

In [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<0.9 and try_num<40):
    # DOE factors:
    learning_rate = 0.001
    dropout_value = 0.3
    # n-conv_Layers = 3
    n_units_last_layer = 2048
    n_filters_l1 = 16
    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 a
    loss = 'binary_crossentropy'
    #optimizer = tf.keras.optimizers.RMSprop(Learning_rate=Learning_rate)
    optimizer = tf.keras.optimizers.Adam(learning_rate=learning_rate)
    metrics = ['accuracy']
    epochs = 14
    f_mode = 'nearest' # fill_mode in image augmentation

    #DATA_DIR = "D:\\\\CS online courses\\\\Free DataSets\\\\Free Images\\\\Easier portr
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
        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(AUTOTUNE)
validation_dataset = val_dataset.cache().prefetch(buffer_size = AUTOTUNE)
test_dataset = test_dataset.cache().prefetch(buffer_size = AUTOTUNE)

# 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)

# Reduce LR every 10 epochs (Learning rate decay factor)
def scheduler(epoch, lr):
    if epoch < 4:
        if epoch % 5 == 0 and epoch > 0:
            return lr / 5
        return lr
    elif epoch < 15:
        if epoch % 5 == 0 and epoch > 0:
            return lr / 1.1
        return lr
    elif epoch < 30:
        if epoch % 5 == 0 and epoch > 0:
            return lr / 1
        return lr
    else:
        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),

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        #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 wi
        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: #####
        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' an
        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_run32_advanced_control.h5')
# Restart script
print("Reseting all weights...")
print(f'Current number of trials: {try_num}')
try_num += 1

result_history.head(15)

```

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result_history[['loss', 'val_loss']].plot(figsize=(5, 3))
result_history[['accuracy', 'val_accuracy']].plot(figsize=(5, 3))
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_n

```

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 1/14

```

2025-05-05 08:02:43.974635: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
27/27 - 3s - 98ms/step - accuracy: 0.6184 - loss: 0.7827 - val_accuracy: 0.6383 -
val_loss: 0.6537 - learning_rate: 1.0000e-03

```

Epoch 2/14

```

27/27 - 2s - 74ms/step - accuracy: 0.7185 - loss: 0.5618 - val_accuracy: 0.7553 -
val_loss: 0.5140 - learning_rate: 1.0000e-03

```

Epoch 3/14

```

27/27 - 2s - 74ms/step - accuracy: 0.7680 - loss: 0.4713 - val_accuracy: 0.8298 -
val_loss: 0.4170 - learning_rate: 1.0000e-03

```

Epoch 4/14

```

27/27 - 2s - 74ms/step - accuracy: 0.7633 - loss: 0.4716 - val_accuracy: 0.7766 -
val_loss: 0.4943 - learning_rate: 1.0000e-03

```

Epoch 5/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8198 - loss: 0.3993 - val_accuracy: 0.8298 -
val_loss: 0.3549 - learning_rate: 1.0000e-03

```

Epoch 6/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8174 - loss: 0.4047 - val_accuracy: 0.8404 -
val_loss: 0.4206 - learning_rate: 9.0909e-04

```

Epoch 7/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8375 - loss: 0.3665 - val_accuracy: 0.8191 -
val_loss: 0.4213 - learning_rate: 9.0909e-04

```

Epoch 8/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8504 - loss: 0.3583 - val_accuracy: 0.8617 -
val_loss: 0.4509 - learning_rate: 9.0909e-04

```

Epoch 9/14

```

27/27 - 2s - 76ms/step - accuracy: 0.8492 - loss: 0.3542 - val_accuracy: 0.7872 -
val_loss: 0.5121 - learning_rate: 9.0909e-04

```

Epoch 10/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8410 - loss: 0.3667 - val_accuracy: 0.8298 -
val_loss: 0.3773 - learning_rate: 9.0909e-04

```

Epoch 11/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8622 - loss: 0.3232 - val_accuracy: 0.7979 -
val_loss: 0.4325 - learning_rate: 8.2645e-04

```

Epoch 12/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8598 - loss: 0.3451 - val_accuracy: 0.8617 -
val_loss: 0.4404 - learning_rate: 8.2645e-04

```

Epoch 13/14

```

27/27 - 2s - 75ms/step - accuracy: 0.8869 - loss: 0.2931 - val_accuracy: 0.8723 -
val_loss: 0.4431 - learning_rate: 8.2645e-04

```

Epoch 14/14

```

27/27 - 2s - 74ms/step - accuracy: 0.8799 - loss: 0.2752 - val_accuracy: 0.8085 -
val_loss: 0.5446 - learning_rate: 8.2645e-04

```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or `ker  
as.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 `ke  
ras.saving.save_model(model, 'my_model.keras')`.
```

```
Current validation accuracy: 0.8085106611251831
```

```
Reseting all weights...
```

```
Current number of trials: 1
```

```
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 1/14
```

```
2025-05-05 08:03:13.124515: I tensorflow/core/framework/local_rendezvous.cc:405] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
```

```
27/27 - 3s - 97ms/step - accuracy: 0.5183 - loss: 0.8302 - val_accuracy: 0.5851 - val_loss: 0.6747 - learning_rate: 1.0000e-03
```

```
Epoch 2/14
```

```
27/27 - 2s - 75ms/step - accuracy: 0.6561 - loss: 0.6171 - val_accuracy: 0.6489 - val_loss: 0.5891 - learning_rate: 1.0000e-03
```

```
Epoch 3/14
```

```
27/27 - 2s - 77ms/step - accuracy: 0.6890 - loss: 0.5674 - val_accuracy: 0.7021 - val_loss: 0.6336 - learning_rate: 1.0000e-03
```

```
Epoch 4/14
```

```
27/27 - 2s - 75ms/step - accuracy: 0.7279 - loss: 0.5356 - val_accuracy: 0.7660 - val_loss: 0.5532 - learning_rate: 1.0000e-03
```

```
Epoch 5/14
```

```
27/27 - 2s - 75ms/step - accuracy: 0.7821 - loss: 0.4651 - val_accuracy: 0.7872 - val_loss: 0.5109 - learning_rate: 1.0000e-03
```

```
Epoch 6/14
```

```
27/27 - 2s - 75ms/step - accuracy: 0.7797 - loss: 0.4503 - val_accuracy: 0.7766 - val_loss: 0.4764 - learning_rate: 9.0909e-04
```

```
Epoch 7/14
```

```
27/27 - 2s - 76ms/step - accuracy: 0.7856 - loss: 0.4494 - val_accuracy: 0.8191 - val_loss: 0.4805 - learning_rate: 9.0909e-04
```

```
Epoch 8/14
```

```
27/27 - 2s - 75ms/step - accuracy: 0.8186 - loss: 0.3979 - val_accuracy: 0.7979 - val_loss: 0.4297 - learning_rate: 9.0909e-04
```

```
Epoch 9/14
```

```
27/27 - 2s - 76ms/step - accuracy: 0.8245 - loss: 0.3861 - val_accuracy: 0.7660 - val_loss: 0.3709 - learning_rate: 9.0909e-04
```

```
Epoch 10/14
```

```
27/27 - 2s - 76ms/step - accuracy: 0.8233 - loss: 0.4111 - val_accuracy: 0.8617 - val_loss: 0.3669 - learning_rate: 9.0909e-04
```

```
Epoch 11/14
```

```
27/27 - 2s - 76ms/step - accuracy: 0.8563 - loss: 0.3503 - val_accuracy: 0.8830 - val_loss: 0.3439 - learning_rate: 8.2645e-04
```

```
Epoch 12/14
```

```
27/27 - 2s - 76ms/step - accuracy: 0.8669 - loss: 0.3097 - val_accuracy: 0.8511 - val_loss: 0.4001 - learning_rate: 8.2645e-04
```

```
Epoch 13/14
```

```
27/27 - 2s - 76ms/step - accuracy: 0.8528 - loss: 0.3506 - val_accuracy: 0.8511 - val_loss: 0.3718 - learning_rate: 8.2645e-04
```

```
Epoch 14/14
```

```
27/27 - 2s - 76ms/step - accuracy: 0.8693 - loss: 0.3061 - val_accuracy: 0.8404 - val_loss: 0.4486 - learning_rate: 8.2645e-04
```

```
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using instead the native Keras format, e.g. `model.save('my_model.keras')` or `ke  
ras.saving.save_model(model, 'my_model.keras')`.
```

```
Current validation accuracy: 0.8404255509376526
Reseting all weights...
Current number of trials: 2
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 1/14
27/27 - 3s - 98ms/step - accuracy: 0.5395 - loss: 1.3359 - val_accuracy: 0.5851 -
val_loss: 0.6636 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.6996 - loss: 0.5786 - val_accuracy: 0.7234 -
val_loss: 0.5727 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 76ms/step - accuracy: 0.7468 - loss: 0.5142 - val_accuracy: 0.7447 -
val_loss: 0.5838 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 77ms/step - accuracy: 0.7703 - loss: 0.4880 - val_accuracy: 0.7979 -
val_loss: 0.4858 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 75ms/step - accuracy: 0.8009 - loss: 0.4353 - val_accuracy: 0.7766 -
val_loss: 0.5324 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 75ms/step - accuracy: 0.8233 - loss: 0.4060 - val_accuracy: 0.8191 -
val_loss: 0.4474 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8092 - loss: 0.4017 - val_accuracy: 0.8085 -
val_loss: 0.4979 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8221 - loss: 0.4028 - val_accuracy: 0.8404 -
val_loss: 0.4042 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 75ms/step - accuracy: 0.8516 - loss: 0.3538 - val_accuracy: 0.8404 -
val_loss: 0.4883 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8681 - loss: 0.3188 - val_accuracy: 0.8191 -
val_loss: 0.5129 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8634 - loss: 0.3189 - val_accuracy: 0.8085 -
val_loss: 0.3506 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 77ms/step - accuracy: 0.8563 - loss: 0.3500 - val_accuracy: 0.8404 -
val_loss: 0.4303 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8634 - loss: 0.3206 - val_accuracy: 0.8404 -
val_loss: 0.4749 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 76ms/step - accuracy: 0.8587 - loss: 0.3229 - val_accuracy: 0.8617 -
val_loss: 0.3080 - learning_rate: 8.2645e-04
```

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```
Current validation accuracy: 0.8617021441459656
Reseting all weights...
Current number of trials: 3
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 1/14
2025-05-05 08:04:12.527242: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
27/27 - 3s - 96ms/step - accuracy: 0.5383 - loss: 0.9706 - val_accuracy: 0.4574 -
val_loss: 0.6956 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 75ms/step - accuracy: 0.6678 - loss: 0.6236 - val_accuracy: 0.6383 -
val_loss: 0.6615 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 75ms/step - accuracy: 0.7326 - loss: 0.5221 - val_accuracy: 0.7128 -
val_loss: 0.5123 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 75ms/step - accuracy: 0.7597 - loss: 0.5020 - val_accuracy: 0.7340 -
val_loss: 0.5571 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 77ms/step - accuracy: 0.7703 - loss: 0.4886 - val_accuracy: 0.7340 -
val_loss: 0.5304 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 75ms/step - accuracy: 0.8068 - loss: 0.4509 - val_accuracy: 0.8191 -
val_loss: 0.4328 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 75ms/step - accuracy: 0.8080 - loss: 0.4352 - val_accuracy: 0.8404 -
val_loss: 0.4107 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8327 - loss: 0.4038 - val_accuracy: 0.8191 -
val_loss: 0.4386 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8363 - loss: 0.3691 - val_accuracy: 0.8617 -
val_loss: 0.4070 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 75ms/step - accuracy: 0.8422 - loss: 0.3569 - val_accuracy: 0.8404 -
val_loss: 0.4545 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8492 - loss: 0.3435 - val_accuracy: 0.8298 -
val_loss: 0.5226 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8492 - loss: 0.3401 - val_accuracy: 0.7979 -
val_loss: 0.4187 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 77ms/step - accuracy: 0.8469 - loss: 0.3542 - val_accuracy: 0.8404 -
val_loss: 0.3918 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 75ms/step - accuracy: 0.8587 - loss: 0.3182 - val_accuracy: 0.8404 -
val_loss: 0.4493 - learning_rate: 8.2645e-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: 4
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 1/14
27/27 - 3s - 97ms/step - accuracy: 0.5972 - loss: 0.7096 - val_accuracy: 0.6596 -
val_loss: 0.6460 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.7350 - loss: 0.5419 - val_accuracy: 0.7340 -
val_loss: 0.5750 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 76ms/step - accuracy: 0.7644 - loss: 0.4935 - val_accuracy: 0.7872 -
val_loss: 0.5167 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 76ms/step - accuracy: 0.7951 - loss: 0.4335 - val_accuracy: 0.8085 -
val_loss: 0.3991 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.7797 - loss: 0.4645 - val_accuracy: 0.8511 -
val_loss: 0.3937 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 78ms/step - accuracy: 0.8174 - loss: 0.3957 - val_accuracy: 0.8298 -
val_loss: 0.4099 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8410 - loss: 0.3791 - val_accuracy: 0.8085 -
val_loss: 0.4804 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8316 - loss: 0.3737 - val_accuracy: 0.8085 -
val_loss: 0.5025 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8363 - loss: 0.3782 - val_accuracy: 0.7979 -
val_loss: 0.4901 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8751 - loss: 0.3073 - val_accuracy: 0.8298 -
val_loss: 0.3333 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8575 - loss: 0.3212 - val_accuracy: 0.8298 -
val_loss: 0.4451 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 77ms/step - accuracy: 0.8704 - loss: 0.2806 - val_accuracy: 0.8191 -
val_loss: 0.3618 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 77ms/step - accuracy: 0.8999 - loss: 0.2447 - val_accuracy: 0.8085 -
val_loss: 0.3318 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 78ms/step - accuracy: 0.8869 - loss: 0.2577 - val_accuracy: 0.7979 -
val_loss: 0.3879 - learning_rate: 8.2645e-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: 5
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 1/14
27/27 - 3s - 97ms/step - accuracy: 0.5477 - loss: 1.4137 - val_accuracy: 0.6383 -
val_loss: 0.6340 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.6926 - loss: 0.5843 - val_accuracy: 0.6915 -
val_loss: 0.5629 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 76ms/step - accuracy: 0.7397 - loss: 0.5163 - val_accuracy: 0.7340 -
val_loss: 0.5813 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 76ms/step - accuracy: 0.7703 - loss: 0.4686 - val_accuracy: 0.7234 -
val_loss: 0.5370 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.7762 - loss: 0.4726 - val_accuracy: 0.8298 -
val_loss: 0.4456 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.8045 - loss: 0.4219 - val_accuracy: 0.7660 -
val_loss: 0.5697 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 77ms/step - accuracy: 0.8033 - loss: 0.4252 - val_accuracy: 0.8298 -
val_loss: 0.3992 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8398 - loss: 0.3793 - val_accuracy: 0.8191 -
val_loss: 0.4143 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8316 - loss: 0.3813 - val_accuracy: 0.7872 -
val_loss: 0.4478 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8363 - loss: 0.3636 - val_accuracy: 0.7979 -
val_loss: 0.3893 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8304 - loss: 0.4004 - val_accuracy: 0.8298 -
val_loss: 0.4067 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8422 - loss: 0.3737 - val_accuracy: 0.8298 -
val_loss: 0.3979 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8681 - loss: 0.3345 - val_accuracy: 0.8191 -
val_loss: 0.3632 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 77ms/step - accuracy: 0.8398 - loss: 0.3558 - val_accuracy: 0.8511 -
val_loss: 0.3435 - learning_rate: 8.2645e-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: 6
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 1/14
27/27 - 3s - 102ms/step - accuracy: 0.5289 - loss: 1.1149 - val_accuracy: 0.6277
- val_loss: 0.6567 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 78ms/step - accuracy: 0.6360 - loss: 0.6303 - val_accuracy: 0.6702 -
val_loss: 0.5839 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 75ms/step - accuracy: 0.7550 - loss: 0.5191 - val_accuracy: 0.7553 -
val_loss: 0.5235 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 76ms/step - accuracy: 0.7527 - loss: 0.5164 - val_accuracy: 0.7340 -
val_loss: 0.5389 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.7903 - loss: 0.4701 - val_accuracy: 0.8191 -
val_loss: 0.4501 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 75ms/step - accuracy: 0.7915 - loss: 0.4658 - val_accuracy: 0.8298 -
val_loss: 0.3877 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 75ms/step - accuracy: 0.8045 - loss: 0.4186 - val_accuracy: 0.8191 -
val_loss: 0.4181 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 78ms/step - accuracy: 0.7986 - loss: 0.4241 - val_accuracy: 0.8085 -
val_loss: 0.4344 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8375 - loss: 0.3651 - val_accuracy: 0.8404 -
val_loss: 0.4017 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8469 - loss: 0.3617 - val_accuracy: 0.8404 -
val_loss: 0.3479 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8469 - loss: 0.3488 - val_accuracy: 0.8085 -
val_loss: 0.4333 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8575 - loss: 0.3211 - val_accuracy: 0.7979 -
val_loss: 0.3725 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8669 - loss: 0.3137 - val_accuracy: 0.8404 -
val_loss: 0.4410 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 75ms/step - accuracy: 0.8610 - loss: 0.3187 - val_accuracy: 0.8298 -
val_loss: 0.4578 - learning_rate: 8.2645e-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: 7
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 1/14
2025-05-05 08:06:11.653223: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
27/27 - 3s - 98ms/step - accuracy: 0.5336 - loss: 0.9243 - val_accuracy: 0.5957 -
val_loss: 0.6932 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.7091 - loss: 0.5734 - val_accuracy: 0.7021 -
val_loss: 0.6141 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 75ms/step - accuracy: 0.7562 - loss: 0.5088 - val_accuracy: 0.8298 -
val_loss: 0.4644 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 75ms/step - accuracy: 0.7762 - loss: 0.4664 - val_accuracy: 0.7872 -
val_loss: 0.5341 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 75ms/step - accuracy: 0.7739 - loss: 0.4661 - val_accuracy: 0.8298 -
val_loss: 0.4326 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 75ms/step - accuracy: 0.7962 - loss: 0.4329 - val_accuracy: 0.8404 -
val_loss: 0.4887 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 75ms/step - accuracy: 0.8068 - loss: 0.4234 - val_accuracy: 0.8830 -
val_loss: 0.3822 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8304 - loss: 0.3691 - val_accuracy: 0.8404 -
val_loss: 0.5394 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 77ms/step - accuracy: 0.8327 - loss: 0.3602 - val_accuracy: 0.8404 -
val_loss: 0.5129 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8433 - loss: 0.3510 - val_accuracy: 0.8191 -
val_loss: 0.4510 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 75ms/step - accuracy: 0.8516 - loss: 0.3523 - val_accuracy: 0.8404 -
val_loss: 0.5573 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8610 - loss: 0.3267 - val_accuracy: 0.8617 -
val_loss: 0.4351 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 75ms/step - accuracy: 0.8481 - loss: 0.3588 - val_accuracy: 0.8298 -
val_loss: 0.3980 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 75ms/step - accuracy: 0.8704 - loss: 0.3168 - val_accuracy: 0.8511 -
val_loss: 0.4078 - learning_rate: 8.2645e-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: 8
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 1/14
27/27 - 3s - 98ms/step - accuracy: 0.5760 - loss: 0.8354 - val_accuracy: 0.6489 -
val_loss: 0.6205 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.7267 - loss: 0.5447 - val_accuracy: 0.7234 -
val_loss: 0.5338 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 77ms/step - accuracy: 0.7468 - loss: 0.5091 - val_accuracy: 0.7766 -
val_loss: 0.4982 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 76ms/step - accuracy: 0.7915 - loss: 0.4625 - val_accuracy: 0.7979 -
val_loss: 0.4716 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.7892 - loss: 0.4638 - val_accuracy: 0.8085 -
val_loss: 0.4447 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.7998 - loss: 0.4336 - val_accuracy: 0.7553 -
val_loss: 0.4632 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8280 - loss: 0.3936 - val_accuracy: 0.8298 -
val_loss: 0.4350 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 75ms/step - accuracy: 0.8127 - loss: 0.3937 - val_accuracy: 0.8404 -
val_loss: 0.4195 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 75ms/step - accuracy: 0.8575 - loss: 0.3406 - val_accuracy: 0.8298 -
val_loss: 0.3691 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 78ms/step - accuracy: 0.8504 - loss: 0.3586 - val_accuracy: 0.8085 -
val_loss: 0.5564 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8539 - loss: 0.3210 - val_accuracy: 0.8511 -
val_loss: 0.3712 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8327 - loss: 0.3644 - val_accuracy: 0.8404 -
val_loss: 0.4909 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8681 - loss: 0.3011 - val_accuracy: 0.8191 -
val_loss: 0.4092 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 78ms/step - accuracy: 0.8704 - loss: 0.2970 - val_accuracy: 0.8404 -
val_loss: 0.3429 - learning_rate: 8.2645e-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: 9
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 1/14
27/27 - 3s - 98ms/step - accuracy: 0.5583 - loss: 1.1669 - val_accuracy: 0.4787 -
val_loss: 0.6997 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 77ms/step - accuracy: 0.6902 - loss: 0.5849 - val_accuracy: 0.6915 -
val_loss: 0.6773 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 78ms/step - accuracy: 0.7456 - loss: 0.5162 - val_accuracy: 0.7660 -
val_loss: 0.5042 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 78ms/step - accuracy: 0.7833 - loss: 0.4696 - val_accuracy: 0.7766 -
val_loss: 0.4489 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 77ms/step - accuracy: 0.7892 - loss: 0.4538 - val_accuracy: 0.8617 -
val_loss: 0.4331 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.8115 - loss: 0.4240 - val_accuracy: 0.8085 -
val_loss: 0.4475 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 77ms/step - accuracy: 0.8045 - loss: 0.4156 - val_accuracy: 0.8404 -
val_loss: 0.3882 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 77ms/step - accuracy: 0.8269 - loss: 0.3790 - val_accuracy: 0.8511 -
val_loss: 0.4504 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 77ms/step - accuracy: 0.8386 - loss: 0.3648 - val_accuracy: 0.8298 -
val_loss: 0.4117 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 77ms/step - accuracy: 0.8327 - loss: 0.3719 - val_accuracy: 0.8404 -
val_loss: 0.3968 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 78ms/step - accuracy: 0.8716 - loss: 0.3119 - val_accuracy: 0.8298 -
val_loss: 0.4229 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 77ms/step - accuracy: 0.8645 - loss: 0.3135 - val_accuracy: 0.8191 -
val_loss: 0.5740 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 77ms/step - accuracy: 0.8693 - loss: 0.3031 - val_accuracy: 0.7872 -
val_loss: 0.4287 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 77ms/step - accuracy: 0.8716 - loss: 0.3151 - val_accuracy: 0.8298 -
val_loss: 0.4851 - learning_rate: 8.2645e-04
```

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```
Current validation accuracy: 0.8297872543334961
Reseting all weights...
Current number of trials: 10
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 1/14
27/27 - 3s - 98ms/step - accuracy: 0.5607 - loss: 0.8460 - val_accuracy: 0.6702 -
val_loss: 0.6584 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.7091 - loss: 0.5733 - val_accuracy: 0.7340 -
val_loss: 0.5509 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 78ms/step - accuracy: 0.7550 - loss: 0.4983 - val_accuracy: 0.8404 -
val_loss: 0.4768 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 76ms/step - accuracy: 0.7680 - loss: 0.4795 - val_accuracy: 0.8404 -
val_loss: 0.4330 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 77ms/step - accuracy: 0.7939 - loss: 0.4518 - val_accuracy: 0.8085 -
val_loss: 0.4825 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.8327 - loss: 0.3946 - val_accuracy: 0.8085 -
val_loss: 0.4817 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8386 - loss: 0.3575 - val_accuracy: 0.8191 -
val_loss: 0.4506 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8151 - loss: 0.4036 - val_accuracy: 0.8298 -
val_loss: 0.3797 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8551 - loss: 0.3464 - val_accuracy: 0.8298 -
val_loss: 0.3334 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 77ms/step - accuracy: 0.8528 - loss: 0.3291 - val_accuracy: 0.8404 -
val_loss: 0.3772 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8657 - loss: 0.3176 - val_accuracy: 0.8404 -
val_loss: 0.4061 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 78ms/step - accuracy: 0.8810 - loss: 0.3139 - val_accuracy: 0.8511 -
val_loss: 0.3662 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8528 - loss: 0.3384 - val_accuracy: 0.8404 -
val_loss: 0.3550 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 77ms/step - accuracy: 0.8657 - loss: 0.2845 - val_accuracy: 0.8511 -
val_loss: 0.4208 - learning_rate: 8.2645e-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
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 1/14
27/27 - 3s - 99ms/step - accuracy: 0.6608 - loss: 0.8042 - val_accuracy: 0.7340 -
val_loss: 0.5660 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 77ms/step - accuracy: 0.7373 - loss: 0.5435 - val_accuracy: 0.7340 -
val_loss: 0.5756 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 77ms/step - accuracy: 0.7786 - loss: 0.4828 - val_accuracy: 0.8723 -
val_loss: 0.4636 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 77ms/step - accuracy: 0.7998 - loss: 0.4464 - val_accuracy: 0.7979 -
val_loss: 0.5463 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 77ms/step - accuracy: 0.8115 - loss: 0.4380 - val_accuracy: 0.8511 -
val_loss: 0.4596 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 77ms/step - accuracy: 0.8068 - loss: 0.4182 - val_accuracy: 0.8936 -
val_loss: 0.3728 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8174 - loss: 0.3938 - val_accuracy: 0.8404 -
val_loss: 0.4775 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 77ms/step - accuracy: 0.8481 - loss: 0.3543 - val_accuracy: 0.8617 -
val_loss: 0.3987 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 77ms/step - accuracy: 0.8610 - loss: 0.3441 - val_accuracy: 0.8191 -
val_loss: 0.4008 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8339 - loss: 0.3558 - val_accuracy: 0.8723 -
val_loss: 0.3089 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 77ms/step - accuracy: 0.8575 - loss: 0.3264 - val_accuracy: 0.8298 -
val_loss: 0.4329 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8728 - loss: 0.2971 - val_accuracy: 0.8404 -
val_loss: 0.3540 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 77ms/step - accuracy: 0.8645 - loss: 0.3082 - val_accuracy: 0.8936 -
val_loss: 0.3023 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 76ms/step - accuracy: 0.8728 - loss: 0.2931 - val_accuracy: 0.8723 -
val_loss: 0.3541 - learning_rate: 8.2645e-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
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 1/14
27/27 - 3s - 103ms/step - accuracy: 0.5536 - loss: 0.8779 - val_accuracy: 0.5745
- val_loss: 0.6503 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 77ms/step - accuracy: 0.6996 - loss: 0.5803 - val_accuracy: 0.6915 -
val_loss: 0.5749 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 77ms/step - accuracy: 0.7102 - loss: 0.5394 - val_accuracy: 0.7128 -
val_loss: 0.6044 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 77ms/step - accuracy: 0.7538 - loss: 0.4981 - val_accuracy: 0.7553 -
val_loss: 0.5034 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.7621 - loss: 0.4807 - val_accuracy: 0.8085 -
val_loss: 0.5142 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 78ms/step - accuracy: 0.8045 - loss: 0.4252 - val_accuracy: 0.7766 -
val_loss: 0.5096 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 77ms/step - accuracy: 0.7951 - loss: 0.4427 - val_accuracy: 0.8404 -
val_loss: 0.4426 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 77ms/step - accuracy: 0.8186 - loss: 0.3987 - val_accuracy: 0.8511 -
val_loss: 0.3620 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 77ms/step - accuracy: 0.8327 - loss: 0.3824 - val_accuracy: 0.8298 -
val_loss: 0.5227 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 77ms/step - accuracy: 0.8645 - loss: 0.3332 - val_accuracy: 0.8617 -
val_loss: 0.3948 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 77ms/step - accuracy: 0.8610 - loss: 0.3324 - val_accuracy: 0.8723 -
val_loss: 0.4079 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 77ms/step - accuracy: 0.8657 - loss: 0.3312 - val_accuracy: 0.8191 -
val_loss: 0.4143 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 77ms/step - accuracy: 0.9034 - loss: 0.2601 - val_accuracy: 0.8191 -
val_loss: 0.3668 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 78ms/step - accuracy: 0.8834 - loss: 0.2693 - val_accuracy: 0.8404 -
val_loss: 0.3959 - learning_rate: 8.2645e-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: 13
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 1/14
27/27 - 3s - 97ms/step - accuracy: 0.5866 - loss: 0.8397 - val_accuracy: 0.6596 -
val_loss: 0.6190 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 77ms/step - accuracy: 0.7079 - loss: 0.5669 - val_accuracy: 0.7660 -
val_loss: 0.5364 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 77ms/step - accuracy: 0.7621 - loss: 0.5017 - val_accuracy: 0.7766 -
val_loss: 0.5613 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 77ms/step - accuracy: 0.7797 - loss: 0.4763 - val_accuracy: 0.8191 -
val_loss: 0.4887 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.8057 - loss: 0.4421 - val_accuracy: 0.8191 -
val_loss: 0.4962 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.8115 - loss: 0.4206 - val_accuracy: 0.8085 -
val_loss: 0.4231 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 78ms/step - accuracy: 0.8009 - loss: 0.4303 - val_accuracy: 0.8085 -
val_loss: 0.3726 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 77ms/step - accuracy: 0.8339 - loss: 0.3809 - val_accuracy: 0.8298 -
val_loss: 0.4093 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8492 - loss: 0.3649 - val_accuracy: 0.8191 -
val_loss: 0.3793 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8422 - loss: 0.3565 - val_accuracy: 0.8298 -
val_loss: 0.3647 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8728 - loss: 0.3187 - val_accuracy: 0.8298 -
val_loss: 0.4426 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 77ms/step - accuracy: 0.8469 - loss: 0.3349 - val_accuracy: 0.8404 -
val_loss: 0.3268 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8457 - loss: 0.3484 - val_accuracy: 0.8723 -
val_loss: 0.4842 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 76ms/step - accuracy: 0.8787 - loss: 0.2981 - val_accuracy: 0.8723 -
val_loss: 0.4139 - learning_rate: 8.2645e-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: 14
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 1/14
27/27 - 3s - 98ms/step - accuracy: 0.5383 - loss: 0.9340 - val_accuracy: 0.6596 -
val_loss: 0.6283 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.6996 - loss: 0.5823 - val_accuracy: 0.7553 -
val_loss: 0.5280 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 76ms/step - accuracy: 0.7338 - loss: 0.5117 - val_accuracy: 0.8511 -
val_loss: 0.4363 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 78ms/step - accuracy: 0.7715 - loss: 0.4751 - val_accuracy: 0.7872 -
val_loss: 0.4557 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.7868 - loss: 0.4654 - val_accuracy: 0.8511 -
val_loss: 0.4832 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.8080 - loss: 0.4234 - val_accuracy: 0.8511 -
val_loss: 0.4255 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8257 - loss: 0.3864 - val_accuracy: 0.8511 -
val_loss: 0.3479 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 78ms/step - accuracy: 0.8363 - loss: 0.3933 - val_accuracy: 0.8617 -
val_loss: 0.4154 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8433 - loss: 0.3557 - val_accuracy: 0.8723 -
val_loss: 0.2967 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8799 - loss: 0.3255 - val_accuracy: 0.8617 -
val_loss: 0.3500 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 76ms/step - accuracy: 0.8539 - loss: 0.3358 - val_accuracy: 0.8723 -
val_loss: 0.3361 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8704 - loss: 0.3087 - val_accuracy: 0.8511 -
val_loss: 0.3747 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8587 - loss: 0.3501 - val_accuracy: 0.8723 -
val_loss: 0.3476 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 77ms/step - accuracy: 0.8598 - loss: 0.3357 - val_accuracy: 0.8723 -
val_loss: 0.2955 - learning_rate: 8.2645e-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: 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 1/14
2025-05-05 08:10:11.354115: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
27/27 - 3s - 98ms/step - accuracy: 0.6007 - loss: 0.7953 - val_accuracy: 0.6383 -
val_loss: 0.6380 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 77ms/step - accuracy: 0.7067 - loss: 0.5763 - val_accuracy: 0.7872 -
val_loss: 0.5011 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 75ms/step - accuracy: 0.7444 - loss: 0.5005 - val_accuracy: 0.7553 -
val_loss: 0.5292 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 76ms/step - accuracy: 0.7762 - loss: 0.4742 - val_accuracy: 0.7979 -
val_loss: 0.4585 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.8198 - loss: 0.4259 - val_accuracy: 0.8085 -
val_loss: 0.5123 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.8057 - loss: 0.4338 - val_accuracy: 0.8191 -
val_loss: 0.5127 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 77ms/step - accuracy: 0.8057 - loss: 0.4308 - val_accuracy: 0.8191 -
val_loss: 0.5029 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8163 - loss: 0.3968 - val_accuracy: 0.8085 -
val_loss: 0.4191 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 78ms/step - accuracy: 0.8210 - loss: 0.3831 - val_accuracy: 0.7872 -
val_loss: 0.4842 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8504 - loss: 0.3605 - val_accuracy: 0.7979 -
val_loss: 0.4099 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 77ms/step - accuracy: 0.8622 - loss: 0.3357 - val_accuracy: 0.7660 -
val_loss: 0.5642 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 77ms/step - accuracy: 0.8481 - loss: 0.3485 - val_accuracy: 0.7766 -
val_loss: 0.5516 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8598 - loss: 0.3229 - val_accuracy: 0.8085 -
val_loss: 0.3671 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 77ms/step - accuracy: 0.8869 - loss: 0.2844 - val_accuracy: 0.7872 -
val_loss: 0.3817 - learning_rate: 8.2645e-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')`.
```

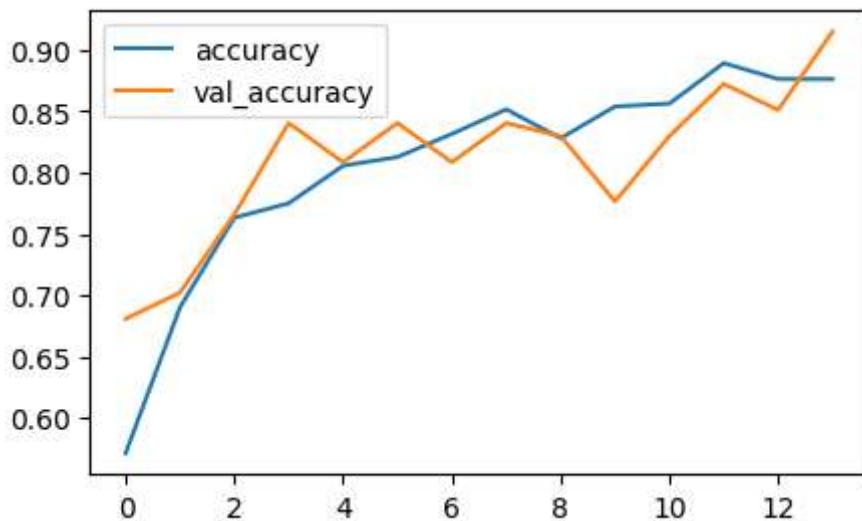
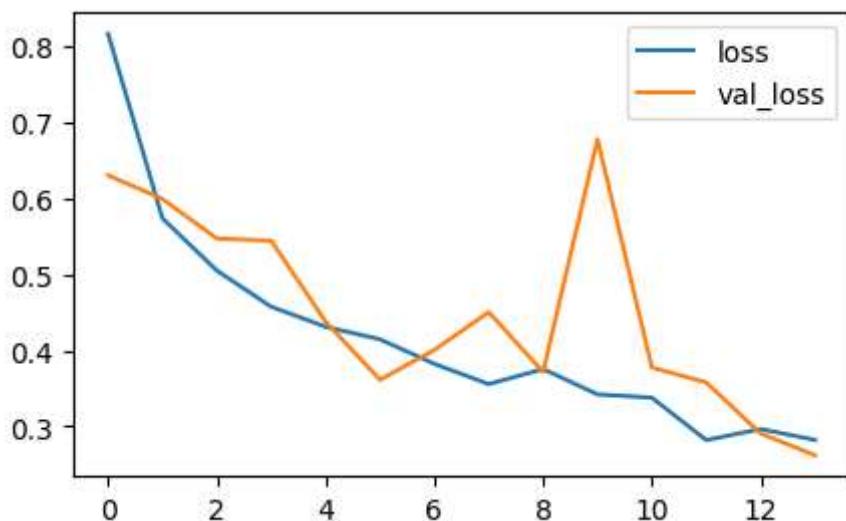
```
Current validation accuracy: 0.7872340679168701
Reseting all weights...
Current number of trials: 16
Found 943 files belonging to 2 classes.
Using 849 files for training.
Found 943 files belonging to 2 classes.
Using 94 files for validation.
Epoch 1/14
27/27 - 3s - 97ms/step - accuracy: 0.5713 - loss: 0.8334 - val_accuracy: 0.5319 -
val_loss: 0.7205 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.6808 - loss: 0.5836 - val_accuracy: 0.7128 -
val_loss: 0.5330 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 78ms/step - accuracy: 0.7703 - loss: 0.4992 - val_accuracy: 0.7553 -
val_loss: 0.4930 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 76ms/step - accuracy: 0.7821 - loss: 0.4745 - val_accuracy: 0.7340 -
val_loss: 0.7063 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 76ms/step - accuracy: 0.7833 - loss: 0.4449 - val_accuracy: 0.7660 -
val_loss: 0.4979 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 77ms/step - accuracy: 0.8092 - loss: 0.4137 - val_accuracy: 0.8085 -
val_loss: 0.3983 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8163 - loss: 0.3892 - val_accuracy: 0.7979 -
val_loss: 0.3972 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8198 - loss: 0.3970 - val_accuracy: 0.8085 -
val_loss: 0.5580 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 77ms/step - accuracy: 0.8422 - loss: 0.3704 - val_accuracy: 0.8298 -
val_loss: 0.4267 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 79ms/step - accuracy: 0.8327 - loss: 0.3931 - val_accuracy: 0.7979 -
val_loss: 0.4061 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 77ms/step - accuracy: 0.8539 - loss: 0.3278 - val_accuracy: 0.7979 -
val_loss: 0.4492 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8657 - loss: 0.3141 - val_accuracy: 0.8191 -
val_loss: 0.5008 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 76ms/step - accuracy: 0.8693 - loss: 0.3145 - val_accuracy: 0.8511 -
val_loss: 0.4500 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 77ms/step - accuracy: 0.8669 - loss: 0.3148 - val_accuracy: 0.8191 -
val_loss: 0.4896 - learning_rate: 8.2645e-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: 17
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 1/14
27/27 - 3s - 98ms/step - accuracy: 0.5713 - loss: 0.8167 - val_accuracy: 0.6809 -
val_loss: 0.6304 - learning_rate: 1.0000e-03
Epoch 2/14
27/27 - 2s - 76ms/step - accuracy: 0.6902 - loss: 0.5738 - val_accuracy: 0.7021 -
val_loss: 0.5994 - learning_rate: 1.0000e-03
Epoch 3/14
27/27 - 2s - 77ms/step - accuracy: 0.7633 - loss: 0.5051 - val_accuracy: 0.7660 -
val_loss: 0.5472 - learning_rate: 1.0000e-03
Epoch 4/14
27/27 - 2s - 78ms/step - accuracy: 0.7750 - loss: 0.4576 - val_accuracy: 0.8404 -
val_loss: 0.5444 - learning_rate: 1.0000e-03
Epoch 5/14
27/27 - 2s - 77ms/step - accuracy: 0.8057 - loss: 0.4313 - val_accuracy: 0.8085 -
val_loss: 0.4380 - learning_rate: 1.0000e-03
Epoch 6/14
27/27 - 2s - 76ms/step - accuracy: 0.8127 - loss: 0.4147 - val_accuracy: 0.8404 -
val_loss: 0.3616 - learning_rate: 9.0909e-04
Epoch 7/14
27/27 - 2s - 76ms/step - accuracy: 0.8316 - loss: 0.3825 - val_accuracy: 0.8085 -
val_loss: 0.4007 - learning_rate: 9.0909e-04
Epoch 8/14
27/27 - 2s - 76ms/step - accuracy: 0.8516 - loss: 0.3558 - val_accuracy: 0.8404 -
val_loss: 0.4506 - learning_rate: 9.0909e-04
Epoch 9/14
27/27 - 2s - 76ms/step - accuracy: 0.8280 - loss: 0.3757 - val_accuracy: 0.8298 -
val_loss: 0.3718 - learning_rate: 9.0909e-04
Epoch 10/14
27/27 - 2s - 76ms/step - accuracy: 0.8539 - loss: 0.3423 - val_accuracy: 0.7766 -
val_loss: 0.6779 - learning_rate: 9.0909e-04
Epoch 11/14
27/27 - 2s - 78ms/step - accuracy: 0.8563 - loss: 0.3380 - val_accuracy: 0.8298 -
val_loss: 0.3777 - learning_rate: 8.2645e-04
Epoch 12/14
27/27 - 2s - 76ms/step - accuracy: 0.8893 - loss: 0.2821 - val_accuracy: 0.8723 -
val_loss: 0.3580 - learning_rate: 8.2645e-04
Epoch 13/14
27/27 - 2s - 77ms/step - accuracy: 0.8763 - loss: 0.2967 - val_accuracy: 0.8511 -
val_loss: 0.2909 - learning_rate: 8.2645e-04
Epoch 14/14
27/27 - 2s - 76ms/step - accuracy: 0.8763 - loss: 0.2823 - val_accuracy: 0.9149 -
val_loss: 0.2623 - learning_rate: 8.2645e-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: 0.914893627166748
Reseting all weights...
Current number of trials: 18
['loss', 'compile_metrics']
3/3 _____ 0s 18ms/step - accuracy: 0.9145 - loss: 0.2752
[0.26226264238357544, 0.914893627166748]
3/3 _____ 0s 29ms/step
Classification Report:
precision    recall    f1-score   support
Female        0.90      0.90      0.90       41
Male          0.92      0.92      0.92       53
accuracy      0.91      0.91      0.91       94
macro avg     0.91      0.91      0.91       94
weighted avg  0.91      0.91      0.91       94
```



In []:

In []: