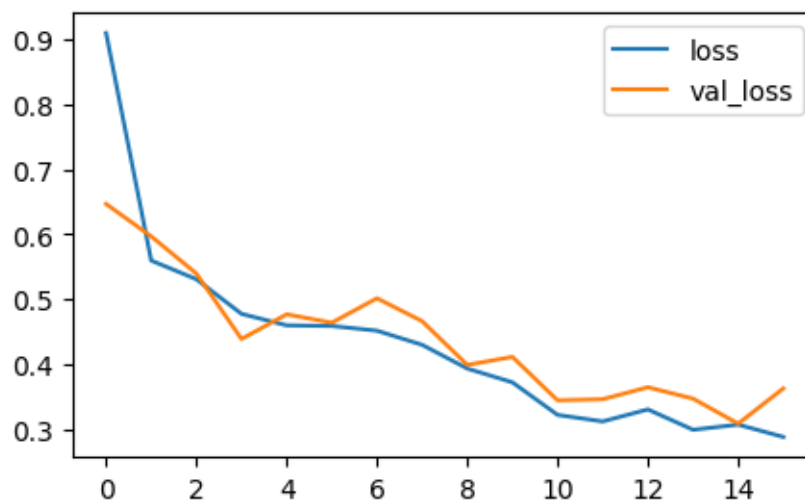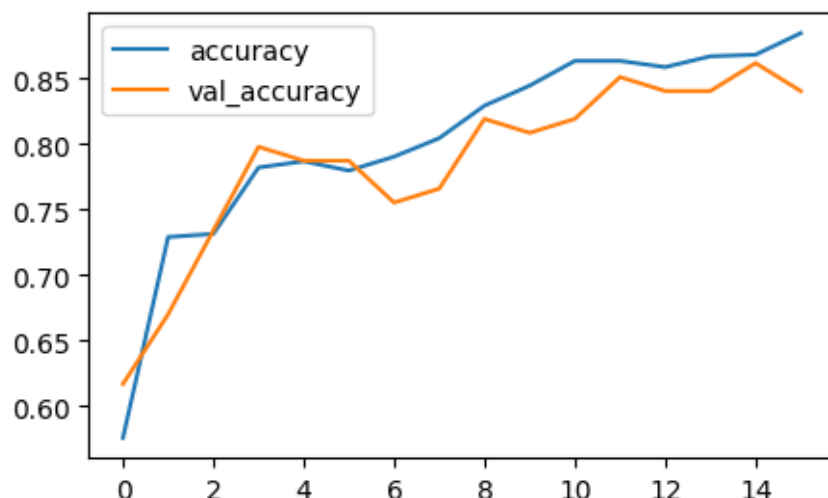['loss', 'compile_metrics']
3/3               0s 15ms/step -
accuracy: 0.8382 - loss: 0.3823
[0.3633468449115753, 0.8404255509376526]
3/3               0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.80      0.85      0.82        41
        Male       0.88      0.83      0.85        53

    accuracy                           0.84        94
   macro avg       0.84      0.84      0.84        94
weighted avg       0.84      0.84      0.84        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5359 - loss: 1.1658 - val_accuracy: 0.4681
- val_loss: 0.6959 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6372 - loss: 0.6375 - val_accuracy: 0.6170
- val_loss: 0.6211 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 66ms/step - accuracy: 0.7008 - loss: 0.5689 - val_accuracy: 0.7234
- val_loss: 0.5709 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7503 - loss: 0.5070 - val_accuracy: 0.8191
```

```
- val_loss: 0.4805 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7809 - loss: 0.4695 - val_accuracy: 0.8298
- val_loss: 0.4590 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 64ms/step - accuracy: 0.8104 - loss: 0.4223 - val_accuracy: 0.8085
- val_loss: 0.4574 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.7998 - loss: 0.4278 - val_accuracy: 0.8617
- val_loss: 0.3896 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 64ms/step - accuracy: 0.8210 - loss: 0.4226 - val_accuracy: 0.8298
- val_loss: 0.4280 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8233 - loss: 0.3914 - val_accuracy: 0.8723
- val_loss: 0.3705 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 66ms/step - accuracy: 0.8351 - loss: 0.3937 - val_accuracy: 0.8511
- val_loss: 0.3384 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8375 - loss: 0.3627 - val_accuracy: 0.8723
- val_loss: 0.3470 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8504 - loss: 0.3335 - val_accuracy: 0.8511
- val_loss: 0.3805 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8575 - loss: 0.3360 - val_accuracy: 0.8404
- val_loss: 0.3511 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8492 - loss: 0.3462 - val_accuracy: 0.8511
- val_loss: 0.4034 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8669 - loss: 0.3016 - val_accuracy: 0.8404
- val_loss: 0.3913 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8645 - loss: 0.3188 - val_accuracy: 0.8191
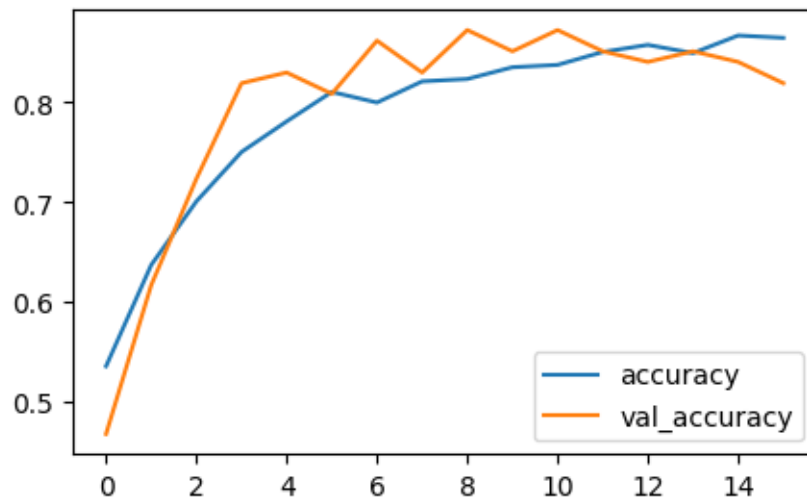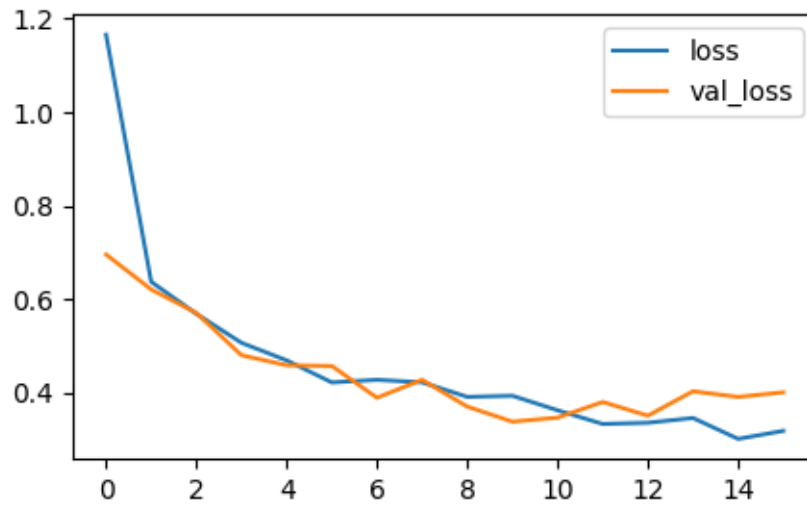- val_loss: 0.4012 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8191489577293396
Reseting all weights…
Current number of trials: 42
```

```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8041 - loss: 0.4643
[0.4011933207511902, 0.8191489577293396]
3/3              0s 25ms/step
Classification Report:
             precision    recall  f1-score    support

     Female       0.80      0.78      0.79         41
       Male       0.83      0.85      0.84         53

   accuracy                           0.82         94
```

```
      macro avg         0.82      0.81      0.82          94
   weighted avg         0.82      0.82      0.82          94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5336 - loss: 0.9872 - val_accuracy: 0.5957
- val_loss: 0.6836 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 67ms/step - accuracy: 0.6584 - loss: 0.6342 - val_accuracy: 0.6064
- val_loss: 0.7112 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 67ms/step - accuracy: 0.6949 - loss: 0.5632 - val_accuracy: 0.7340
- val_loss: 0.5155 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7644 - loss: 0.4723 - val_accuracy: 0.7553
- val_loss: 0.4707 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8033 - loss: 0.4388 - val_accuracy: 0.8404
- val_loss: 0.3870 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8151 - loss: 0.4178 - val_accuracy: 0.7979
- val_loss: 0.4804 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8151 - loss: 0.4087 - val_accuracy: 0.7979
- val_loss: 0.5431 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8304 - loss: 0.4000 - val_accuracy: 0.8191
- val_loss: 0.4338 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8433 - loss: 0.3778 - val_accuracy: 0.8404
- val_loss: 0.4349 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8351 - loss: 0.3618 - val_accuracy: 0.8404
- val_loss: 0.3704 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8598 - loss: 0.3306 - val_accuracy: 0.8298
- val_loss: 0.4180 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 64ms/step - accuracy: 0.8716 - loss: 0.3190 - val_accuracy: 0.8298
- val_loss: 0.4005 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 64ms/step - accuracy: 0.8669 - loss: 0.3170 - val_accuracy: 0.8511
- val_loss: 0.3854 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 64ms/step - accuracy: 0.8728 - loss: 0.3119 - val_accuracy: 0.8298
```

```
- val_loss: 0.4151 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 64ms/step - accuracy: 0.8751 - loss: 0.3178 - val_accuracy: 0.8723
- val_loss: 0.3365 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 64ms/step - accuracy: 0.8693 - loss: 0.3021 - val_accuracy: 0.8298
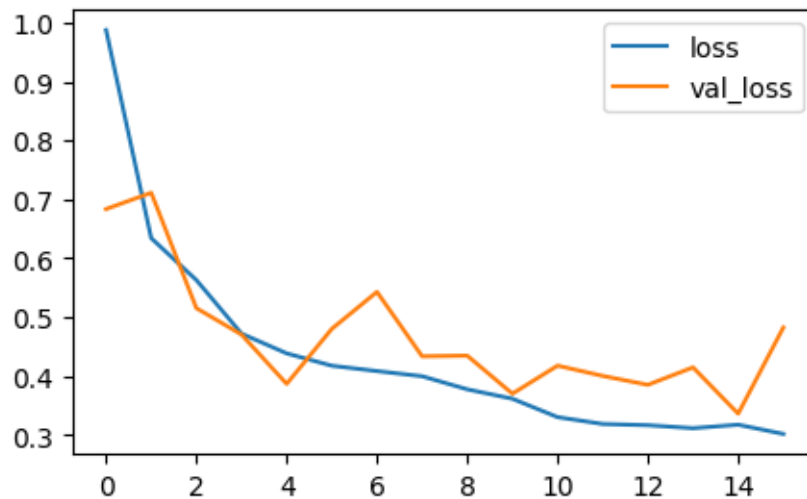- val_loss: 0.4826 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
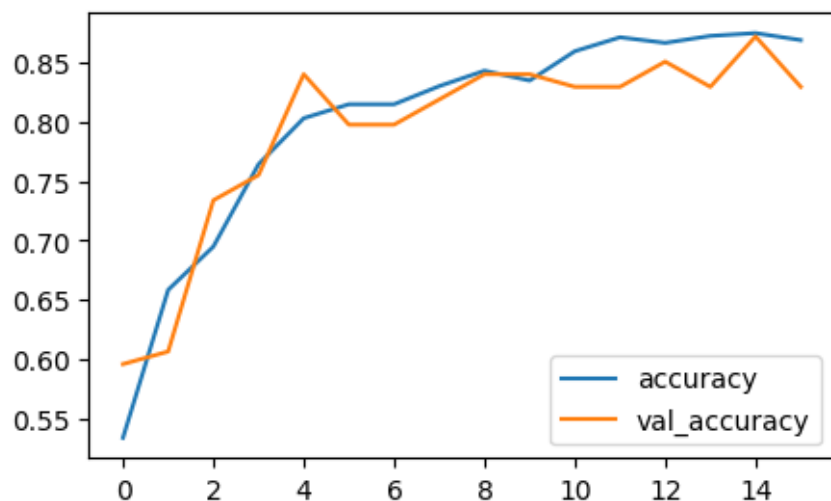recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 43
```

```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8446 - loss: 0.5193
[0.48261722922325134, 0.8297872543334961]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.74      0.95      0.83        41
        Male       0.95      0.74      0.83        53

    accuracy                           0.83        94
   macro avg       0.84      0.84      0.83        94
weighted avg       0.86      0.83      0.83        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5230 - loss: 0.9043 - val_accuracy: 0.6489
- val_loss: 0.6586 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6549 - loss: 0.6279 - val_accuracy: 0.6915
- val_loss: 0.6238 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7044 - loss: 0.5650 - val_accuracy: 0.7660
- val_loss: 0.4640 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 66ms/step - accuracy: 0.7750 - loss: 0.4858 - val_accuracy: 0.7766
```

```
- val_loss: 0.4971 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 64ms/step - accuracy: 0.7727 - loss: 0.4815 - val_accuracy: 0.8511
- val_loss: 0.4200 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7774 - loss: 0.4737 - val_accuracy: 0.8511
- val_loss: 0.4538 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.7892 - loss: 0.4672 - val_accuracy: 0.8404
- val_loss: 0.4012 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.7786 - loss: 0.4508 - val_accuracy: 0.8085
- val_loss: 0.4410 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8068 - loss: 0.4298 - val_accuracy: 0.8404
- val_loss: 0.3863 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8292 - loss: 0.3908 - val_accuracy: 0.8723
- val_loss: 0.3640 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8210 - loss: 0.3771 - val_accuracy: 0.8404
- val_loss: 0.3709 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 64ms/step - accuracy: 0.8410 - loss: 0.3738 - val_accuracy: 0.8298
- val_loss: 0.4025 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8469 - loss: 0.3540 - val_accuracy: 0.8404
- val_loss: 0.3747 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8375 - loss: 0.3738 - val_accuracy: 0.8298
- val_loss: 0.3821 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 64ms/step - accuracy: 0.8587 - loss: 0.3281 - val_accuracy: 0.8298
- val_loss: 0.4069 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8787 - loss: 0.3052 - val_accuracy: 0.8617
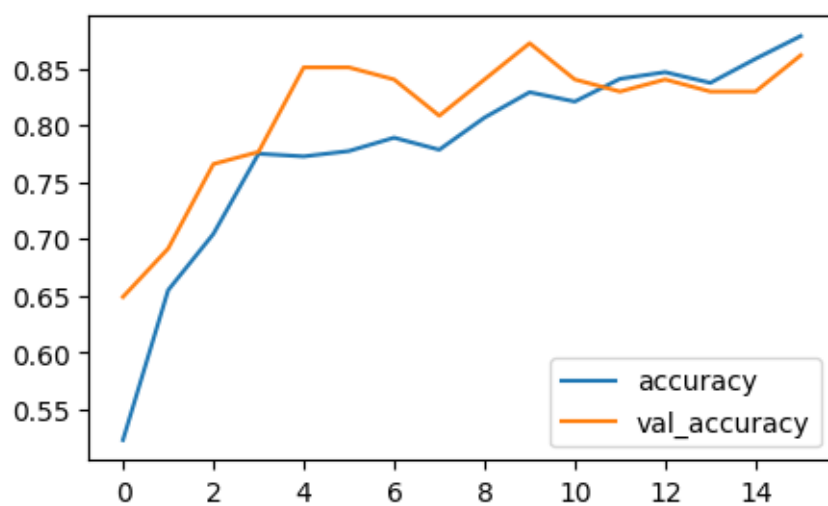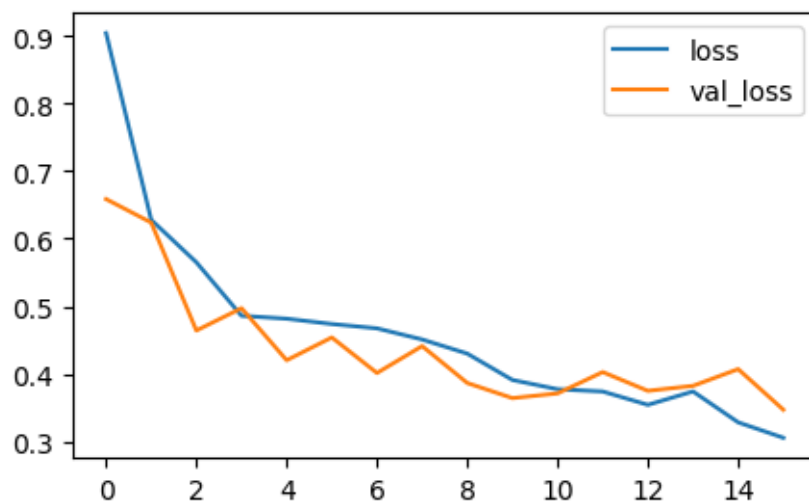- val_loss: 0.3468 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 44
```

```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8605 - loss: 0.3588
[0.34680673480033875, 0.8617021441459656]
3/3                0s 25ms/step
Classification Report:
            precision    recall  f1-score   support

     Female      0.83       0.85      0.84        41
       Male      0.88       0.87      0.88        53

   accuracy                           0.86        94
```

```
    macro avg       0.86      0.86      0.86         94
weighted avg        0.86      0.86      0.86         94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 86ms/step - accuracy: 0.6090 - loss: 0.8566 - val_accuracy: 0.6489
- val_loss: 0.6301 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.7244 - loss: 0.5671 - val_accuracy: 0.5957
- val_loss: 0.6215 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7515 - loss: 0.5173 - val_accuracy: 0.7660
- val_loss: 0.5199 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8045 - loss: 0.4210 - val_accuracy: 0.8298
- val_loss: 0.4101 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 66ms/step - accuracy: 0.8280 - loss: 0.3925 - val_accuracy: 0.8404
- val_loss: 0.4406 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8257 - loss: 0.3886 - val_accuracy: 0.8404
- val_loss: 0.3715 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 64ms/step - accuracy: 0.8551 - loss: 0.3400 - val_accuracy: 0.8298
- val_loss: 0.4340 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8433 - loss: 0.3422 - val_accuracy: 0.8191
- val_loss: 0.4894 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8693 - loss: 0.3113 - val_accuracy: 0.8298
- val_loss: 0.3727 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8716 - loss: 0.3008 - val_accuracy: 0.8191
- val_loss: 0.4428 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8869 - loss: 0.2692 - val_accuracy: 0.8617
- val_loss: 0.3274 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8869 - loss: 0.2666 - val_accuracy: 0.8404
- val_loss: 0.3561 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.9034 - loss: 0.2447 - val_accuracy: 0.8830
- val_loss: 0.3519 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.9152 - loss: 0.2190 - val_accuracy: 0.8404
```

```
- val_loss: 0.4184 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.9046 - loss: 0.2384 - val_accuracy: 0.8617
- val_loss: 0.4483 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.9022 - loss: 0.2324 - val_accuracy: 0.8298
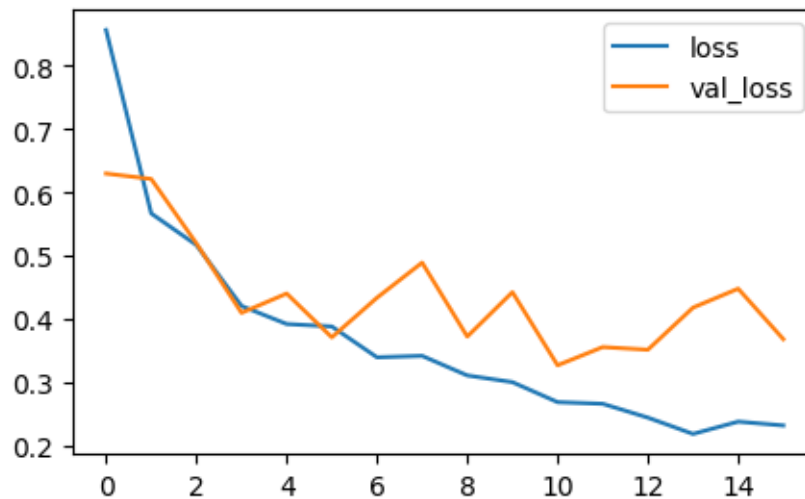- val_loss: 0.3686 - learning_rate: 5.0000e-04
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
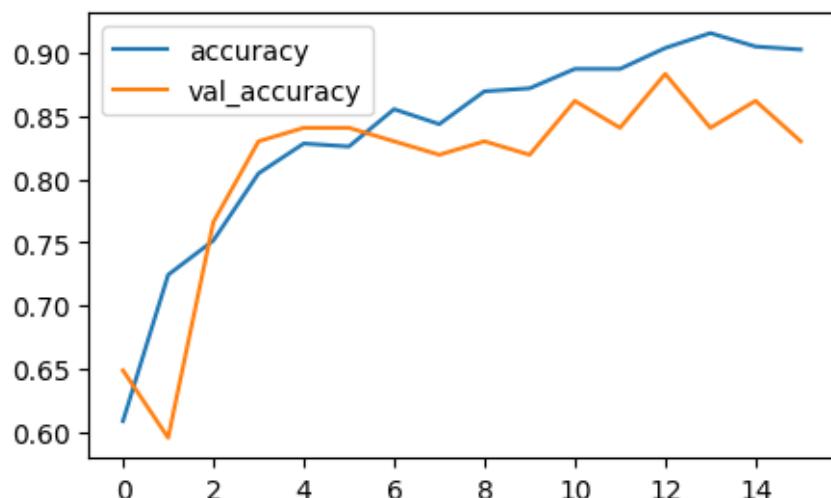recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 45
```

```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8250 - loss: 0.4109
[0.3686387836933136, 0.8297872543334961]
3/3                 0s 25ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.85      0.81        41
        Male       0.88      0.81      0.84        53

    accuracy                           0.83        94
   macro avg       0.83      0.83      0.83        94
weighted avg       0.83      0.83      0.83        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5630 - loss: 0.8420 - val_accuracy: 0.6277
- val_loss: 0.6556 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 66ms/step - accuracy: 0.7244 - loss: 0.5584 - val_accuracy: 0.7447
- val_loss: 0.5352 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7409 - loss: 0.5310 - val_accuracy: 0.6596
- val_loss: 0.6118 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7468 - loss: 0.5010 - val_accuracy: 0.8085
```

```
- val_loss: 0.5487 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8139 - loss: 0.4389 - val_accuracy: 0.8298
- val_loss: 0.4840 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 66ms/step - accuracy: 0.8339 - loss: 0.3985 - val_accuracy: 0.8511
- val_loss: 0.4481 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 67ms/step - accuracy: 0.8445 - loss: 0.3807 - val_accuracy: 0.7872
- val_loss: 0.4152 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.8410 - loss: 0.3769 - val_accuracy: 0.7234
- val_loss: 0.5390 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 66ms/step - accuracy: 0.8198 - loss: 0.3954 - val_accuracy: 0.8404
- val_loss: 0.4456 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8610 - loss: 0.3264 - val_accuracy: 0.8191
- val_loss: 0.4531 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 66ms/step - accuracy: 0.8563 - loss: 0.3367 - val_accuracy: 0.8617
- val_loss: 0.3322 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8799 - loss: 0.2926 - val_accuracy: 0.7979
- val_loss: 0.4037 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 66ms/step - accuracy: 0.8857 - loss: 0.2749 - val_accuracy: 0.8511
- val_loss: 0.4030 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 66ms/step - accuracy: 0.8822 - loss: 0.2720 - val_accuracy: 0.8404
- val_loss: 0.4390 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8775 - loss: 0.2950 - val_accuracy: 0.7979
- val_loss: 0.3791 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 67ms/step - accuracy: 0.8928 - loss: 0.2585 - val_accuracy: 0.8191
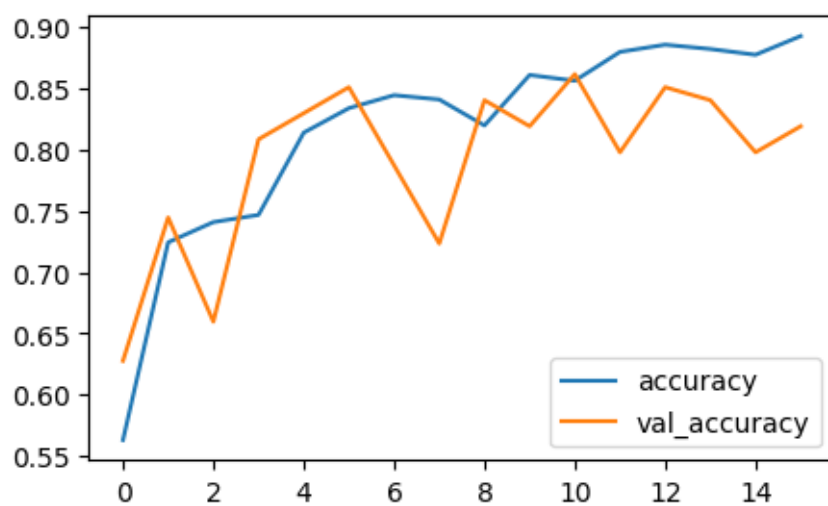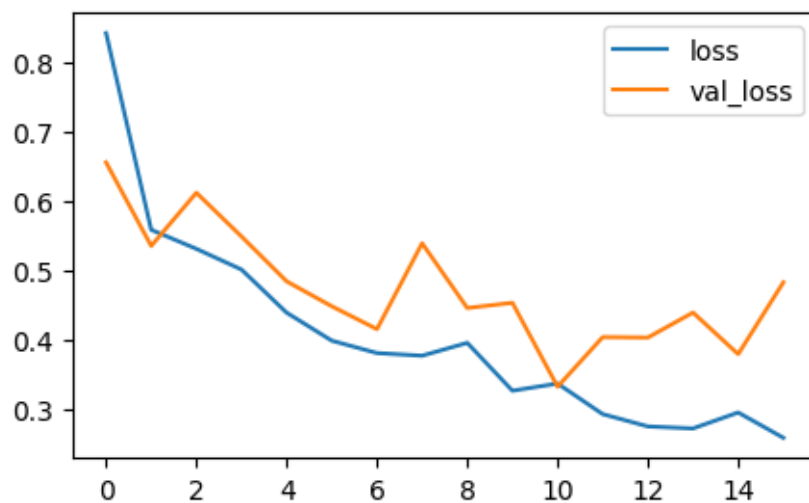- val_loss: 0.4826 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.8191489577293396
Reseting all weights…
Current number of trials: 46
```

```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8236 - loss: 0.5081
[0.4826164245605469, 0.8191489577293396]
3/3                0s 25ms/step
Classification Report:
             precision    recall  f1-score   support

     Female       0.73      0.93      0.82        41
       Male       0.93      0.74      0.82        53

   accuracy                           0.82        94
```

```
    macro avg        0.83       0.83       0.82         94
weighted avg         0.84       0.82       0.82         94


Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 87ms/step - accuracy: 0.5265 - loss: 0.9787 - val_accuracy: 0.4362
- val_loss: 0.6926 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 65ms/step - accuracy: 0.6054 - loss: 0.6529 - val_accuracy: 0.6702
- val_loss: 0.6498 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.6902 - loss: 0.5986 - val_accuracy: 0.7553
- val_loss: 0.5225 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.7527 - loss: 0.5196 - val_accuracy: 0.7872
- val_loss: 0.5367 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.7644 - loss: 0.5102 - val_accuracy: 0.7447
- val_loss: 0.5795 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.7903 - loss: 0.4708 - val_accuracy: 0.7234
- val_loss: 0.5307 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.7703 - loss: 0.4873 - val_accuracy: 0.7979
- val_loss: 0.4810 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 66ms/step - accuracy: 0.7856 - loss: 0.4525 - val_accuracy: 0.7766
- val_loss: 0.4936 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.7998 - loss: 0.4391 - val_accuracy: 0.8191
- val_loss: 0.4180 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 65ms/step - accuracy: 0.8139 - loss: 0.4246 - val_accuracy: 0.8723
- val_loss: 0.4169 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.8292 - loss: 0.3791 - val_accuracy: 0.8723
- val_loss: 0.3505 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8351 - loss: 0.3836 - val_accuracy: 0.8404
- val_loss: 0.3862 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8186 - loss: 0.3839 - val_accuracy: 0.8404
- val_loss: 0.4063 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.8280 - loss: 0.3842 - val_accuracy: 0.8830
```

```
- val_loss: 0.3808 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.8504 - loss: 0.3535 - val_accuracy: 0.8511
- val_loss: 0.3950 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8740 - loss: 0.3112 - val_accuracy: 0.8404
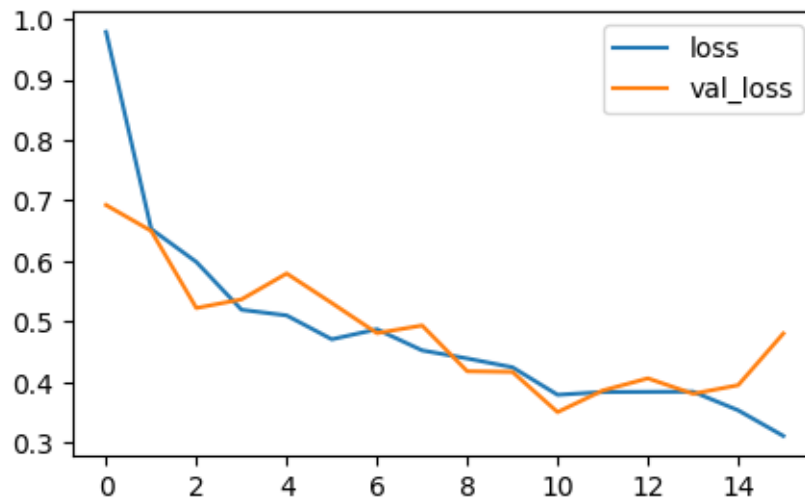- val_loss: 0.4804 - learning_rate: 5.0000e-04
```

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

```
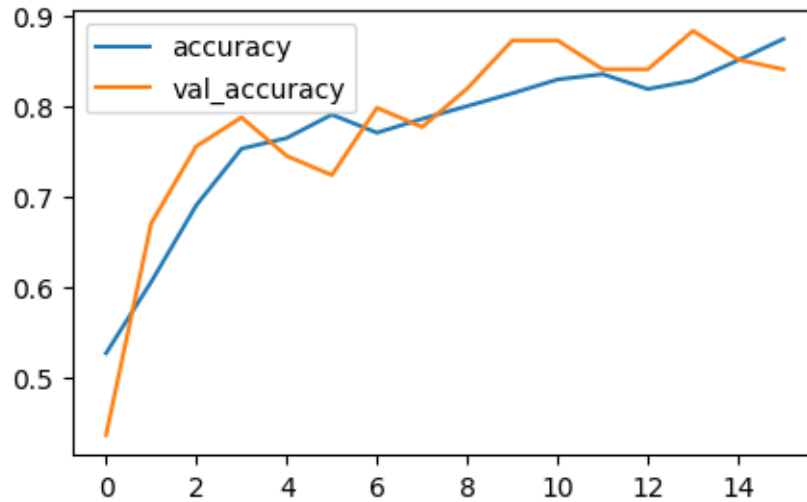Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 47
```

```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8147 - loss: 0.5610
[0.4803805947303772, 0.8404255509376526]
3/3              0s 25ms/step
Classification Report:
             precision    recall  f1-score   support

     Female       0.84      0.78      0.81        41
       Male       0.84      0.89      0.86        53

   accuracy                          0.84        94
  macro avg       0.84      0.83      0.84        94
weighted avg      0.84      0.84      0.84        94

Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/16
27/27 - 2s - 88ms/step - accuracy: 0.5925 - loss: 0.7069 - val_accuracy: 0.7128
- val_loss: 0.5959 - learning_rate: 1.0000e-03
Epoch 2/16
27/27 - 2s - 67ms/step - accuracy: 0.7468 - loss: 0.5055 - val_accuracy: 0.8085
- val_loss: 0.6172 - learning_rate: 1.0000e-03
Epoch 3/16
27/27 - 2s - 65ms/step - accuracy: 0.7574 - loss: 0.5012 - val_accuracy: 0.8511
- val_loss: 0.4599 - learning_rate: 1.0000e-03
Epoch 4/16
27/27 - 2s - 65ms/step - accuracy: 0.8139 - loss: 0.4127 - val_accuracy: 0.8191
```

```
- val_loss: 0.4413 - learning_rate: 1.0000e-03
Epoch 5/16
27/27 - 2s - 65ms/step - accuracy: 0.8174 - loss: 0.4030 - val_accuracy: 0.8511
- val_loss: 0.4085 - learning_rate: 1.0000e-03
Epoch 6/16
27/27 - 2s - 65ms/step - accuracy: 0.8316 - loss: 0.3658 - val_accuracy: 0.8404
- val_loss: 0.4184 - learning_rate: 1.0000e-03
Epoch 7/16
27/27 - 2s - 65ms/step - accuracy: 0.8469 - loss: 0.3475 - val_accuracy: 0.8298
- val_loss: 0.3522 - learning_rate: 1.0000e-03
Epoch 8/16
27/27 - 2s - 65ms/step - accuracy: 0.8645 - loss: 0.3265 - val_accuracy: 0.8511
- val_loss: 0.3216 - learning_rate: 1.0000e-03
Epoch 9/16
27/27 - 2s - 65ms/step - accuracy: 0.8669 - loss: 0.3149 - val_accuracy: 0.8404
- val_loss: 0.3500 - learning_rate: 1.0000e-03
Epoch 10/16
27/27 - 2s - 67ms/step - accuracy: 0.8681 - loss: 0.3012 - val_accuracy: 0.8830
- val_loss: 0.3195 - learning_rate: 1.0000e-03
Epoch 11/16
27/27 - 2s - 65ms/step - accuracy: 0.9069 - loss: 0.2660 - val_accuracy: 0.8723
- val_loss: 0.3838 - learning_rate: 5.0000e-04
Epoch 12/16
27/27 - 2s - 65ms/step - accuracy: 0.8928 - loss: 0.2631 - val_accuracy: 0.8830
- val_loss: 0.3026 - learning_rate: 5.0000e-04
Epoch 13/16
27/27 - 2s - 65ms/step - accuracy: 0.8810 - loss: 0.2571 - val_accuracy: 0.8723
- val_loss: 0.3533 - learning_rate: 5.0000e-04
Epoch 14/16
27/27 - 2s - 65ms/step - accuracy: 0.9046 - loss: 0.2509 - val_accuracy: 0.8936
- val_loss: 0.3263 - learning_rate: 5.0000e-04
Epoch 15/16
27/27 - 2s - 65ms/step - accuracy: 0.9058 - loss: 0.2314 - val_accuracy: 0.8830
- val_loss: 0.3521 - learning_rate: 5.0000e-04
Epoch 16/16
27/27 - 2s - 65ms/step - accuracy: 0.8916 - loss: 0.2405 - val_accuracy: 0.9043
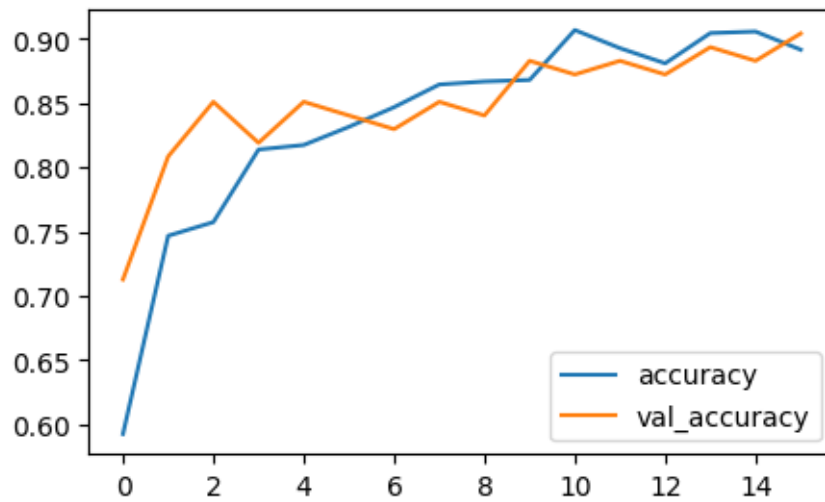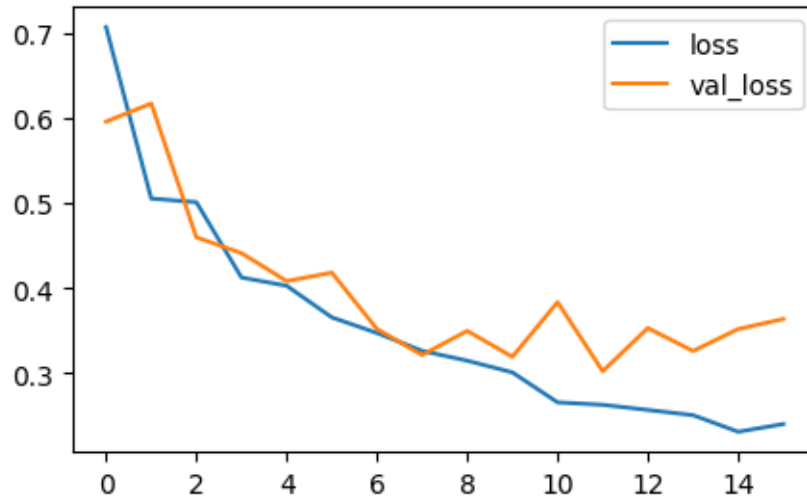- val_loss: 0.3639 - learning_rate: 5.0000e-04

WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.

Current validation accuracy: 0.9042553305625916
Reseting all weights…
Current number of trials: 48
```

```
['loss', 'compile_metrics']
3/3                Os 14ms/step -
accuracy: 0.8818 - loss: 0.4189
[0.3638972342014313, 0.9042553305625916]
3/3                Os 25ms/step
Classification Report:
              precision    recall  f1-score    support

      Female       0.86       0.93      0.89         41
        Male       0.94       0.89      0.91         53

    accuracy                            0.90         94
```

```
       macro avg      0.90     0.91     0.90        94
    weighted avg      0.91     0.90     0.90        94
```

[1]:

```
        accuracy      loss  val_accuracy  val_loss  learning_rate
    0   0.592462  0.706931      0.712766  0.595866         0.0010
    1   0.746761  0.505478      0.808511  0.617151         0.0010
    2   0.757362  0.501167      0.851064  0.459903         0.0010
    3   0.813899  0.412672      0.819149  0.441338         0.0010
    4   0.817432  0.403004      0.851064  0.408463         0.0010
    5   0.831567  0.365826      0.840426  0.418396         0.0010
    6   0.846879  0.347481      0.829787  0.352203         0.0010
    7   0.864547  0.326505      0.851064  0.321596         0.0010
    8   0.866902  0.314927      0.840426  0.350007         0.0010
    9   0.868080  0.301186      0.882979  0.319519         0.0010
    10  0.906949  0.265967      0.872340  0.383776         0.0005
    11  0.892815  0.263132      0.882979  0.302552         0.0005
    12  0.881037  0.257067      0.872340  0.353307         0.0005
    13  0.904594  0.250938      0.893617  0.326296         0.0005
    14  0.905771  0.231422      0.882979  0.352098         0.0005
```

[ ]:

[ ]:

[ ]: