Personal Project_04_v10_test1_4conv-layer_run77_very advanced control 3_autorun

May 7, 2025

```python
[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


     class EarlyStoppingCallback(tf.keras.callbacks.Callback):
         def on_epoch_end(self, epoch, logs=None):
             train_accuracy = logs.get('accuracy')
             val_accuracy = logs.get('val_accuracy')
             if train_accuracy >= desired_train_accuracy and val_accuracy >=
       ↪desired_val_accuracy:
                 self.model.stop_training = True
                 print("Reached desired accuracy so cancelling training!")


     # target accuracy values:
     desired_train_accuracy = 0.90
     desired_val_accuracy = 0.90

     # maximum trial number:
     trial_num = 50

     # maximum possible epoch:
     epochs = 20


     TRAIN_ACC=0.1
     VAL_ACC=0.1
     try_num = 1
     condition = True
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while (try_num<trial_num and condition==True):
    # DOE factors:
    learning_rate = 0.0005
    dropout_value = 0.2
    # n-conv_layers = 4
    n_units_last_layer = 1024
    n_filters_l1 = 32
    n_filters_l2 = 16

    # 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']
    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
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    )

    # 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)

    # 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 / 1
            return lr
        elif epoch < 30:
            if epoch % 5 == 0 and epoch > 0:
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            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:    #####
        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),
        #####    CONV_LAYER_4:    #####
        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,
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            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,␣
↪EarlyStoppingCallback()],
                                 verbose=1)
    result_history = pd.DataFrame(model.history.history)
    TRAIN_ACC = result_history['accuracy'].iloc[-1]
    print(f"Current training accuracy: {TRAIN_ACC}")
    VAL_ACC = result_history['val_accuracy'].iloc[-1]
    print(f"Current validation accuracy: {VAL_ACC}")
    # 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']))

    if (TRAIN_ACC>=desired_train_accuracy and VAL_ACC>=desired_val_accuracy):
        condition = False
        model.save('trained_model_run77_very_advanced_control.h5')
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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 1/20

2025-05-07 11:06:17.893014: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

27/27   2s 62ms/step -
accuracy: 0.5092 - loss: 0.7174 - val_accuracy: 0.5957 - val_loss: 0.6850 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27   2s 59ms/step -
accuracy: 0.6189 - loss: 0.6696 - val_accuracy: 0.5106 - val_loss: 0.7823 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27   2s 58ms/step -
accuracy: 0.6384 - loss: 0.6220 - val_accuracy: 0.7340 - val_loss: 0.5502 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27   2s 58ms/step -
accuracy: 0.7166 - loss: 0.5466 - val_accuracy: 0.7447 - val_loss: 0.5202 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27   2s 58ms/step -
accuracy: 0.7550 - loss: 0.5061 - val_accuracy: 0.7660 - val_loss: 0.5839 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27   2s 59ms/step -
accuracy: 0.7363 - loss: 0.5344 - val_accuracy: 0.7234 - val_loss: 0.5577 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27   2s 59ms/step -
accuracy: 0.8056 - loss: 0.4705 - val_accuracy: 0.7872 - val_loss: 0.5251 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27   2s 59ms/step -
accuracy: 0.7669 - loss: 0.4760 - val_accuracy: 0.7872 - val_loss: 0.4714 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27   2s 59ms/step -
accuracy: 0.8006 - loss: 0.4513 - val_accuracy: 0.8298 - val_loss: 0.4724 -
learning_rate: 5.0000e-04
Epoch 10/20

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27/27              2s 59ms/step -
accuracy: 0.8155 - loss: 0.3846 - val_accuracy: 0.8191 - val_loss: 0.4604 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 59ms/step -
accuracy: 0.8597 - loss: 0.3767 - val_accuracy: 0.8511 - val_loss: 0.4195 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8371 - loss: 0.3714 - val_accuracy: 0.8511 - val_loss: 0.3861 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8749 - loss: 0.3311 - val_accuracy: 0.7872 - val_loss: 0.3925 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 59ms/step -
accuracy: 0.8469 - loss: 0.3393 - val_accuracy: 0.8723 - val_loss: 0.4160 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8604 - loss: 0.3224 - val_accuracy: 0.8191 - val_loss: 0.3715 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27              2s 59ms/step -
accuracy: 0.8669 - loss: 0.3148 - val_accuracy: 0.8511 - val_loss: 0.4131 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27              2s 60ms/step -
accuracy: 0.8697 - loss: 0.3270 - val_accuracy: 0.8511 - val_loss: 0.4523 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27              2s 61ms/step -
accuracy: 0.8524 - loss: 0.3220 - val_accuracy: 0.8511 - val_loss: 0.4279 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27              2s 60ms/step -
accuracy: 0.8668 - loss: 0.3247 - val_accuracy: 0.8404 - val_loss: 0.4327 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27              2s 60ms/step -
accuracy: 0.8987 - loss: 0.2440 - val_accuracy: 0.8404 - val_loss: 0.4188 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8881036639213562
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 1
```
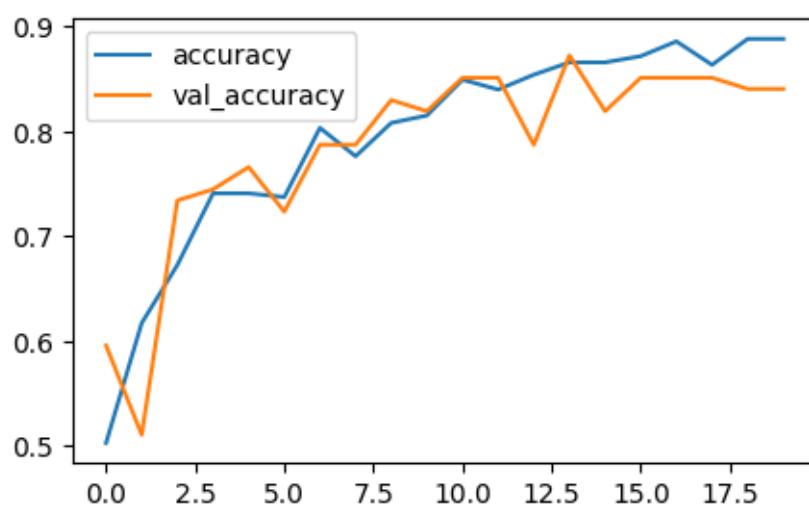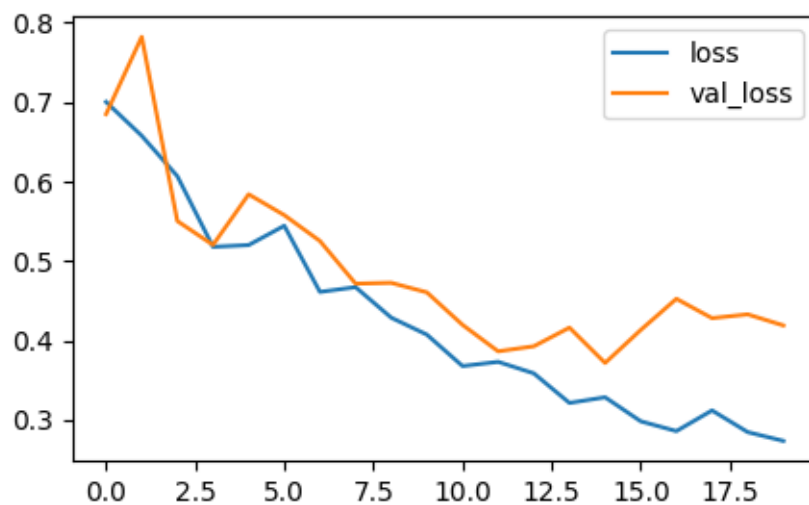
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8030 - loss: 0.4700
[0.41875380277633667, 0.8404255509376526]
3/3              0s 28ms/step
Classification Report:
              precision    recall   f1-score    support

      Female       0.82      0.80       0.81        41
        Male       0.85      0.87       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.
2025-05-07 11:06:50.665409: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/20
27/27              2s 63ms/step -
accuracy: 0.5415 - loss: 0.6891 - val_accuracy: 0.6596 - val_loss: 0.6711 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6775 - loss: 0.6069 - val_accuracy: 0.6383 - val_loss: 0.7346 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7212 - loss: 0.5498 - val_accuracy: 0.7234 - val_loss: 0.5584 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7474 - loss: 0.4912 - val_accuracy: 0.7766 - val_loss: 0.5226 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7960 - loss: 0.4576 - val_accuracy: 0.7872 - val_loss: 0.4414 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 61ms/step -
accuracy: 0.7847 - loss: 0.4653 - val_accuracy: 0.8085 - val_loss: 0.4461 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 62ms/step -
accuracy: 0.7949 - loss: 0.4298 - val_accuracy: 0.8404 - val_loss: 0.4730 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.8404 - loss: 0.3695 - val_accuracy: 0.8191 - val_loss: 0.3544 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 62ms/step -
accuracy: 0.8556 - loss: 0.3589 - val_accuracy: 0.8298 - val_loss: 0.3576 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 62ms/step -
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accuracy: 0.8186 - loss: 0.3689 - val_accuracy: 0.8404 - val_loss: 0.3321 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 62ms/step -
accuracy: 0.8489 - loss: 0.3507 - val_accuracy: 0.8085 - val_loss: 0.4419 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 61ms/step -
accuracy: 0.8486 - loss: 0.3476 - val_accuracy: 0.7979 - val_loss: 0.5356 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 61ms/step -
accuracy: 0.8573 - loss: 0.3481 - val_accuracy: 0.7979 - val_loss: 0.6265 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 62ms/step -
accuracy: 0.8573 - loss: 0.3287 - val_accuracy: 0.8511 - val_loss: 0.4775 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 61ms/step -
accuracy: 0.8724 - loss: 0.3038 - val_accuracy: 0.8191 - val_loss: 0.3607 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 63ms/step -
accuracy: 0.8792 - loss: 0.2985 - val_accuracy: 0.8617 - val_loss: 0.3057 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 62ms/step -
accuracy: 0.8841 - loss: 0.3043 - val_accuracy: 0.8511 - val_loss: 0.3975 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.9039 - loss: 0.2669 - val_accuracy: 0.8404 - val_loss: 0.4953 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.8741 - loss: 0.2681 - val_accuracy: 0.8191 - val_loss: 0.3713 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 61ms/step -
accuracy: 0.8864 - loss: 0.2496 - val_accuracy: 0.8191 - val_loss: 0.4312 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8939929604530334
Current validation accuracy: 0.8191489577293396
Reseting all weights…
Current number of trials: 2
```
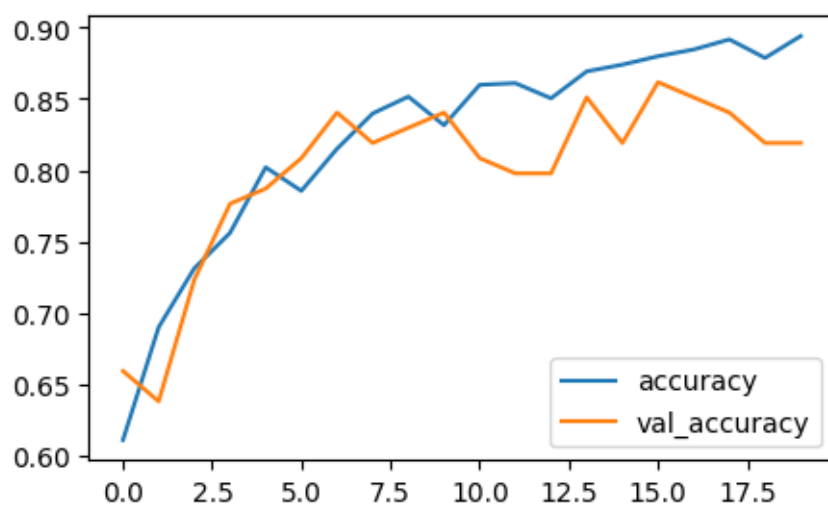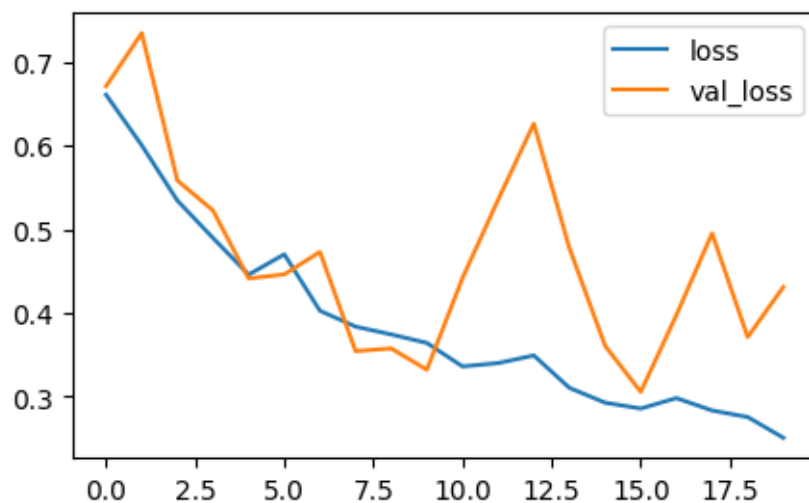
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8080 - loss: 0.4707
[0.43116217851638794, 0.8191489577293396]
3/3                0s 27ms/step
Classification Report:
            precision    recall   f1-score    support

     Female      0.79      0.80       0.80         41
       Male      0.85      0.83       0.84         53

   accuracy                          0.82         94
```

```
      macro avg       0.82      0.82      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.

2025-05-07 11:07:24.970544: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/20
27/27            2s 64ms/step -
accuracy: 0.5019 - loss: 0.7026 - val_accuracy: 0.4362 - val_loss: 0.7074 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27            2s 62ms/step -
accuracy: 0.5932 - loss: 0.6525 - val_accuracy: 0.6170 - val_loss: 0.6290 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27            2s 61ms/step -
accuracy: 0.7251 - loss: 0.5520 - val_accuracy: 0.6915 - val_loss: 0.5680 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27            2s 61ms/step -
accuracy: 0.7129 - loss: 0.5421 - val_accuracy: 0.7660 - val_loss: 0.5343 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27            2s 63ms/step -
accuracy: 0.7540 - loss: 0.5161 - val_accuracy: 0.7766 - val_loss: 0.4934 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27            2s 61ms/step -
accuracy: 0.7552 - loss: 0.4845 - val_accuracy: 0.8404 - val_loss: 0.4217 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27            2s 60ms/step -
accuracy: 0.7667 - loss: 0.5068 - val_accuracy: 0.8298 - val_loss: 0.4345 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27            2s 59ms/step -
accuracy: 0.8026 - loss: 0.4416 - val_accuracy: 0.7979 - val_loss: 0.5065 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27            2s 59ms/step -
accuracy: 0.8048 - loss: 0.4364 - val_accuracy: 0.7766 - val_loss: 0.4627 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27            2s 59ms/step -
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accuracy: 0.8394 - loss: 0.3654 - val_accuracy: 0.7447 - val_loss: 0.4698 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27   2s 60ms/step -
accuracy: 0.8191 - loss: 0.3899 - val_accuracy: 0.7447 - val_loss: 0.6339 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27   2s 59ms/step -
accuracy: 0.8446 - loss: 0.3479 - val_accuracy: 0.8723 - val_loss: 0.3891 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27   2s 59ms/step -
accuracy: 0.8613 - loss: 0.3542 - val_accuracy: 0.7766 - val_loss: 0.5260 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27   2s 60ms/step -
accuracy: 0.8543 - loss: 0.3430 - val_accuracy: 0.8085 - val_loss: 0.3587 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27   2s 61ms/step -
accuracy: 0.8395 - loss: 0.3644 - val_accuracy: 0.8511 - val_loss: 0.3680 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27   2s 60ms/step -
accuracy: 0.8827 - loss: 0.3182 - val_accuracy: 0.8936 - val_loss: 0.3536 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27   2s 60ms/step -
accuracy: 0.8683 - loss: 0.3065 - val_accuracy: 0.8617 - val_loss: 0.3817 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27   2s 60ms/step -
accuracy: 0.8817 - loss: 0.2779 - val_accuracy: 0.8617 - val_loss: 0.3372 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27   2s 60ms/step -
accuracy: 0.8528 - loss: 0.3381 - val_accuracy: 0.8404 - val_loss: 0.3635 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27   2s 60ms/step -
accuracy: 0.8833 - loss: 0.2770 - val_accuracy: 0.8085 - val_loss: 0.4466 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8939929604530334
Current validation accuracy: 0.8085106611251831
Reseting all weights…
Current number of trials: 3
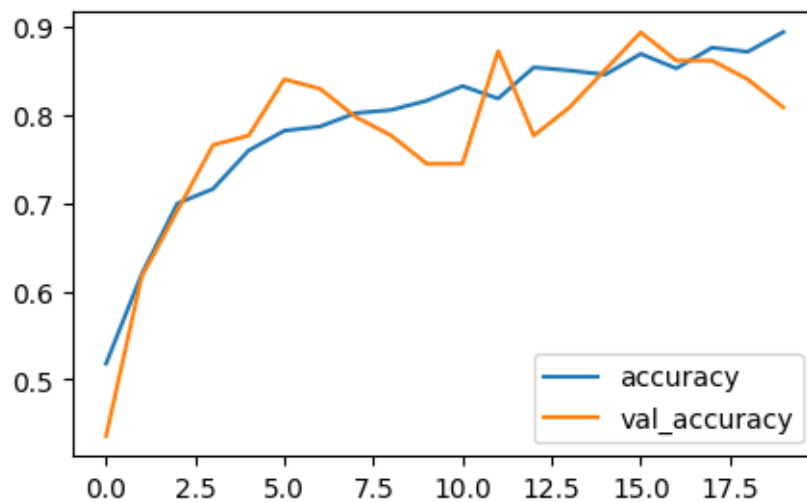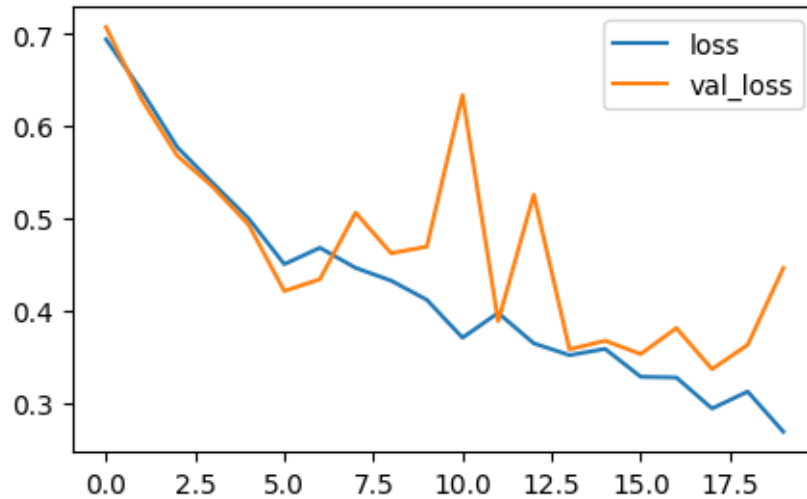
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.7988 - loss: 0.4745
[0.4466264545917511, 0.8085106611251831]
WARNING:tensorflow:5 out of the last 7 calls to <function
TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed at
0x1775ed1c0> triggered 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
36ms/stepWARNING:tensorflow:6 out of the last 9 calls to <function
TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed at
0x1775ed1c0> 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 27ms/step
Classification Report:
             precision    recall  f1-score    support

     Female       0.79      0.76      0.78        41
       Male       0.82      0.85      0.83        53

   accuracy                          0.81        94
  macro avg       0.81      0.80      0.80        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 1/20
27/27              2s 62ms/step -
accuracy: 0.4881 - loss: 0.7193 - val_accuracy: 0.5745 - val_loss: 0.6518 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6561 - loss: 0.6285 - val_accuracy: 0.7234 - val_loss: 0.5575 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7682 - loss: 0.5116 - val_accuracy: 0.7553 - val_loss: 0.4972 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 61ms/step -
accuracy: 0.7429 - loss: 0.5250 - val_accuracy: 0.7340 - val_loss: 0.4878 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7365 - loss: 0.5328 - val_accuracy: 0.8298 - val_loss: 0.4325 -
learning_rate: 5.0000e-04
```

```
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.7808 - loss: 0.4770 - val_accuracy: 0.8298 - val_loss: 0.4300 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.8098 - loss: 0.4311 - val_accuracy: 0.7979 - val_loss: 0.4748 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7857 - loss: 0.4539 - val_accuracy: 0.8085 - val_loss: 0.4832 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 59ms/step -
accuracy: 0.8118 - loss: 0.3934 - val_accuracy: 0.8404 - val_loss: 0.4165 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 59ms/step -
accuracy: 0.8439 - loss: 0.3638 - val_accuracy: 0.8298 - val_loss: 0.3434 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8016 - loss: 0.4158 - val_accuracy: 0.8085 - val_loss: 0.4049 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8666 - loss: 0.3372 - val_accuracy: 0.8085 - val_loss: 0.4251 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 59ms/step -
accuracy: 0.8221 - loss: 0.3962 - val_accuracy: 0.8723 - val_loss: 0.3456 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8426 - loss: 0.3588 - val_accuracy: 0.8298 - val_loss: 0.3886 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 59ms/step -
accuracy: 0.8841 - loss: 0.2789 - val_accuracy: 0.8298 - val_loss: 0.3551 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27              2s 59ms/step -
accuracy: 0.8749 - loss: 0.2981 - val_accuracy: 0.8191 - val_loss: 0.3554 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27              2s 60ms/step -
accuracy: 0.8690 - loss: 0.3142 - val_accuracy: 0.8191 - val_loss: 0.3273 -
learning_rate: 5.0000e-04
```

```
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8950 - loss: 0.2561 - val_accuracy: 0.8404 - val_loss: 0.4282 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.9135 - loss: 0.2217 - val_accuracy: 0.8936 - val_loss: 0.3371 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.9057 - loss: 0.2550 - val_accuracy: 0.8617 - val_loss: 0.3262 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9128386378288269
Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 4
```
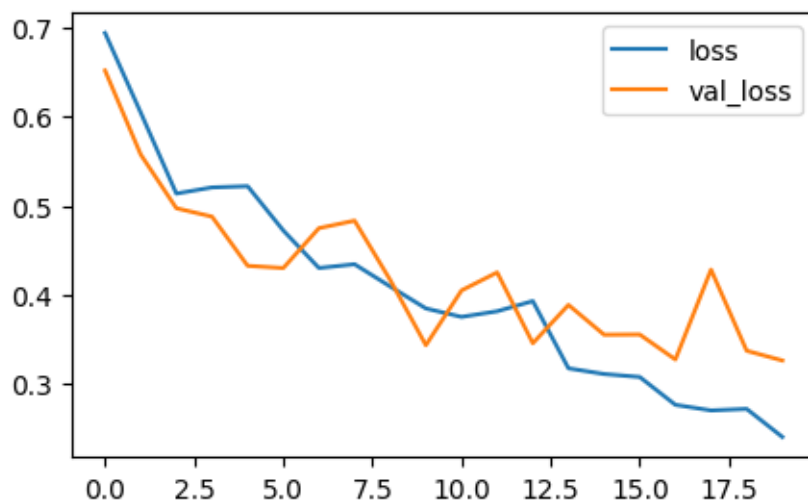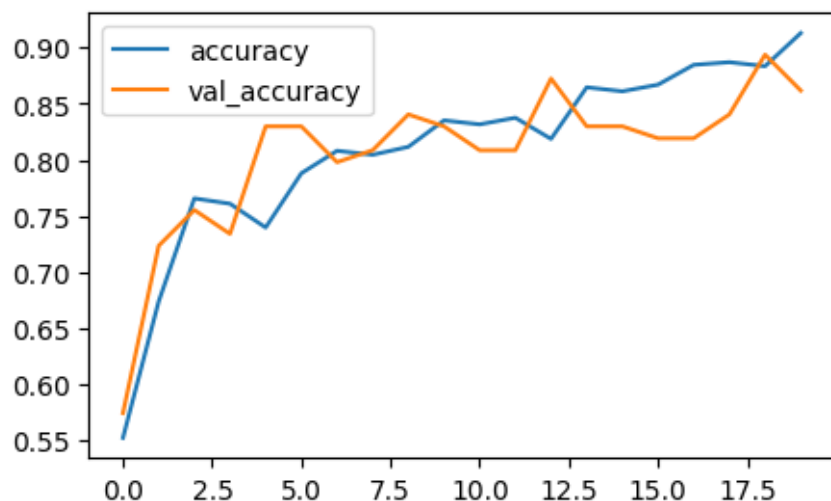
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8488 - loss: 0.3409
[0.32620444893836975, 0.8617021441459656]
3/3                 0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.95      0.86        41
        Male       0.95      0.79      0.87        53

    accuracy                           0.86        94
   macro avg       0.87      0.87      0.86        94
weighted avg       0.88      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.

2025-05-07 11:08:31.996005: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/20
27/27               2s 63ms/step -
accuracy: 0.4885 - loss: 0.7167 - val_accuracy: 0.4787 - val_loss: 0.7281 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 59ms/step -
accuracy: 0.6695 - loss: 0.6017 - val_accuracy: 0.7340 - val_loss: 0.5718 -
learning_rate: 5.0000e-04
```

```
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7413 - loss: 0.5299 - val_accuracy: 0.7340 - val_loss: 0.5563 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7145 - loss: 0.5432 - val_accuracy: 0.7234 - val_loss: 0.5499 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7798 - loss: 0.4511 - val_accuracy: 0.8191 - val_loss: 0.4939 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7643 - loss: 0.4739 - val_accuracy: 0.7872 - val_loss: 0.4946 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.7993 - loss: 0.4218 - val_accuracy: 0.8085 - val_loss: 0.4862 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8149 - loss: 0.4023 - val_accuracy: 0.8298 - val_loss: 0.3904 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 59ms/step -
accuracy: 0.7992 - loss: 0.4325 - val_accuracy: 0.7660 - val_loss: 0.4423 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8194 - loss: 0.3763 - val_accuracy: 0.8085 - val_loss: 0.4183 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8910 - loss: 0.3076 - val_accuracy: 0.8085 - val_loss: 0.5360 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8580 - loss: 0.3518 - val_accuracy: 0.8191 - val_loss: 0.4220 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8284 - loss: 0.3749 - val_accuracy: 0.8191 - val_loss: 0.5263 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 59ms/step -
accuracy: 0.8543 - loss: 0.3322 - val_accuracy: 0.8085 - val_loss: 0.4371 -
learning_rate: 5.0000e-04
```

```
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.9027 - loss: 0.2657 - val_accuracy: 0.8191 - val_loss: 0.4305 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27              2s 60ms/step -
accuracy: 0.8690 - loss: 0.2936 - val_accuracy: 0.8404 - val_loss: 0.4796 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27              2s 60ms/step -
accuracy: 0.8535 - loss: 0.3088 - val_accuracy: 0.8191 - val_loss: 0.4122 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27              2s 60ms/step -
accuracy: 0.8840 - loss: 0.3026 - val_accuracy: 0.7979 - val_loss: 0.4523 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27              2s 59ms/step -
accuracy: 0.8441 - loss: 0.3375 - val_accuracy: 0.7979 - val_loss: 0.4790 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27              2s 60ms/step -
accuracy: 0.9058 - loss: 0.2307 - val_accuracy: 0.8404 - val_loss: 0.4565 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8963486552238464
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 5
```
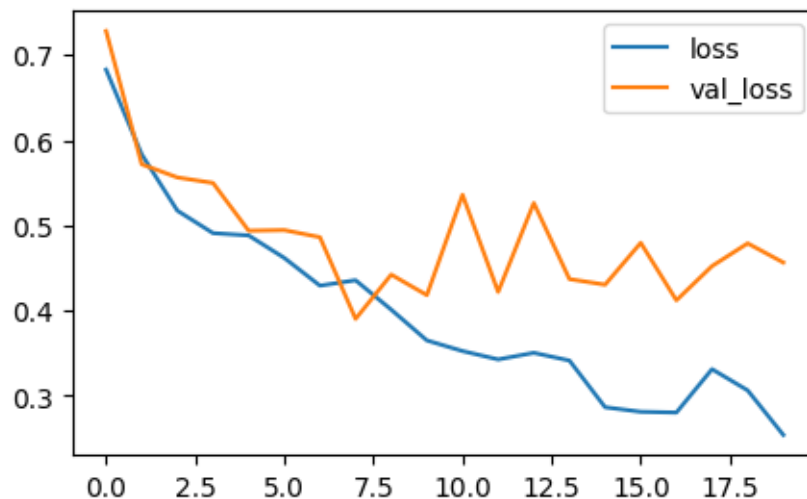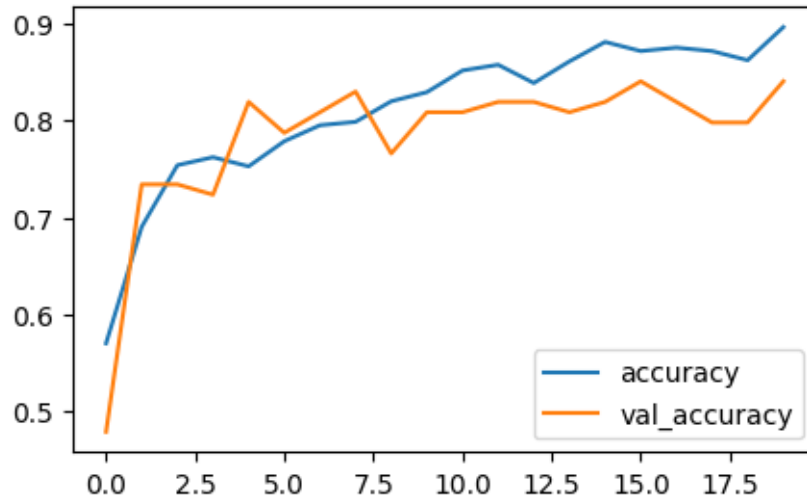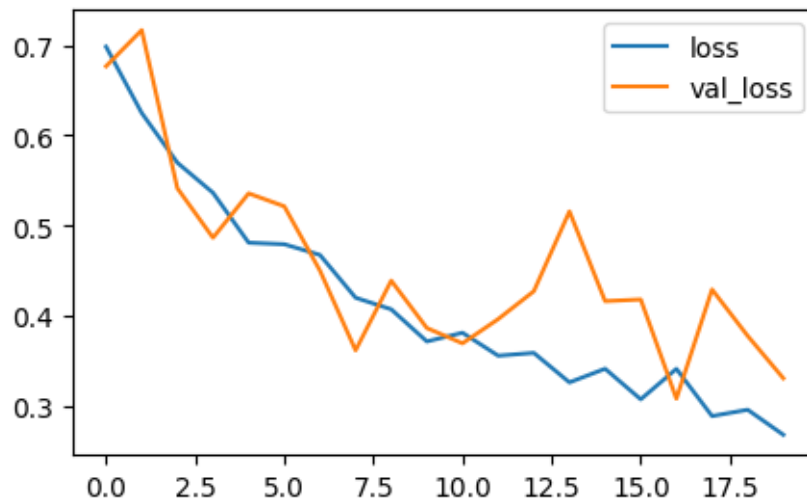
```
['loss', 'compile_metrics']
3/3                  0s 15ms/step -
accuracy: 0.8460 - loss: 0.4826
[0.45653465390205383, 0.8404255509376526]
3/3                  0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27                2s 64ms/step -
accuracy: 0.4979 - loss: 0.7138 - val_accuracy: 0.5851 - val_loss: 0.6767 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 62ms/step -
accuracy: 0.6405 - loss: 0.6445 - val_accuracy: 0.5745 - val_loss: 0.7167 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 61ms/step -
accuracy: 0.7292 - loss: 0.5617 - val_accuracy: 0.7872 - val_loss: 0.5417 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 60ms/step -
accuracy: 0.7452 - loss: 0.5393 - val_accuracy: 0.7979 - val_loss: 0.4868 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 60ms/step -
accuracy: 0.7728 - loss: 0.4817 - val_accuracy: 0.7128 - val_loss: 0.5360 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 60ms/step -
accuracy: 0.7570 - loss: 0.4869 - val_accuracy: 0.7766 - val_loss: 0.5216 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 61ms/step -
accuracy: 0.7561 - loss: 0.4852 - val_accuracy: 0.7979 - val_loss: 0.4505 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 60ms/step -
accuracy: 0.7944 - loss: 0.4305 - val_accuracy: 0.8191 - val_loss: 0.3622 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 61ms/step -
accuracy: 0.8523 - loss: 0.3741 - val_accuracy: 0.8298 - val_loss: 0.4393 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 60ms/step -
accuracy: 0.8383 - loss: 0.3860 - val_accuracy: 0.8723 - val_loss: 0.3869 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 61ms/step -
accuracy: 0.8416 - loss: 0.3453 - val_accuracy: 0.8191 - val_loss: 0.3700 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 62ms/step -
accuracy: 0.8221 - loss: 0.3802 - val_accuracy: 0.8298 - val_loss: 0.3968 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 62ms/step -
accuracy: 0.8441 - loss: 0.3454 - val_accuracy: 0.8298 - val_loss: 0.4276 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 60ms/step -
accuracy: 0.8544 - loss: 0.3272 - val_accuracy: 0.8298 - val_loss: 0.5160 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 62ms/step -
accuracy: 0.8369 - loss: 0.3401 - val_accuracy: 0.8298 - val_loss: 0.4167 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8409 - loss: 0.3585 - val_accuracy: 0.8191 - val_loss: 0.4185 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8647 - loss: 0.3130 - val_accuracy: 0.8830 - val_loss: 0.3087 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8925 - loss: 0.2728 - val_accuracy: 0.8511 - val_loss: 0.4296 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.8485 - loss: 0.3270 - val_accuracy: 0.8511 - val_loss: 0.3782 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 61ms/step -
accuracy: 0.9063 - loss: 0.2312 - val_accuracy: 0.8511 - val_loss: 0.3313 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8881036639213562
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 6
```
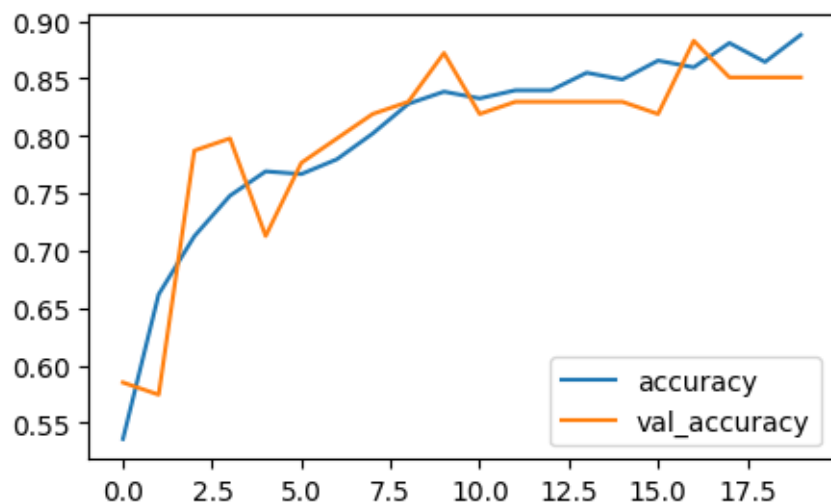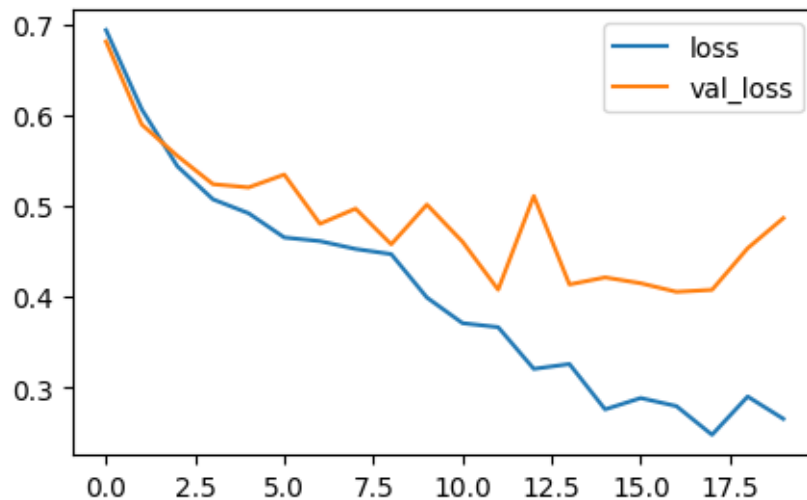
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8396 - loss: 0.3373
[0.3312816917896271, 0.8510638475418091]
3/3                 0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27               2s 66ms/step -
accuracy: 0.5398 - loss: 0.6982 - val_accuracy: 0.5851 - val_loss: 0.6809 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 61ms/step -
accuracy: 0.6691 - loss: 0.6463 - val_accuracy: 0.6809 - val_loss: 0.5896 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 61ms/step -
accuracy: 0.7235 - loss: 0.5525 - val_accuracy: 0.7979 - val_loss: 0.5550 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                 2s 60ms/step -
accuracy: 0.7782 - loss: 0.4959 - val_accuracy: 0.8085 - val_loss: 0.5239 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                 2s 60ms/step -
accuracy: 0.7663 - loss: 0.4910 - val_accuracy: 0.8191 - val_loss: 0.5204 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                 2s 61ms/step -
accuracy: 0.7757 - loss: 0.4740 - val_accuracy: 0.8085 - val_loss: 0.5345 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                 2s 60ms/step -
accuracy: 0.7972 - loss: 0.4499 - val_accuracy: 0.8191 - val_loss: 0.4803 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                 2s 60ms/step -
accuracy: 0.8034 - loss: 0.4514 - val_accuracy: 0.7021 - val_loss: 0.4970 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                 2s 59ms/step -
accuracy: 0.7514 - loss: 0.4849 - val_accuracy: 0.8298 - val_loss: 0.4577 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                 2s 60ms/step -
accuracy: 0.8291 - loss: 0.3766 - val_accuracy: 0.8085 - val_loss: 0.5014 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                 2s 61ms/step -
accuracy: 0.8211 - loss: 0.3960 - val_accuracy: 0.7979 - val_loss: 0.4606 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                 2s 60ms/step -
accuracy: 0.8436 - loss: 0.3350 - val_accuracy: 0.8404 - val_loss: 0.4079 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                 2s 59ms/step -
accuracy: 0.8771 - loss: 0.3193 - val_accuracy: 0.8085 - val_loss: 0.5109 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                 2s 59ms/step -
accuracy: 0.8490 - loss: 0.3372 - val_accuracy: 0.8511 - val_loss: 0.4136 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                 2s 59ms/step -
accuracy: 0.8789 - loss: 0.2811 - val_accuracy: 0.8085 - val_loss: 0.4213 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8912 - loss: 0.2835 - val_accuracy: 0.8617 - val_loss: 0.4149 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.8803 - loss: 0.2688 - val_accuracy: 0.8298 - val_loss: 0.4055 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 59ms/step -
accuracy: 0.8921 - loss: 0.2438 - val_accuracy: 0.8298 - val_loss: 0.4076 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 59ms/step -
accuracy: 0.8856 - loss: 0.2663 - val_accuracy: 0.8191 - val_loss: 0.4534 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 59ms/step -
accuracy: 0.8912 - loss: 0.2536 - val_accuracy: 0.8298 - val_loss: 0.4866 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8833922147750854
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 7
```
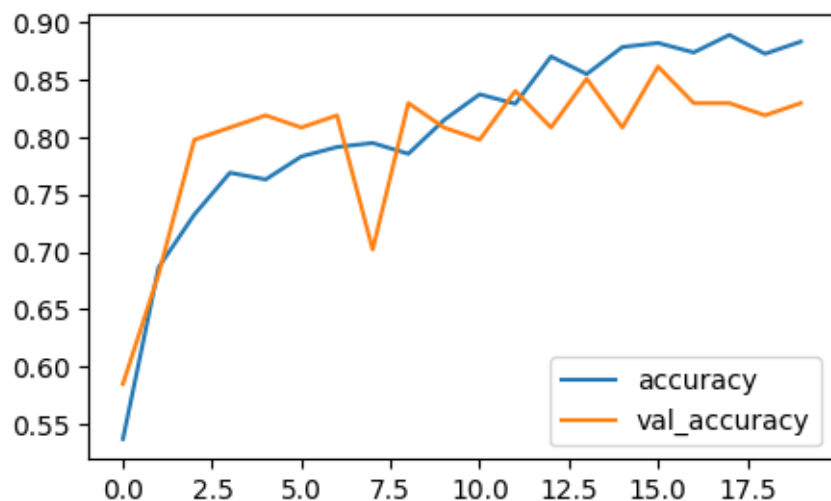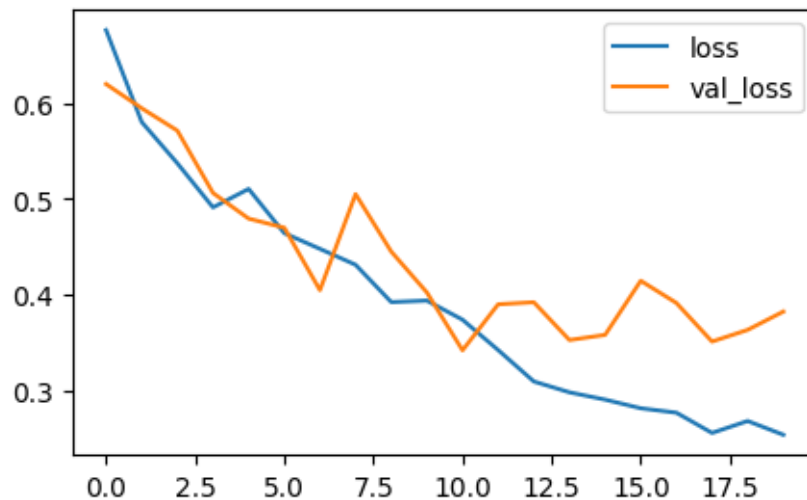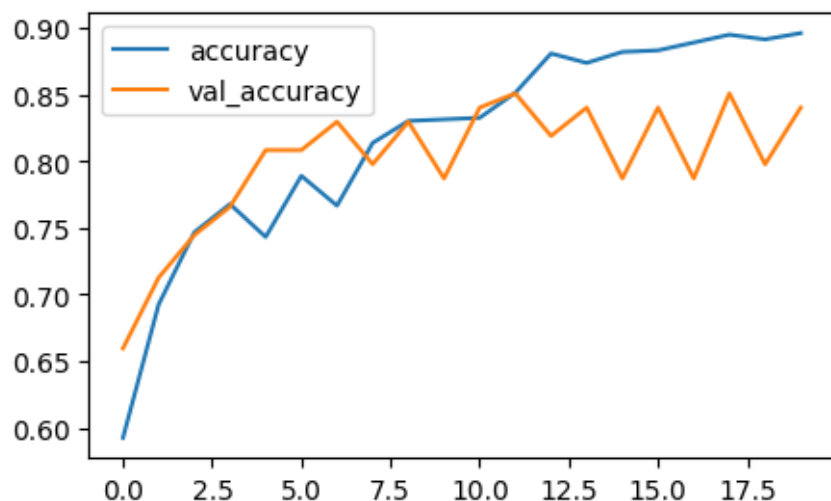
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8172 - loss: 0.5321
[0.4865547716617584, 0.8297872543334961]
3/3                 0s 27ms/step
Classification Report:
              precision    recall  f1-score    support

      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 1/20
27/27               2s 63ms/step -
accuracy: 0.5284 - loss: 0.7011 - val_accuracy: 0.6596 - val_loss: 0.6199 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 61ms/step -
accuracy: 0.6871 - loss: 0.5843 - val_accuracy: 0.7128 - val_loss: 0.5947 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 60ms/step -
accuracy: 0.7234 - loss: 0.5672 - val_accuracy: 0.7447 - val_loss: 0.5713 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7468 - loss: 0.5163 - val_accuracy: 0.7660 - val_loss: 0.5061 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7326 - loss: 0.5104 - val_accuracy: 0.8085 - val_loss: 0.4793 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.7899 - loss: 0.4684 - val_accuracy: 0.8085 - val_loss: 0.4698 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 61ms/step -
accuracy: 0.8017 - loss: 0.4130 - val_accuracy: 0.8298 - val_loss: 0.4046 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8132 - loss: 0.4557 - val_accuracy: 0.7979 - val_loss: 0.5049 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 59ms/step -
accuracy: 0.8196 - loss: 0.4170 - val_accuracy: 0.8298 - val_loss: 0.4449 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8354 - loss: 0.3965 - val_accuracy: 0.7872 - val_loss: 0.4022 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8075 - loss: 0.3919 - val_accuracy: 0.8404 - val_loss: 0.3417 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8711 - loss: 0.3209 - val_accuracy: 0.8511 - val_loss: 0.3898 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8828 - loss: 0.2903 - val_accuracy: 0.8191 - val_loss: 0.3919 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 59ms/step -
accuracy: 0.8806 - loss: 0.2963 - val_accuracy: 0.8404 - val_loss: 0.3524 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.9097 - loss: 0.2458 - val_accuracy: 0.7872 - val_loss: 0.3578 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                 2s 59ms/step -
accuracy: 0.8796 - loss: 0.2828 - val_accuracy: 0.8404 - val_loss: 0.4144 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                 2s 60ms/step -
accuracy: 0.8954 - loss: 0.2587 - val_accuracy: 0.7872 - val_loss: 0.3912 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                 2s 60ms/step -
accuracy: 0.9006 - loss: 0.2443 - val_accuracy: 0.8511 - val_loss: 0.3508 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                 2s 60ms/step -
accuracy: 0.8973 - loss: 0.2559 - val_accuracy: 0.7979 - val_loss: 0.3631 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                 2s 61ms/step -
accuracy: 0.9079 - loss: 0.2422 - val_accuracy: 0.8404 - val_loss: 0.3822 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8963486552238464
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 8
```

```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8382 - loss: 0.4202
[0.3821631968021393, 0.8404255509376526]
3/3                 0s 27ms/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.

2025-05-07 11:10:46.494767: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/20
27/27               2s 64ms/step -
accuracy: 0.5605 - loss: 0.6969 - val_accuracy: 0.5532 - val_loss: 0.6992 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 61ms/step -
accuracy: 0.6577 - loss: 0.6235 - val_accuracy: 0.6915 - val_loss: 0.5772 -
learning_rate: 5.0000e-04
```

```
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7182 - loss: 0.5577 - val_accuracy: 0.7447 - val_loss: 0.5963 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7471 - loss: 0.5117 - val_accuracy: 0.7766 - val_loss: 0.5004 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7754 - loss: 0.4775 - val_accuracy: 0.7340 - val_loss: 0.4516 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7798 - loss: 0.4582 - val_accuracy: 0.7872 - val_loss: 0.5278 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7912 - loss: 0.4210 - val_accuracy: 0.8191 - val_loss: 0.4659 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8091 - loss: 0.4292 - val_accuracy: 0.8298 - val_loss: 0.4525 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 62ms/step -
accuracy: 0.8534 - loss: 0.3697 - val_accuracy: 0.8511 - val_loss: 0.3961 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8005 - loss: 0.4214 - val_accuracy: 0.8723 - val_loss: 0.3477 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8545 - loss: 0.3609 - val_accuracy: 0.8404 - val_loss: 0.3872 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8747 - loss: 0.3275 - val_accuracy: 0.8404 - val_loss: 0.3553 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8902 - loss: 0.2856 - val_accuracy: 0.7979 - val_loss: 0.4038 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8533 - loss: 0.3396 - val_accuracy: 0.8298 - val_loss: 0.4225 -
learning_rate: 5.0000e-04
```

```
Epoch 15/20
27/27                  2s 61ms/step -
accuracy: 0.8682 - loss: 0.3243 - val_accuracy: 0.8298 - val_loss: 0.4052 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27                  2s 60ms/step -
accuracy: 0.8803 - loss: 0.3093 - val_accuracy: 0.8617 - val_loss: 0.4487 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                  2s 61ms/step -
accuracy: 0.8639 - loss: 0.3129 - val_accuracy: 0.8404 - val_loss: 0.3852 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                  2s 61ms/step -
accuracy: 0.8575 - loss: 0.3199 - val_accuracy: 0.8298 - val_loss: 0.3088 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                  2s 62ms/step -
accuracy: 0.8816 - loss: 0.2654 - val_accuracy: 0.8404 - val_loss: 0.3852 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                  2s 61ms/step -
accuracy: 0.8862 - loss: 0.2616 - val_accuracy: 0.8298 - val_loss: 0.3327 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8975265026092529
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 9
```
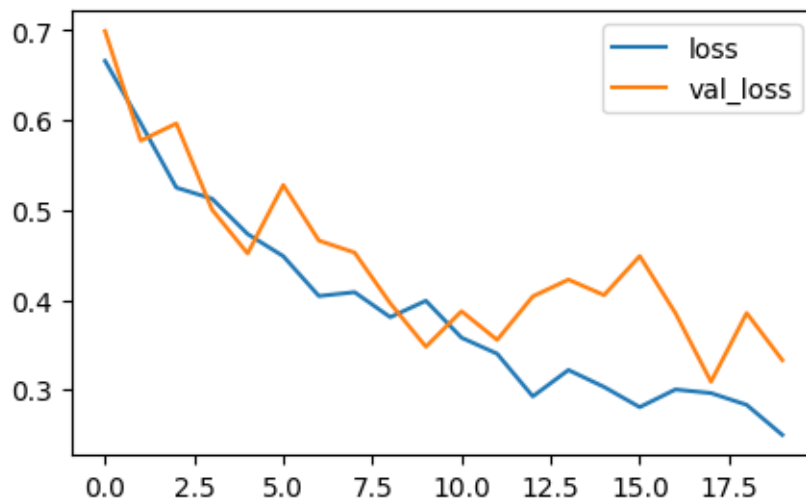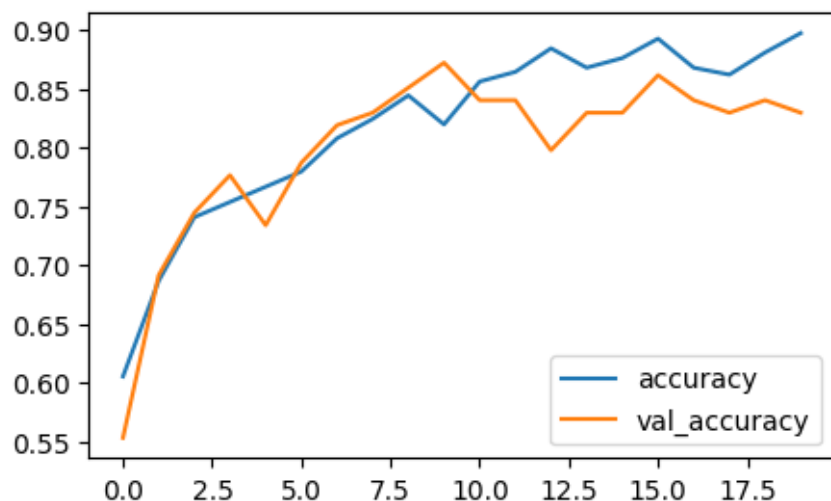
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8055 - loss: 0.3702
[0.33274605870246887, 0.8297872543334961]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 64ms/step -
accuracy: 0.5371 - loss: 0.6863 - val_accuracy: 0.5532 - val_loss: 0.6942 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6800 - loss: 0.6184 - val_accuracy: 0.6489 - val_loss: 0.7563 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7436 - loss: 0.5267 - val_accuracy: 0.7979 - val_loss: 0.4673 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7879 - loss: 0.4667 - val_accuracy: 0.7128 - val_loss: 0.4745 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7859 - loss: 0.4784 - val_accuracy: 0.8404 - val_loss: 0.4423 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.7984 - loss: 0.4121 - val_accuracy: 0.7979 - val_loss: 0.4699 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.8277 - loss: 0.4002 - val_accuracy: 0.7979 - val_loss: 0.5424 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.8318 - loss: 0.3795 - val_accuracy: 0.8085 - val_loss: 0.4676 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8370 - loss: 0.3418 - val_accuracy: 0.8298 - val_loss: 0.3110 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8411 - loss: 0.3377 - val_accuracy: 0.8404 - val_loss: 0.4448 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8476 - loss: 0.3497 - val_accuracy: 0.8191 - val_loss: 0.4508 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8306 - loss: 0.3321 - val_accuracy: 0.8191 - val_loss: 0.4039 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8865 - loss: 0.2975 - val_accuracy: 0.8191 - val_loss: 0.4903 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8817 - loss: 0.3030 - val_accuracy: 0.8085 - val_loss: 0.4155 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8341 - loss: 0.3668 - val_accuracy: 0.8617 - val_loss: 0.3785 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8661 - loss: 0.2881 - val_accuracy: 0.7979 - val_loss: 0.3440 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.9060 - loss: 0.2487 - val_accuracy: 0.8085 - val_loss: 0.5488 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8843 - loss: 0.2702 - val_accuracy: 0.8191 - val_loss: 0.4960 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.8968 - loss: 0.2451 - val_accuracy: 0.8511 - val_loss: 0.4248 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.9117 - loss: 0.2245 - val_accuracy: 0.8404 - val_loss: 0.3427 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8987043499946594
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 10
```
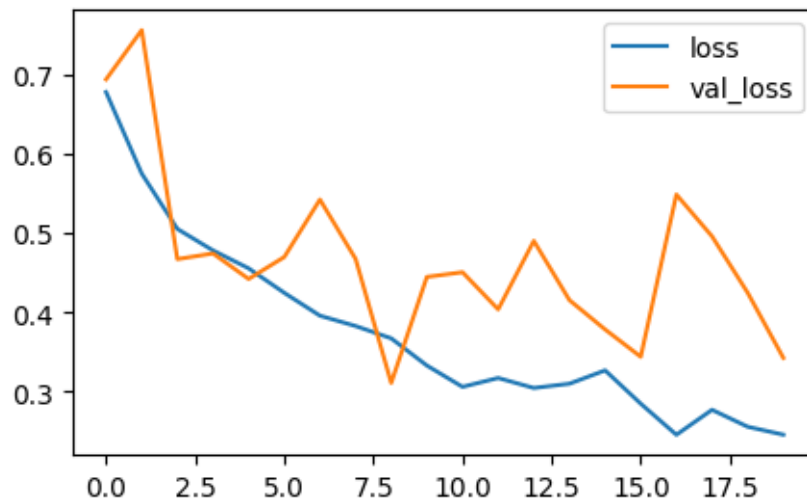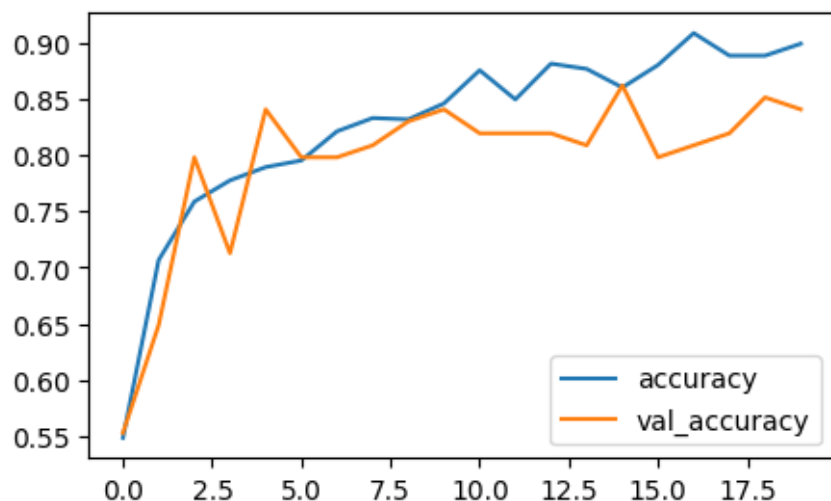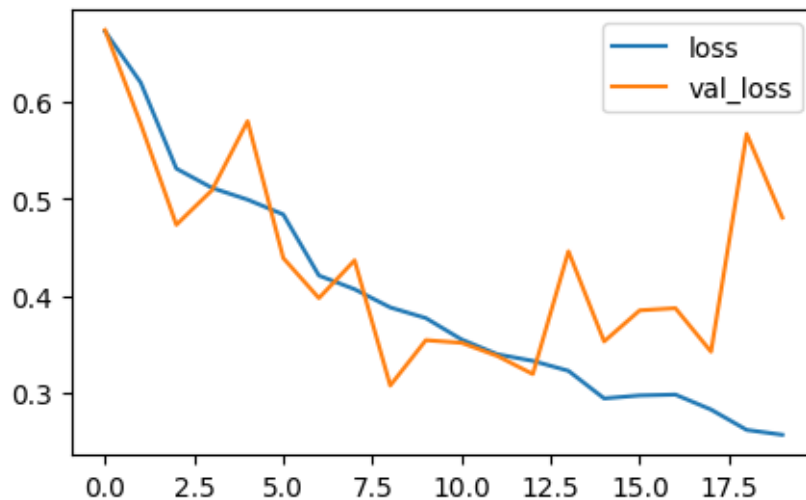
```
['loss', 'compile_metrics']
3/3                0s 14ms/step -
accuracy: 0.8460 - loss: 0.3526
[0.34266945719718933, 0.8404255509376526]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 65ms/step -
accuracy: 0.5910 - loss: 0.6824 - val_accuracy: 0.6277 - val_loss: 0.6747 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 61ms/step -
accuracy: 0.7082 - loss: 0.6080 - val_accuracy: 0.7660 - val_loss: 0.5776 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7682 - loss: 0.5420 - val_accuracy: 0.7766 - val_loss: 0.4733 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 60ms/step -
accuracy: 0.7660 - loss: 0.4971 - val_accuracy: 0.8085 - val_loss: 0.5091 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 61ms/step -
accuracy: 0.7499 - loss: 0.4960 - val_accuracy: 0.7340 - val_loss: 0.5805 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 61ms/step -
accuracy: 0.7676 - loss: 0.5056 - val_accuracy: 0.8511 - val_loss: 0.4388 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 63ms/step -
accuracy: 0.7832 - loss: 0.4390 - val_accuracy: 0.8404 - val_loss: 0.3974 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 63ms/step -
accuracy: 0.8215 - loss: 0.4097 - val_accuracy: 0.8085 - val_loss: 0.4365 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 61ms/step -
accuracy: 0.8354 - loss: 0.3773 - val_accuracy: 0.8404 - val_loss: 0.3070 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 61ms/step -
accuracy: 0.8601 - loss: 0.3510 - val_accuracy: 0.8511 - val_loss: 0.3539 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 60ms/step -
accuracy: 0.8445 - loss: 0.3522 - val_accuracy: 0.8085 - val_loss: 0.3512 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 61ms/step -
accuracy: 0.8311 - loss: 0.3652 - val_accuracy: 0.8404 - val_loss: 0.3377 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 61ms/step -
accuracy: 0.8765 - loss: 0.3164 - val_accuracy: 0.8617 - val_loss: 0.3188 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 61ms/step -
accuracy: 0.8643 - loss: 0.2955 - val_accuracy: 0.8298 - val_loss: 0.4458 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 61ms/step -
accuracy: 0.8764 - loss: 0.3180 - val_accuracy: 0.8404 - val_loss: 0.3526 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8921 - loss: 0.2992 - val_accuracy: 0.8085 - val_loss: 0.3847 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 62ms/step -
accuracy: 0.8962 - loss: 0.2736 - val_accuracy: 0.8511 - val_loss: 0.3870 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8951 - loss: 0.2644 - val_accuracy: 0.8936 - val_loss: 0.3420 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.8945 - loss: 0.2397 - val_accuracy: 0.8617 - val_loss: 0.5673 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.8964 - loss: 0.2572 - val_accuracy: 0.8404 - val_loss: 0.4807 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9010600447654724
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 11
```
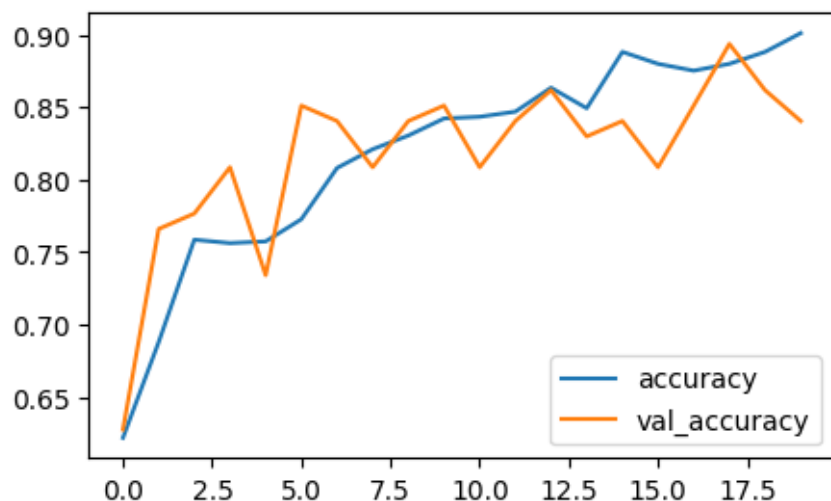
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8343 - loss: 0.5142
[0.4807354807853699, 0.8404255509376526]
3/3              0s 27ms/step
Classification Report:
              precision    recall   f1-score    support

      Female       0.77      0.90       0.83         41
        Male       0.91      0.79       0.85         53

    accuracy                            0.84         94
   macro avg       0.84      0.85       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 1/20
27/27               2s 64ms/step -
accuracy: 0.5024 - loss: 0.6994 - val_accuracy: 0.4362 - val_loss: 0.7635 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 62ms/step -
accuracy: 0.6107 - loss: 0.6456 - val_accuracy: 0.7021 - val_loss: 0.6734 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 61ms/step -
accuracy: 0.7174 - loss: 0.5623 - val_accuracy: 0.7660 - val_loss: 0.5541 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 62ms/step -
accuracy: 0.7688 - loss: 0.4909 - val_accuracy: 0.7979 - val_loss: 0.4715 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 62ms/step -
accuracy: 0.7700 - loss: 0.4895 - val_accuracy: 0.7766 - val_loss: 0.4274 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 63ms/step -
accuracy: 0.7928 - loss: 0.4556 - val_accuracy: 0.8191 - val_loss: 0.4937 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 61ms/step -
accuracy: 0.8124 - loss: 0.4271 - val_accuracy: 0.7979 - val_loss: 0.4499 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 62ms/step -
accuracy: 0.7867 - loss: 0.4455 - val_accuracy: 0.7340 - val_loss: 0.7028 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 62ms/step -
accuracy: 0.7856 - loss: 0.4721 - val_accuracy: 0.8085 - val_loss: 0.4682 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 62ms/step -
accuracy: 0.8323 - loss: 0.3909 - val_accuracy: 0.8298 - val_loss: 0.4033 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 62ms/step -
accuracy: 0.8529 - loss: 0.3443 - val_accuracy: 0.8298 - val_loss: 0.3958 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 62ms/step -
accuracy: 0.8515 - loss: 0.3271 - val_accuracy: 0.7979 - val_loss: 0.5201 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8408 - loss: 0.3532 - val_accuracy: 0.8298 - val_loss: 0.4016 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 62ms/step -
accuracy: 0.8738 - loss: 0.3259 - val_accuracy: 0.8404 - val_loss: 0.4478 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 63ms/step -
accuracy: 0.8788 - loss: 0.3133 - val_accuracy: 0.8298 - val_loss: 0.4401 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8702 - loss: 0.3112 - val_accuracy: 0.8511 - val_loss: 0.3939 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.8799 - loss: 0.2910 - val_accuracy: 0.8191 - val_loss: 0.4238 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 62ms/step -
accuracy: 0.8667 - loss: 0.2940 - val_accuracy: 0.8511 - val_loss: 0.3780 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.8822 - loss: 0.2656 - val_accuracy: 0.8191 - val_loss: 0.4289 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 61ms/step -
accuracy: 0.8858 - loss: 0.2437 - val_accuracy: 0.8404 - val_loss: 0.3811 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8845700621604919
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 12
```
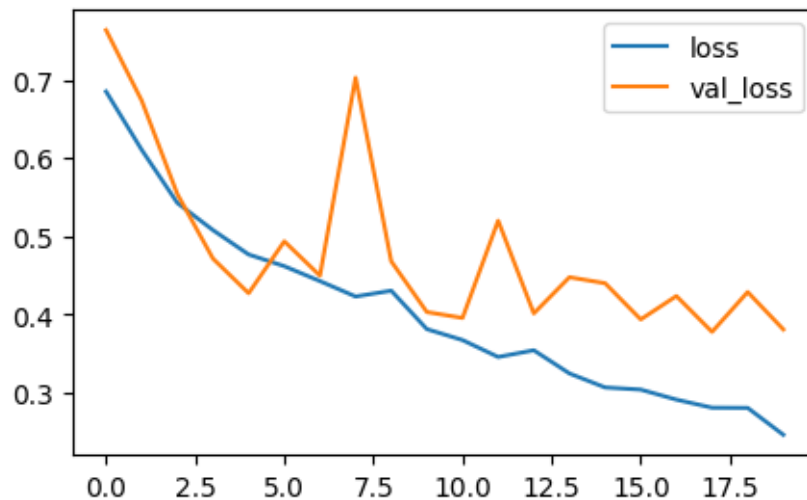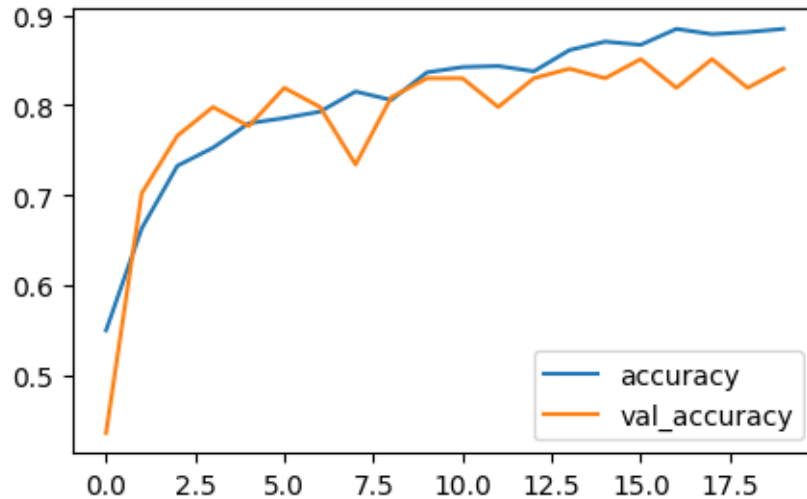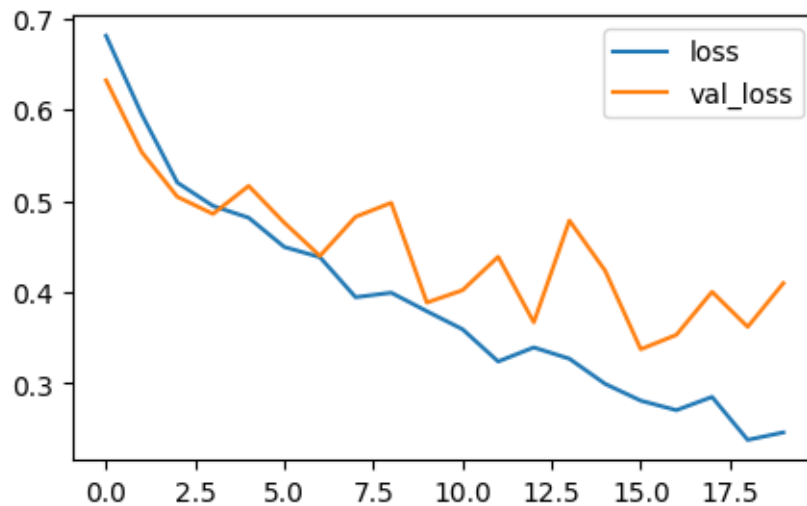
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8460 - loss: 0.3978
[0.38113290071487427, 0.8404255509376526]
3/3              0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27            2s 64ms/step -
accuracy: 0.5379 - loss: 0.6911 - val_accuracy: 0.6170 - val_loss: 0.6322 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27            2s 59ms/step -
accuracy: 0.6949 - loss: 0.5887 - val_accuracy: 0.7553 - val_loss: 0.5536 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27            2s 60ms/step -
accuracy: 0.7296 - loss: 0.5356 - val_accuracy: 0.8085 - val_loss: 0.5046 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 61ms/step -
accuracy: 0.7873 - loss: 0.4819 - val_accuracy: 0.8191 - val_loss: 0.4859 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 61ms/step -
accuracy: 0.7866 - loss: 0.4794 - val_accuracy: 0.7979 - val_loss: 0.5166 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 60ms/step -
accuracy: 0.8024 - loss: 0.4508 - val_accuracy: 0.8085 - val_loss: 0.4763 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 59ms/step -
accuracy: 0.8275 - loss: 0.4146 - val_accuracy: 0.8404 - val_loss: 0.4398 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 60ms/step -
accuracy: 0.8089 - loss: 0.4152 - val_accuracy: 0.8085 - val_loss: 0.4827 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 60ms/step -
accuracy: 0.8531 - loss: 0.3566 - val_accuracy: 0.7766 - val_loss: 0.4980 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 59ms/step -
accuracy: 0.8131 - loss: 0.3999 - val_accuracy: 0.7979 - val_loss: 0.3887 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 60ms/step -
accuracy: 0.8575 - loss: 0.3443 - val_accuracy: 0.8404 - val_loss: 0.4022 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 60ms/step -
accuracy: 0.8740 - loss: 0.3209 - val_accuracy: 0.8404 - val_loss: 0.4389 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 60ms/step -
accuracy: 0.8475 - loss: 0.3396 - val_accuracy: 0.8298 - val_loss: 0.3671 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 62ms/step -
accuracy: 0.8723 - loss: 0.3186 - val_accuracy: 0.7979 - val_loss: 0.4786 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 60ms/step -
accuracy: 0.8597 - loss: 0.3117 - val_accuracy: 0.8298 - val_loss: 0.4237 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                  2s 59ms/step -
accuracy: 0.8804 - loss: 0.2806 - val_accuracy: 0.8723 - val_loss: 0.3375 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                  2s 59ms/step -
accuracy: 0.9154 - loss: 0.2428 - val_accuracy: 0.8617 - val_loss: 0.3534 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                  2s 60ms/step -
accuracy: 0.9014 - loss: 0.2469 - val_accuracy: 0.8404 - val_loss: 0.4005 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                  2s 60ms/step -
accuracy: 0.9127 - loss: 0.2255 - val_accuracy: 0.8404 - val_loss: 0.3621 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                  2s 61ms/step -
accuracy: 0.8955 - loss: 0.2507 - val_accuracy: 0.8298 - val_loss: 0.4099 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9034157991409302
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 13
```
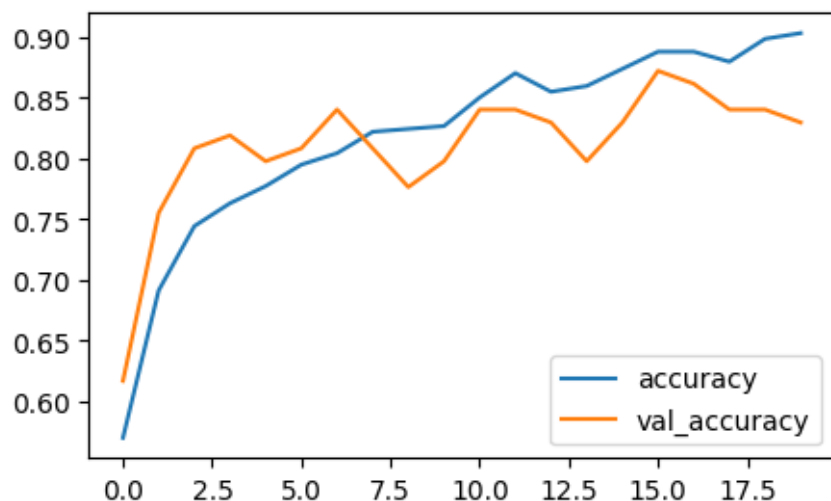
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8211 - loss: 0.4477
[0.40992841124534607, 0.8297872543334961]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27                2s 63ms/step -
accuracy: 0.5588 - loss: 0.7004 - val_accuracy: 0.4574 - val_loss: 0.7495 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 61ms/step -
accuracy: 0.6774 - loss: 0.5873 - val_accuracy: 0.7128 - val_loss: 0.5994 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 62ms/step -
accuracy: 0.7600 - loss: 0.5376 - val_accuracy: 0.8085 - val_loss: 0.5115 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7656 - loss: 0.4866 - val_accuracy: 0.8404 - val_loss: 0.4641 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 61ms/step -
accuracy: 0.7598 - loss: 0.5024 - val_accuracy: 0.8085 - val_loss: 0.4956 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 61ms/step -
accuracy: 0.7915 - loss: 0.4448 - val_accuracy: 0.8617 - val_loss: 0.4195 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7884 - loss: 0.4390 - val_accuracy: 0.7979 - val_loss: 0.4111 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.7836 - loss: 0.4414 - val_accuracy: 0.8723 - val_loss: 0.3854 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 61ms/step -
accuracy: 0.8112 - loss: 0.3981 - val_accuracy: 0.8404 - val_loss: 0.3396 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 62ms/step -
accuracy: 0.8257 - loss: 0.4072 - val_accuracy: 0.8617 - val_loss: 0.4774 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8144 - loss: 0.4309 - val_accuracy: 0.8617 - val_loss: 0.3521 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8429 - loss: 0.3645 - val_accuracy: 0.8511 - val_loss: 0.4361 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8529 - loss: 0.3531 - val_accuracy: 0.8830 - val_loss: 0.3134 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8548 - loss: 0.3300 - val_accuracy: 0.8830 - val_loss: 0.3013 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8537 - loss: 0.2977 - val_accuracy: 0.8511 - val_loss: 0.4518 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8947 - loss: 0.2658 - val_accuracy: 0.8723 - val_loss: 0.3310 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8808 - loss: 0.2948 - val_accuracy: 0.8617 - val_loss: 0.4213 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8923 - loss: 0.2654 - val_accuracy: 0.8617 - val_loss: 0.3717 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 62ms/step -
accuracy: 0.9110 - loss: 0.2464 - val_accuracy: 0.8511 - val_loss: 0.3926 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 62ms/step -
accuracy: 0.8897 - loss: 0.2753 - val_accuracy: 0.8830 - val_loss: 0.3472 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8775029182434082
Current validation accuracy: 0.8829787373542786
Reseting all weights…
Current number of trials: 14
```
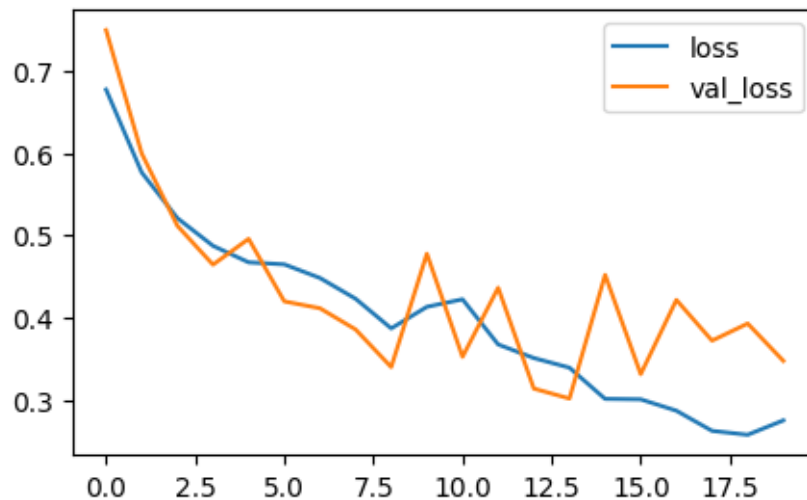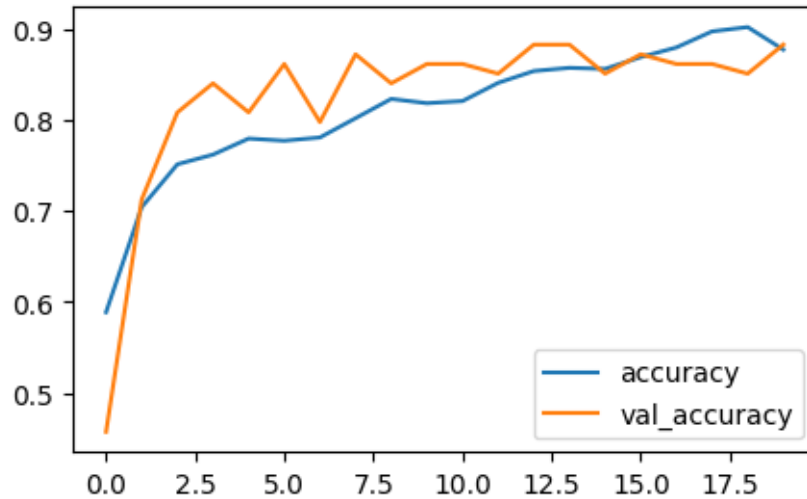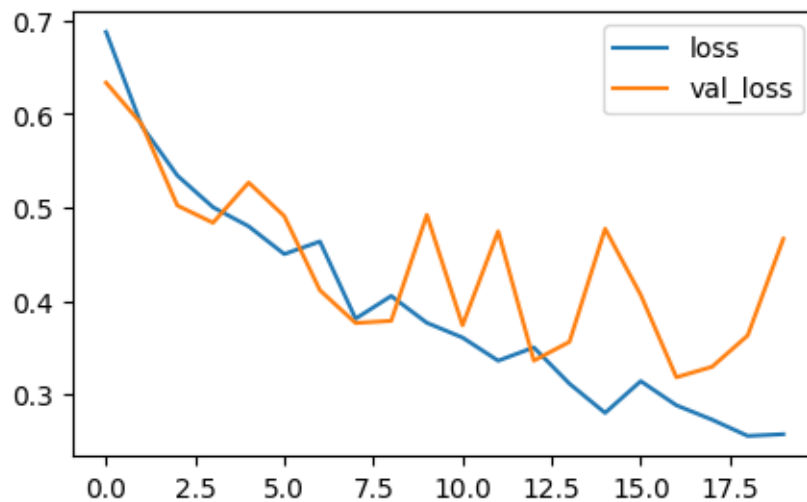
```
['loss', 'compile_metrics']
3/3                0s 16ms/step -
accuracy: 0.8829 - loss: 0.3638
[0.34717556834220886, 0.8829787373542786]
3/3                0s 29ms/step
Classification Report:
             precision    recall  f1-score   support

     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 1/20
27/27                2s 65ms/step -
accuracy: 0.5160 - loss: 0.7045 - val_accuracy: 0.7021 - val_loss: 0.6337 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 63ms/step -
accuracy: 0.6646 - loss: 0.6146 - val_accuracy: 0.6809 - val_loss: 0.5892 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 61ms/step -
accuracy: 0.7316 - loss: 0.5256 - val_accuracy: 0.7979 - val_loss: 0.5023 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 61ms/step -
accuracy: 0.7270 - loss: 0.5148 - val_accuracy: 0.7979 - val_loss: 0.4838 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 61ms/step -
accuracy: 0.7627 - loss: 0.4663 - val_accuracy: 0.7660 - val_loss: 0.5268 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 61ms/step -
accuracy: 0.7999 - loss: 0.4530 - val_accuracy: 0.7979 - val_loss: 0.4909 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7649 - loss: 0.4683 - val_accuracy: 0.8191 - val_loss: 0.4116 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8581 - loss: 0.3699 - val_accuracy: 0.8191 - val_loss: 0.3766 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8093 - loss: 0.4130 - val_accuracy: 0.8298 - val_loss: 0.3790 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8174 - loss: 0.4372 - val_accuracy: 0.8404 - val_loss: 0.4922 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8265 - loss: 0.3828 - val_accuracy: 0.8617 - val_loss: 0.3742 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 63ms/step -
accuracy: 0.8559 - loss: 0.3418 - val_accuracy: 0.8404 - val_loss: 0.4746 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8458 - loss: 0.3471 - val_accuracy: 0.8723 - val_loss: 0.3363 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8694 - loss: 0.3208 - val_accuracy: 0.8404 - val_loss: 0.3564 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 61ms/step -
accuracy: 0.8888 - loss: 0.2637 - val_accuracy: 0.8723 - val_loss: 0.4774 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8571 - loss: 0.3339 - val_accuracy: 0.8511 - val_loss: 0.4066 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8844 - loss: 0.2610 - val_accuracy: 0.8936 - val_loss: 0.3186 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8964 - loss: 0.2481 - val_accuracy: 0.8830 - val_loss: 0.3298 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.9130 - loss: 0.2193 - val_accuracy: 0.8511 - val_loss: 0.3633 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 62ms/step -
accuracy: 0.8805 - loss: 0.2865 - val_accuracy: 0.8830 - val_loss: 0.4667 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8951708078384399
Current validation accuracy: 0.8829787373542786
Reseting all weights…
Current number of trials: 15
```
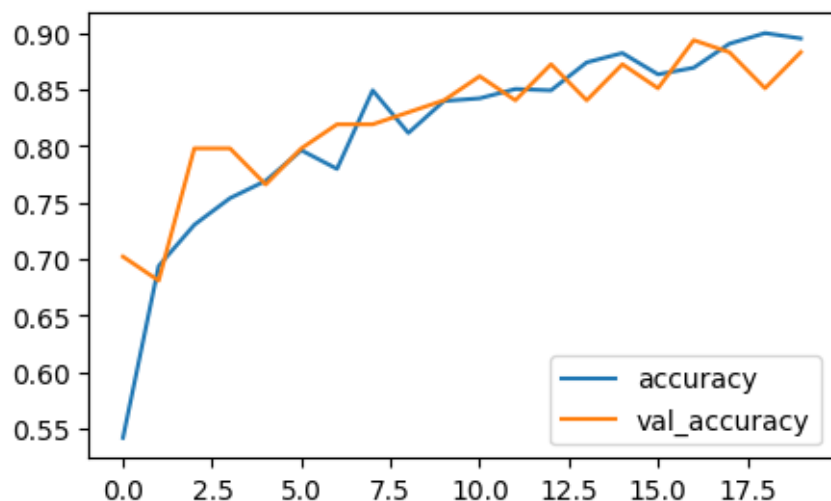
```
['loss', 'compile_metrics']
3/3                0s 17ms/step -
accuracy: 0.8790 - loss: 0.5005
[0.46667659282684326, 0.8829787373542786]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.81      0.95      0.88        41
        Male       0.96      0.83      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 1/20
27/27                2s 66ms/step -
accuracy: 0.5189 - loss: 0.6865 - val_accuracy: 0.6702 - val_loss: 0.6256 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 61ms/step -
accuracy: 0.7173 - loss: 0.5754 - val_accuracy: 0.7021 - val_loss: 0.5422 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 61ms/step -
accuracy: 0.7623 - loss: 0.4968 - val_accuracy: 0.7872 - val_loss: 0.5488 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 61ms/step -
accuracy: 0.7607 - loss: 0.4743 - val_accuracy: 0.8085 - val_loss: 0.5107 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7605 - loss: 0.4874 - val_accuracy: 0.7979 - val_loss: 0.5205 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7984 - loss: 0.4375 - val_accuracy: 0.8404 - val_loss: 0.4646 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7986 - loss: 0.4432 - val_accuracy: 0.7979 - val_loss: 0.5032 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7988 - loss: 0.4120 - val_accuracy: 0.8298 - val_loss: 0.4643 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 61ms/step -
accuracy: 0.7871 - loss: 0.4400 - val_accuracy: 0.7872 - val_loss: 0.5013 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8167 - loss: 0.4168 - val_accuracy: 0.8511 - val_loss: 0.4592 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8447 - loss: 0.3575 - val_accuracy: 0.8511 - val_loss: 0.4001 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8820 - loss: 0.3109 - val_accuracy: 0.8298 - val_loss: 0.4375 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8783 - loss: 0.3306 - val_accuracy: 0.7872 - val_loss: 0.4935 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8348 - loss: 0.3781 - val_accuracy: 0.7979 - val_loss: 0.3793 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 61ms/step -
accuracy: 0.8562 - loss: 0.3589 - val_accuracy: 0.8404 - val_loss: 0.3464 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8921 - loss: 0.2578 - val_accuracy: 0.8511 - val_loss: 0.4364 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.8674 - loss: 0.3067 - val_accuracy: 0.8511 - val_loss: 0.4285 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8864 - loss: 0.2678 - val_accuracy: 0.8191 - val_loss: 0.3756 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.8907 - loss: 0.2532 - val_accuracy: 0.8191 - val_loss: 0.3734 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 62ms/step -
accuracy: 0.8847 - loss: 0.2701 - val_accuracy: 0.8617 - val_loss: 0.3803 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8892815113067627
Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 16
```
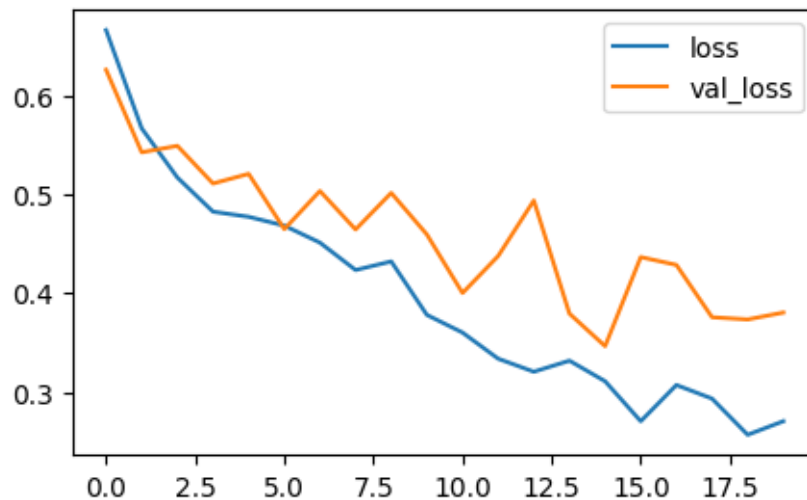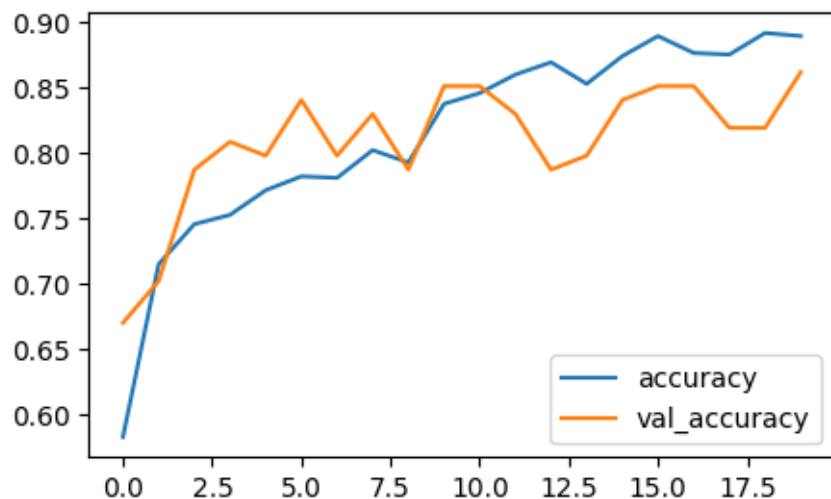
```
['loss', 'compile_metrics']
3/3                0s 14ms/step -
accuracy: 0.8449 - loss: 0.4175
[0.3803487718105316, 0.8617021441459656]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      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.

2025-05-07 11:15:18.444673: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/20
27/27                2s 65ms/step -
accuracy: 0.5512 - loss: 0.6815 - val_accuracy: 0.6277 - val_loss: 0.6392 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 61ms/step -
accuracy: 0.6897 - loss: 0.5786 - val_accuracy: 0.6702 - val_loss: 0.6683 -
learning_rate: 5.0000e-04
```

```
Epoch 3/20
27/27              2s 62ms/step -
accuracy: 0.7371 - loss: 0.5377 - val_accuracy: 0.7234 - val_loss: 0.5593 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 61ms/step -
accuracy: 0.7388 - loss: 0.5164 - val_accuracy: 0.7340 - val_loss: 0.5814 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 61ms/step -
accuracy: 0.7499 - loss: 0.4925 - val_accuracy: 0.8085 - val_loss: 0.4910 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.8004 - loss: 0.4539 - val_accuracy: 0.7553 - val_loss: 0.5540 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 63ms/step -
accuracy: 0.8190 - loss: 0.4205 - val_accuracy: 0.8404 - val_loss: 0.3815 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8188 - loss: 0.4046 - val_accuracy: 0.8298 - val_loss: 0.5134 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 63ms/step -
accuracy: 0.8351 - loss: 0.3732 - val_accuracy: 0.8404 - val_loss: 0.3837 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8395 - loss: 0.3781 - val_accuracy: 0.8404 - val_loss: 0.4309 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8594 - loss: 0.3371 - val_accuracy: 0.7660 - val_loss: 0.3866 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8368 - loss: 0.3708 - val_accuracy: 0.8085 - val_loss: 0.3920 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8690 - loss: 0.3317 - val_accuracy: 0.8723 - val_loss: 0.3367 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8619 - loss: 0.3262 - val_accuracy: 0.8723 - val_loss: 0.4371 -
learning_rate: 5.0000e-04
```

```
Epoch 15/20
27/27               2s 63ms/step -
accuracy: 0.8686 - loss: 0.3102 - val_accuracy: 0.8511 - val_loss: 0.4103 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27               2s 61ms/step -
accuracy: 0.8549 - loss: 0.3279 - val_accuracy: 0.8404 - val_loss: 0.4097 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27               2s 61ms/step -
accuracy: 0.8904 - loss: 0.2894 - val_accuracy: 0.8191 - val_loss: 0.3858 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27               2s 61ms/step -
accuracy: 0.8745 - loss: 0.2843 - val_accuracy: 0.8191 - val_loss: 0.4534 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27               2s 63ms/step -
accuracy: 0.8650 - loss: 0.2989 - val_accuracy: 0.7979 - val_loss: 0.5430 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27               2s 61ms/step -
accuracy: 0.8852 - loss: 0.2810 - val_accuracy: 0.8617 - val_loss: 0.3657 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8892815113067627
Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 17
```
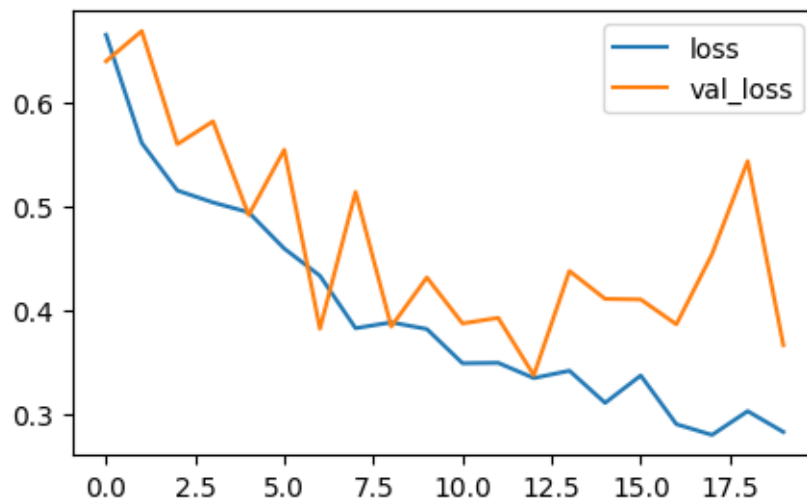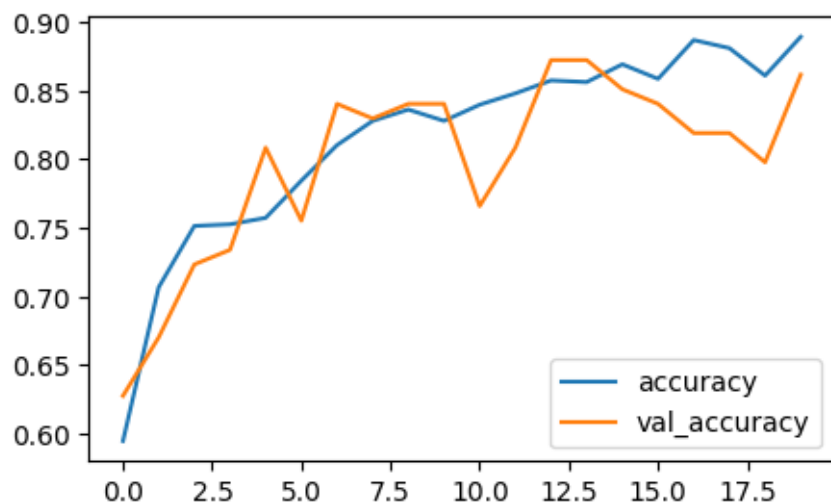
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8488 - loss: 0.3987
[0.3656914532184601, 0.8617021441459656]
3/3              0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.79      0.93      0.85        41
        Male       0.93      0.81      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 1/20
27/27              2s 63ms/step -
accuracy: 0.5362 - loss: 0.6999 - val_accuracy: 0.6489 - val_loss: 0.6842 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6960 - loss: 0.6458 - val_accuracy: 0.6170 - val_loss: 0.6812 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.6702 - loss: 0.5963 - val_accuracy: 0.7021 - val_loss: 0.6014 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7593 - loss: 0.5240 - val_accuracy: 0.7660 - val_loss: 0.5138 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7663 - loss: 0.4968 - val_accuracy: 0.7660 - val_loss: 0.5215 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7934 - loss: 0.4399 - val_accuracy: 0.8085 - val_loss: 0.4995 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.8231 - loss: 0.4212 - val_accuracy: 0.8191 - val_loss: 0.5021 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 62ms/step -
accuracy: 0.8004 - loss: 0.4303 - val_accuracy: 0.7872 - val_loss: 0.5638 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8119 - loss: 0.4321 - val_accuracy: 0.8404 - val_loss: 0.4998 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 62ms/step -
accuracy: 0.8090 - loss: 0.4067 - val_accuracy: 0.8830 - val_loss: 0.3792 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8321 - loss: 0.3469 - val_accuracy: 0.7660 - val_loss: 0.4997 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8356 - loss: 0.3544 - val_accuracy: 0.8511 - val_loss: 0.4189 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8308 - loss: 0.3438 - val_accuracy: 0.7660 - val_loss: 0.6215 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8447 - loss: 0.3404 - val_accuracy: 0.8191 - val_loss: 0.3581 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 61ms/step -
accuracy: 0.8661 - loss: 0.2989 - val_accuracy: 0.8723 - val_loss: 0.4390 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27              2s 61ms/step -
accuracy: 0.8791 - loss: 0.3064 - val_accuracy: 0.8404 - val_loss: 0.4592 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27              2s 60ms/step -
accuracy: 0.8879 - loss: 0.2636 - val_accuracy: 0.8511 - val_loss: 0.4293 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27              2s 62ms/step -
accuracy: 0.9021 - loss: 0.2555 - val_accuracy: 0.8830 - val_loss: 0.3305 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27              2s 60ms/step -
accuracy: 0.8959 - loss: 0.2520 - val_accuracy: 0.8617 - val_loss: 0.4181 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27              2s 61ms/step -
accuracy: 0.8912 - loss: 0.2541 - val_accuracy: 0.8511 - val_loss: 0.3189 -
learning_rate: 5.0000e-04
Current training accuracy: 0.882214367389679
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 18
```
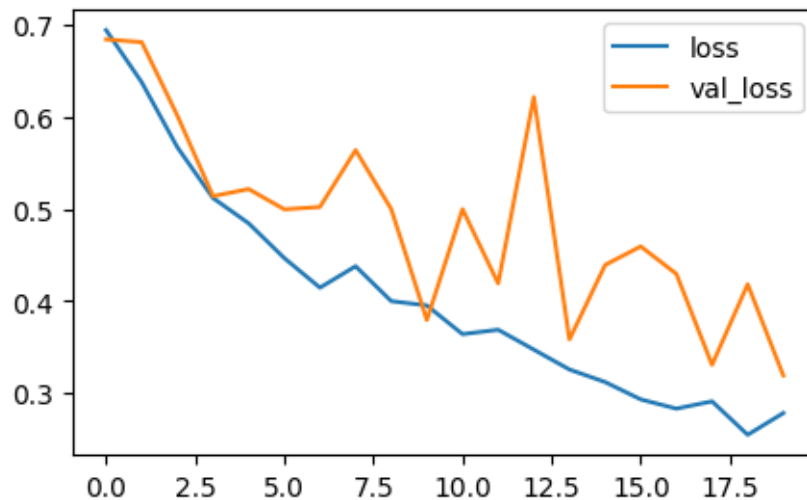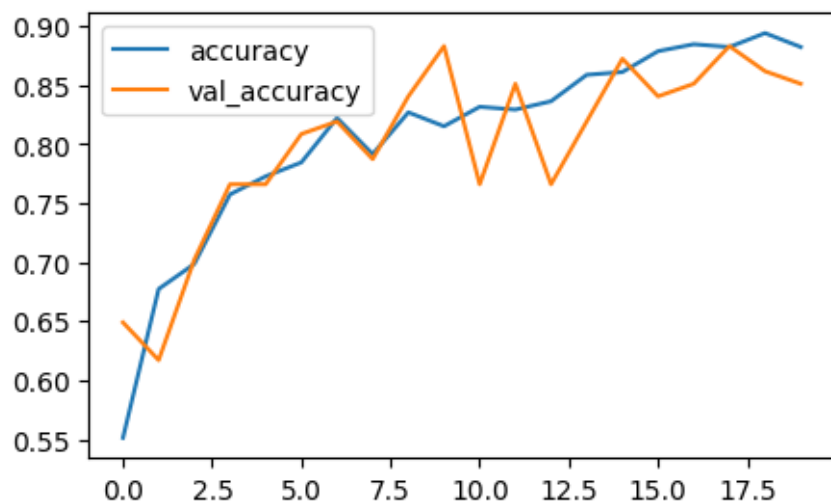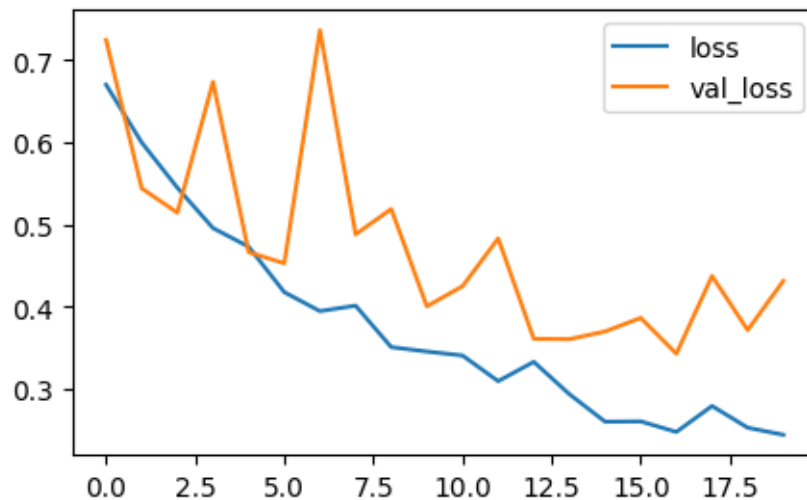
```
['loss', 'compile_metrics']
3/3                 0s 16ms/step -
accuracy: 0.8357 - loss: 0.3360
[0.3189258575439453, 0.8510638475418091]
3/3                 0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27               2s 63ms/step -
accuracy: 0.5675 - loss: 0.6895 - val_accuracy: 0.5532 - val_loss: 0.7244 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 61ms/step -
accuracy: 0.6571 - loss: 0.6396 - val_accuracy: 0.7128 - val_loss: 0.5441 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 61ms/step -
accuracy: 0.7171 - loss: 0.5535 - val_accuracy: 0.7553 - val_loss: 0.5145 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 59ms/step -
accuracy: 0.7522 - loss: 0.4847 - val_accuracy: 0.6489 - val_loss: 0.6736 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7688 - loss: 0.5111 - val_accuracy: 0.7660 - val_loss: 0.4665 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.8073 - loss: 0.4478 - val_accuracy: 0.8617 - val_loss: 0.4530 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 61ms/step -
accuracy: 0.8075 - loss: 0.3812 - val_accuracy: 0.7128 - val_loss: 0.7364 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8064 - loss: 0.4223 - val_accuracy: 0.8298 - val_loss: 0.4882 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8585 - loss: 0.3315 - val_accuracy: 0.8085 - val_loss: 0.5189 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8758 - loss: 0.3037 - val_accuracy: 0.8511 - val_loss: 0.4007 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8769 - loss: 0.3134 - val_accuracy: 0.8511 - val_loss: 0.4251 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 59ms/step -
accuracy: 0.8637 - loss: 0.2943 - val_accuracy: 0.8404 - val_loss: 0.4832 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 59ms/step -
accuracy: 0.8446 - loss: 0.3847 - val_accuracy: 0.8617 - val_loss: 0.3612 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8625 - loss: 0.3264 - val_accuracy: 0.8298 - val_loss: 0.3608 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 61ms/step -
accuracy: 0.8983 - loss: 0.2492 - val_accuracy: 0.8511 - val_loss: 0.3702 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 62ms/step -
accuracy: 0.9130 - loss: 0.2467 - val_accuracy: 0.8511 - val_loss: 0.3866 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.9030 - loss: 0.2509 - val_accuracy: 0.8723 - val_loss: 0.3431 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 59ms/step -
accuracy: 0.8975 - loss: 0.2523 - val_accuracy: 0.8617 - val_loss: 0.4376 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.9039 - loss: 0.2604 - val_accuracy: 0.8404 - val_loss: 0.3719 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 61ms/step -
accuracy: 0.8920 - loss: 0.2854 - val_accuracy: 0.8511 - val_loss: 0.4316 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8987043499946594
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 19
```
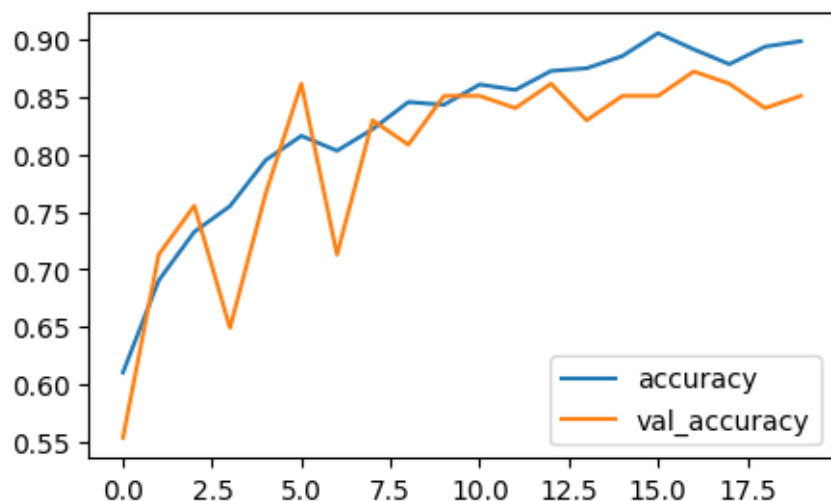
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8318 - loss: 0.4592
[0.4315751791000366, 0.8510638475418091]
3/3              0s 28ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.80      0.88      0.84        41
        Male       0.90      0.83      0.86        53

    accuracy                           0.85        94
   macro avg       0.85      0.85      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 1/20
27/27              2s 63ms/step -
accuracy: 0.5373 - loss: 0.6930 - val_accuracy: 0.6489 - val_loss: 0.6326 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 59ms/step -
accuracy: 0.6897 - loss: 0.6000 - val_accuracy: 0.7234 - val_loss: 0.5828 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7264 - loss: 0.5474 - val_accuracy: 0.7128 - val_loss: 0.5656 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7515 - loss: 0.5092 - val_accuracy: 0.7872 - val_loss: 0.5026 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7886 - loss: 0.4455 - val_accuracy: 0.7979 - val_loss: 0.4935 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7883 - loss: 0.4866 - val_accuracy: 0.8191 - val_loss: 0.4569 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7859 - loss: 0.4662 - val_accuracy: 0.8298 - val_loss: 0.4860 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7941 - loss: 0.4410 - val_accuracy: 0.8191 - val_loss: 0.5194 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8116 - loss: 0.3992 - val_accuracy: 0.8085 - val_loss: 0.4948 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 59ms/step -
accuracy: 0.8220 - loss: 0.3714 - val_accuracy: 0.8298 - val_loss: 0.4456 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8538 - loss: 0.3351 - val_accuracy: 0.7766 - val_loss: 0.5129 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 59ms/step -
accuracy: 0.8343 - loss: 0.3775 - val_accuracy: 0.8191 - val_loss: 0.4688 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8270 - loss: 0.3819 - val_accuracy: 0.8723 - val_loss: 0.4293 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8800 - loss: 0.3023 - val_accuracy: 0.8191 - val_loss: 0.4940 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 59ms/step -
accuracy: 0.8790 - loss: 0.2785 - val_accuracy: 0.8191 - val_loss: 0.3387 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 62ms/step -
accuracy: 0.8823 - loss: 0.2880 - val_accuracy: 0.8404 - val_loss: 0.4317 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 59ms/step -
accuracy: 0.8570 - loss: 0.3287 - val_accuracy: 0.8404 - val_loss: 0.4069 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8796 - loss: 0.2720 - val_accuracy: 0.8617 - val_loss: 0.3702 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 59ms/step -
accuracy: 0.8768 - loss: 0.3049 - val_accuracy: 0.8511 - val_loss: 0.4493 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.8892 - loss: 0.2506 - val_accuracy: 0.8511 - val_loss: 0.3968 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8833922147750854
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 20
```
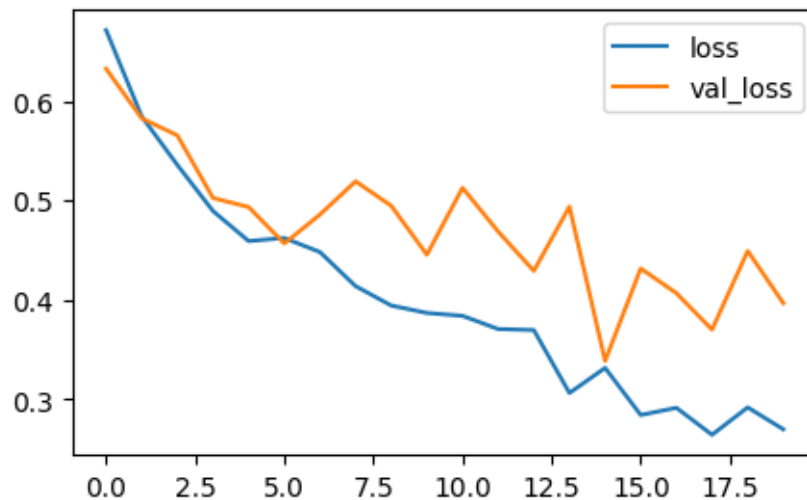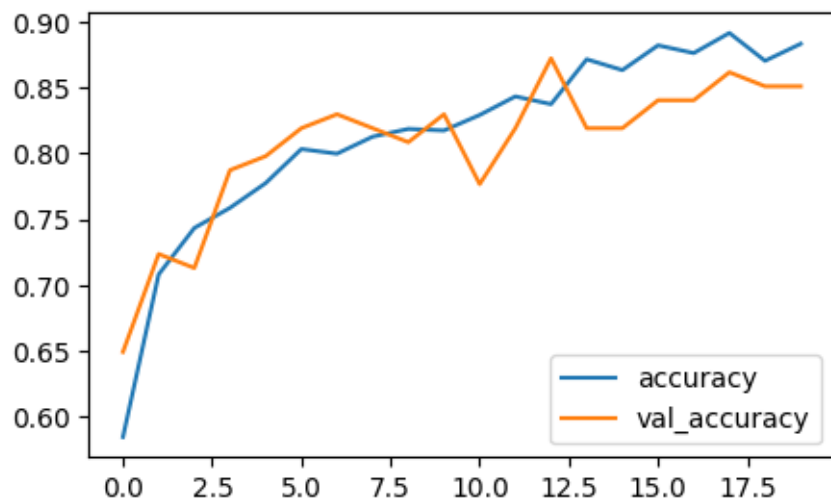
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8396 - loss: 0.4358
[0.3968352973461151, 0.8510638475418091]
3/3                 0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27                2s 63ms/step -
accuracy: 0.5673 - loss: 0.6889 - val_accuracy: 0.5213 - val_loss: 0.7984 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 60ms/step -
accuracy: 0.6846 - loss: 0.6044 - val_accuracy: 0.6702 - val_loss: 0.6552 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 60ms/step -
accuracy: 0.7483 - loss: 0.5147 - val_accuracy: 0.7979 - val_loss: 0.5011 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 61ms/step -
accuracy: 0.7495 - loss: 0.5221 - val_accuracy: 0.7553 - val_loss: 0.6033 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 61ms/step -
accuracy: 0.7715 - loss: 0.4844 - val_accuracy: 0.8085 - val_loss: 0.4733 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7912 - loss: 0.4253 - val_accuracy: 0.7553 - val_loss: 0.4586 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.7681 - loss: 0.4782 - val_accuracy: 0.8085 - val_loss: 0.4392 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.8336 - loss: 0.4048 - val_accuracy: 0.8723 - val_loss: 0.3474 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8267 - loss: 0.4000 - val_accuracy: 0.7340 - val_loss: 0.5086 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 62ms/step -
accuracy: 0.7883 - loss: 0.4704 - val_accuracy: 0.8298 - val_loss: 0.4386 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8414 - loss: 0.3655 - val_accuracy: 0.8511 - val_loss: 0.4364 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8418 - loss: 0.3599 - val_accuracy: 0.8404 - val_loss: 0.3724 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8552 - loss: 0.3295 - val_accuracy: 0.8723 - val_loss: 0.3653 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8666 - loss: 0.3013 - val_accuracy: 0.8191 - val_loss: 0.3877 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 62ms/step -
accuracy: 0.8563 - loss: 0.3206 - val_accuracy: 0.8298 - val_loss: 0.3757 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8857 - loss: 0.2812 - val_accuracy: 0.7872 - val_loss: 0.4231 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8869 - loss: 0.2912 - val_accuracy: 0.8298 - val_loss: 0.3894 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8946 - loss: 0.2545 - val_accuracy: 0.8298 - val_loss: 0.4338 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.9278 - loss: 0.2068 - val_accuracy: 0.8298 - val_loss: 0.3574 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.9033 - loss: 0.2311 - val_accuracy: 0.8191 - val_loss: 0.4796 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8869258165359497
Current validation accuracy: 0.8191489577293396
Reseting all weights…
Current number of trials: 21
```
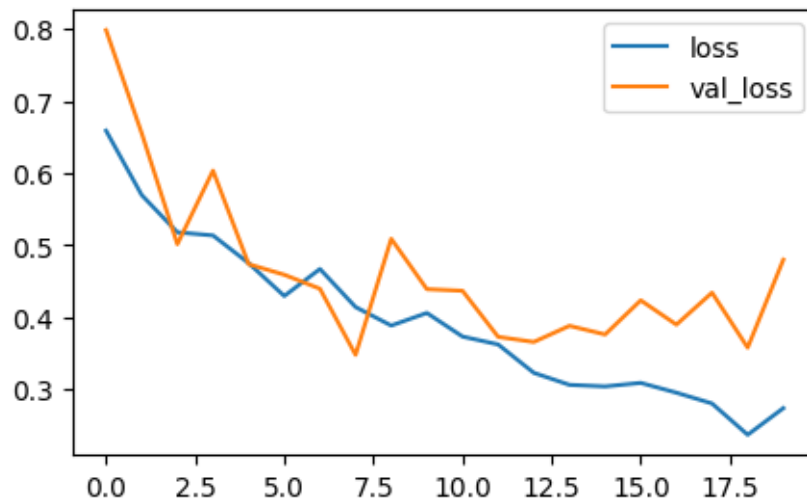
```
['loss', 'compile_metrics']
3/3                  0s 17ms/step -
accuracy: 0.8158 - loss: 0.5094
[0.4795762300491333, 0.8191489577293396]
3/3                  0s 28ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27                2s 64ms/step -
accuracy: 0.5667 - loss: 0.6854 - val_accuracy: 0.5851 - val_loss: 0.6943 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 60ms/step -
accuracy: 0.6958 - loss: 0.5788 - val_accuracy: 0.7234 - val_loss: 0.5761 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 61ms/step -
accuracy: 0.7104 - loss: 0.5597 - val_accuracy: 0.7340 - val_loss: 0.5580 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 63ms/step -
accuracy: 0.7586 - loss: 0.4917 - val_accuracy: 0.7979 - val_loss: 0.4785 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7836 - loss: 0.4719 - val_accuracy: 0.7872 - val_loss: 0.4835 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7961 - loss: 0.4388 - val_accuracy: 0.8298 - val_loss: 0.4863 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.7952 - loss: 0.4423 - val_accuracy: 0.7979 - val_loss: 0.5243 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.7897 - loss: 0.4045 - val_accuracy: 0.7979 - val_loss: 0.5637 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 59ms/step -
accuracy: 0.8526 - loss: 0.3291 - val_accuracy: 0.8404 - val_loss: 0.3960 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8481 - loss: 0.3473 - val_accuracy: 0.8511 - val_loss: 0.4227 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.7838 - loss: 0.4313 - val_accuracy: 0.7766 - val_loss: 0.4797 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8364 - loss: 0.3566 - val_accuracy: 0.7766 - val_loss: 0.5906 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 59ms/step -
accuracy: 0.8496 - loss: 0.3493 - val_accuracy: 0.8298 - val_loss: 0.4451 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 62ms/step -
accuracy: 0.8967 - loss: 0.2569 - val_accuracy: 0.8404 - val_loss: 0.4143 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 59ms/step -
accuracy: 0.8759 - loss: 0.2936 - val_accuracy: 0.8404 - val_loss: 0.3785 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                    2s 60ms/step -
accuracy: 0.8741 - loss: 0.3073 - val_accuracy: 0.8298 - val_loss: 0.4339 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                    2s 60ms/step -
accuracy: 0.8630 - loss: 0.3029 - val_accuracy: 0.8298 - val_loss: 0.4803 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                    2s 60ms/step -
accuracy: 0.8585 - loss: 0.3093 - val_accuracy: 0.8617 - val_loss: 0.3729 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                    2s 60ms/step -
accuracy: 0.8874 - loss: 0.2606 - val_accuracy: 0.8723 - val_loss: 0.4220 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                    2s 59ms/step -
accuracy: 0.8782 - loss: 0.2691 - val_accuracy: 0.8617 - val_loss: 0.4313 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8833922147750854
Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 22
```
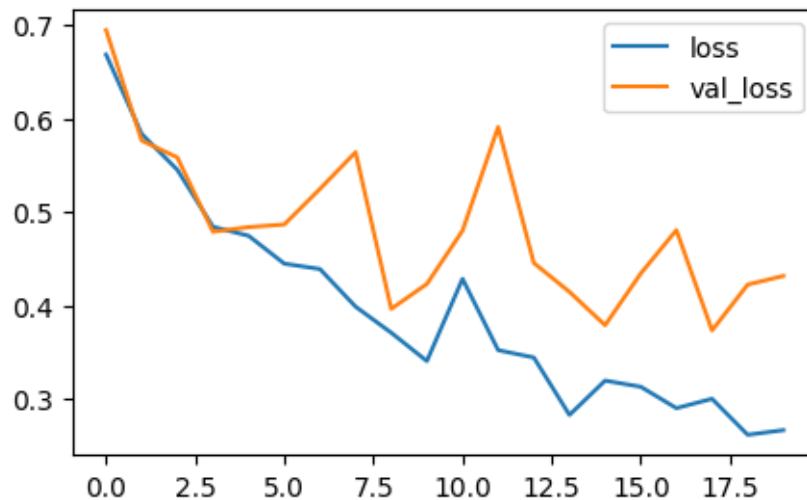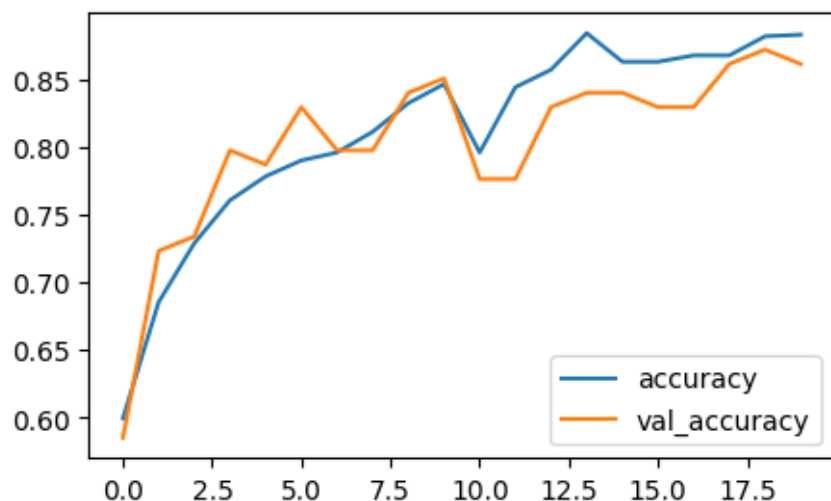
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8449 - loss: 0.4909
[0.4312693774700165, 0.8617021441459656]
3/3                 0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.95      0.86        41
        Male       0.95      0.79      0.87        53

    accuracy                           0.86        94
   macro avg       0.87      0.87      0.86        94
weighted avg       0.88      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 1/20
27/27               2s 63ms/step -
accuracy: 0.5231 - loss: 0.7029 - val_accuracy: 0.6489 - val_loss: 0.6667 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 60ms/step -
accuracy: 0.6575 - loss: 0.6303 - val_accuracy: 0.7553 - val_loss: 0.5180 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 61ms/step -
accuracy: 0.7454 - loss: 0.5217 - val_accuracy: 0.7553 - val_loss: 0.5226 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7787 - loss: 0.4882 - val_accuracy: 0.8085 - val_loss: 0.4696 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7922 - loss: 0.4493 - val_accuracy: 0.8191 - val_loss: 0.3793 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.8054 - loss: 0.4142 - val_accuracy: 0.8298 - val_loss: 0.3425 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.8035 - loss: 0.4001 - val_accuracy: 0.8298 - val_loss: 0.3558 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 59ms/step -
accuracy: 0.8265 - loss: 0.3941 - val_accuracy: 0.7553 - val_loss: 0.3492 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 61ms/step -
accuracy: 0.8005 - loss: 0.4066 - val_accuracy: 0.8404 - val_loss: 0.3348 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8408 - loss: 0.3513 - val_accuracy: 0.8511 - val_loss: 0.3399 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 59ms/step -
accuracy: 0.8349 - loss: 0.3488 - val_accuracy: 0.8617 - val_loss: 0.3544 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8458 - loss: 0.3506 - val_accuracy: 0.8298 - val_loss: 0.3704 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8739 - loss: 0.2841 - val_accuracy: 0.8511 - val_loss: 0.3186 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 59ms/step -
accuracy: 0.8753 - loss: 0.3147 - val_accuracy: 0.8617 - val_loss: 0.3020 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 59ms/step -
accuracy: 0.8743 - loss: 0.2989 - val_accuracy: 0.8723 - val_loss: 0.2805 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 59ms/step -
accuracy: 0.9150 - loss: 0.2263 - val_accuracy: 0.8617 - val_loss: 0.4597 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8731 - loss: 0.2833 - val_accuracy: 0.8298 - val_loss: 0.3029 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 59ms/step -
accuracy: 0.8734 - loss: 0.2781 - val_accuracy: 0.8830 - val_loss: 0.3174 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 59ms/step -
accuracy: 0.9354 - loss: 0.1942 - val_accuracy: 0.8404 - val_loss: 0.3546 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 59ms/step -
accuracy: 0.8958 - loss: 0.2443 - val_accuracy: 0.8830 - val_loss: 0.3199 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9128386378288269
Current validation accuracy: 0.8829787373542786
Reseting all weights…
Current number of trials: 23
```
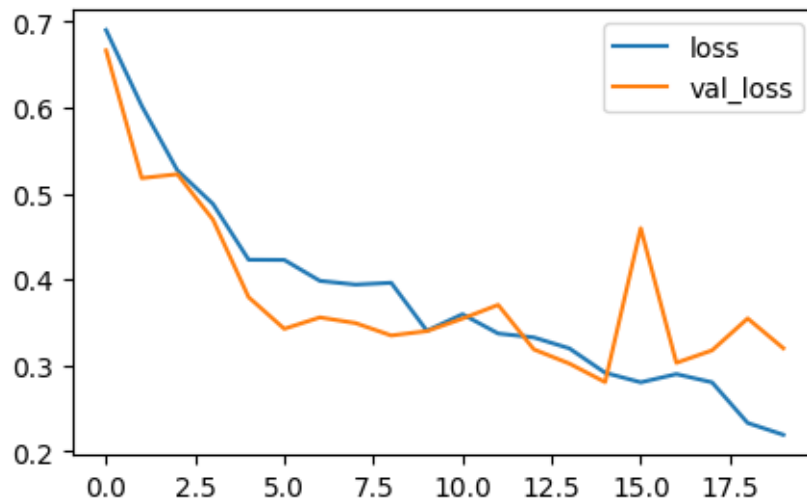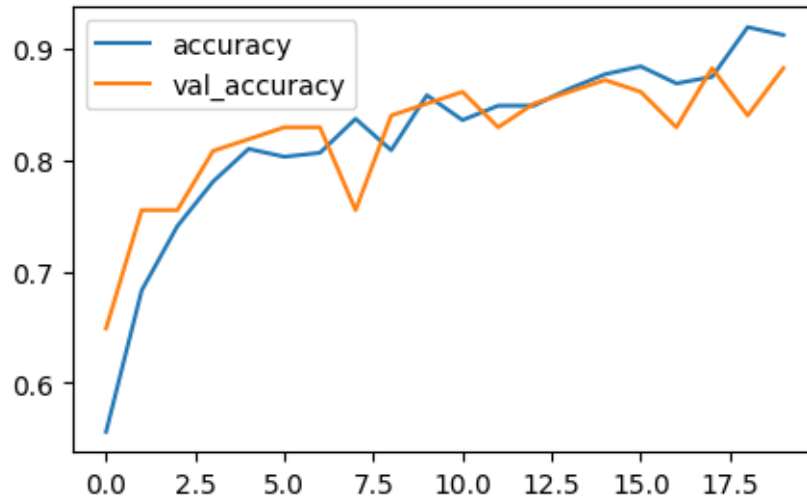
```
['loss', 'compile_metrics']
3/3                0s 16ms/step -
accuracy: 0.8673 - loss: 0.3455
[0.3199244439601898, 0.8829787373542786]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score    support

      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 1/20
27/27              2s 64ms/step -
accuracy: 0.5353 - loss: 0.6911 - val_accuracy: 0.6383 - val_loss: 0.6347 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 62ms/step -
accuracy: 0.6788 - loss: 0.6003 - val_accuracy: 0.6809 - val_loss: 0.6130 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7427 - loss: 0.5480 - val_accuracy: 0.7447 - val_loss: 0.5778 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7628 - loss: 0.5129 - val_accuracy: 0.7660 - val_loss: 0.5324 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 61ms/step -
accuracy: 0.7721 - loss: 0.4795 - val_accuracy: 0.7872 - val_loss: 0.5394 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.7620 - loss: 0.4888 - val_accuracy: 0.7979 - val_loss: 0.6142 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 61ms/step -
accuracy: 0.7905 - loss: 0.4432 - val_accuracy: 0.7872 - val_loss: 0.5203 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.8080 - loss: 0.4214 - val_accuracy: 0.8085 - val_loss: 0.4267 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8220 - loss: 0.3960 - val_accuracy: 0.8191 - val_loss: 0.4221 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8320 - loss: 0.3626 - val_accuracy: 0.8191 - val_loss: 0.4239 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8420 - loss: 0.3288 - val_accuracy: 0.8298 - val_loss: 0.4616 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8728 - loss: 0.3080 - val_accuracy: 0.8511 - val_loss: 0.4233 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8387 - loss: 0.3502 - val_accuracy: 0.8511 - val_loss: 0.4237 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8758 - loss: 0.2902 - val_accuracy: 0.8191 - val_loss: 0.4681 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8716 - loss: 0.2948 - val_accuracy: 0.8085 - val_loss: 0.4913 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                  2s 60ms/step -
accuracy: 0.8799 - loss: 0.2836 - val_accuracy: 0.8085 - val_loss: 0.5960 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                  2s 61ms/step -
accuracy: 0.8960 - loss: 0.2626 - val_accuracy: 0.8298 - val_loss: 0.3150 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                  2s 61ms/step -
accuracy: 0.8970 - loss: 0.2668 - val_accuracy: 0.8404 - val_loss: 0.3868 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                  2s 60ms/step -
accuracy: 0.8656 - loss: 0.2897 - val_accuracy: 0.8191 - val_loss: 0.3567 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                  2s 60ms/step -
accuracy: 0.9132 - loss: 0.2168 - val_accuracy: 0.8085 - val_loss: 0.3869 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8975265026092529
Current validation accuracy: 0.8085106611251831
Reseting all weights…
Current number of trials: 24
```
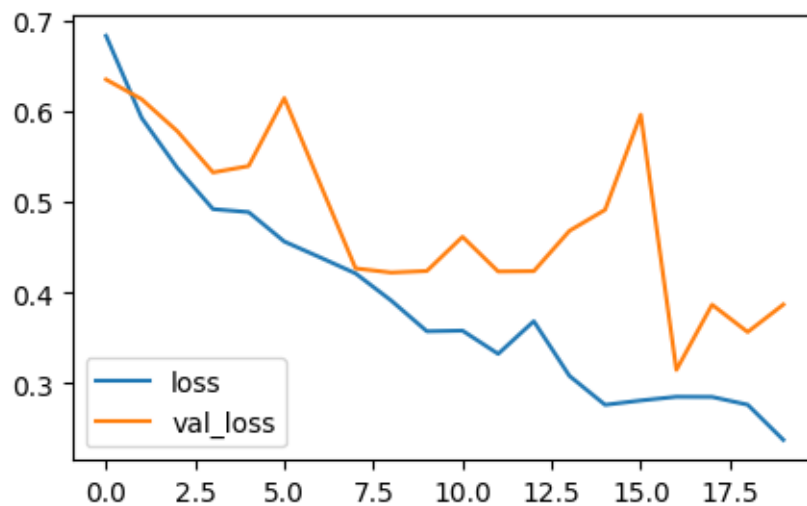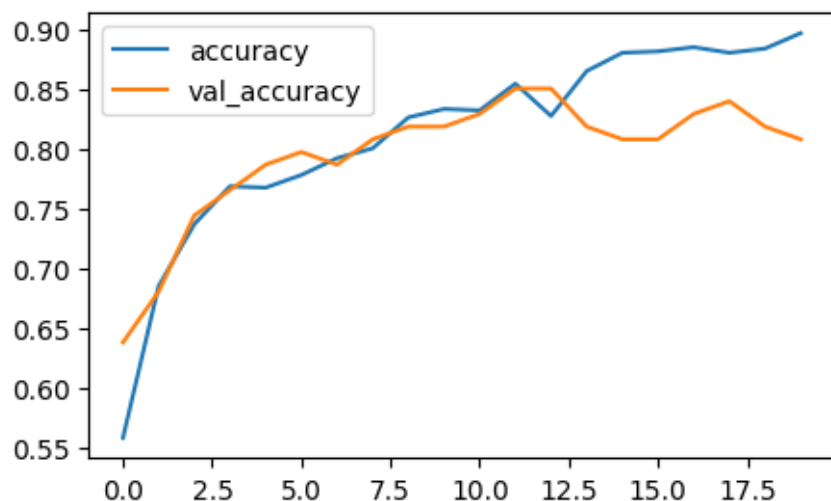
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.7949 - loss: 0.4052
[0.3869173526763916, 0.8085106611251831]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 65ms/step -
accuracy: 0.5603 - loss: 0.6814 - val_accuracy: 0.5426 - val_loss: 0.6774 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6432 - loss: 0.6198 - val_accuracy: 0.6809 - val_loss: 0.6186 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7347 - loss: 0.5391 - val_accuracy: 0.7340 - val_loss: 0.5964 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 59ms/step -
accuracy: 0.7516 - loss: 0.5355 - val_accuracy: 0.7447 - val_loss: 0.5511 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7363 - loss: 0.5282 - val_accuracy: 0.7660 - val_loss: 0.5373 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.7356 - loss: 0.4896 - val_accuracy: 0.7447 - val_loss: 0.5819 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.7845 - loss: 0.4721 - val_accuracy: 0.7872 - val_loss: 0.5123 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7924 - loss: 0.4354 - val_accuracy: 0.7447 - val_loss: 0.5464 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 59ms/step -
accuracy: 0.7863 - loss: 0.4606 - val_accuracy: 0.7340 - val_loss: 0.6471 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8232 - loss: 0.4085 - val_accuracy: 0.8511 - val_loss: 0.4143 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 62ms/step -
accuracy: 0.8174 - loss: 0.3889 - val_accuracy: 0.8191 - val_loss: 0.4710 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8308 - loss: 0.3676 - val_accuracy: 0.8191 - val_loss: 0.5462 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8296 - loss: 0.3825 - val_accuracy: 0.8298 - val_loss: 0.4395 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8639 - loss: 0.3387 - val_accuracy: 0.8511 - val_loss: 0.4826 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8435 - loss: 0.3477 - val_accuracy: 0.8191 - val_loss: 0.4716 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8578 - loss: 0.3072 - val_accuracy: 0.7979 - val_loss: 0.4006 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 62ms/step -
accuracy: 0.8774 - loss: 0.3017 - val_accuracy: 0.8404 - val_loss: 0.4183 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8726 - loss: 0.2969 - val_accuracy: 0.8404 - val_loss: 0.4632 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 59ms/step -
accuracy: 0.8801 - loss: 0.2730 - val_accuracy: 0.8085 - val_loss: 0.4580 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 61ms/step -
accuracy: 0.8857 - loss: 0.2491 - val_accuracy: 0.8404 - val_loss: 0.3988 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8833922147750854
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 25
```
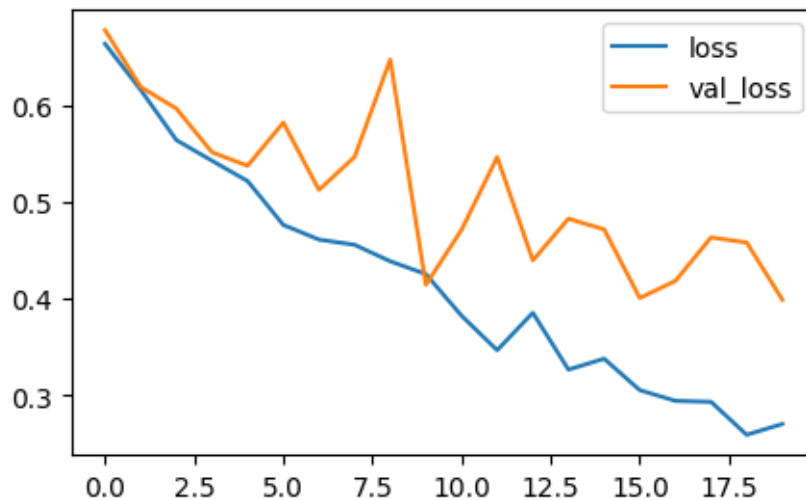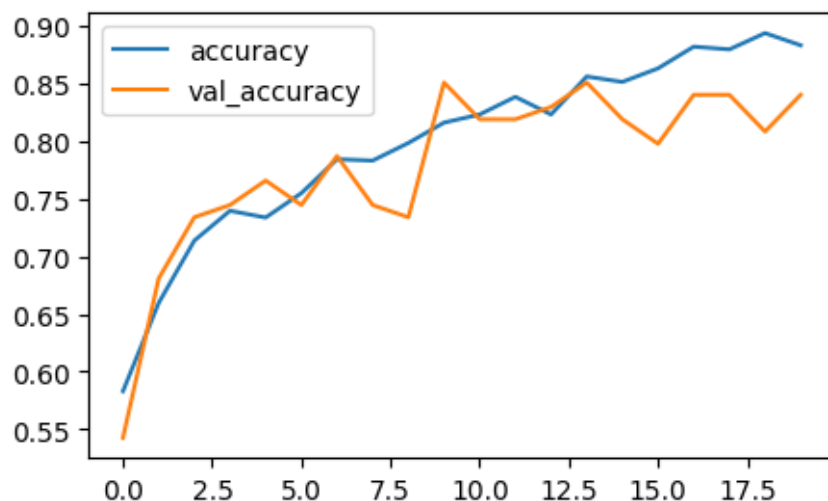
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8343 - loss: 0.4493
[0.39884141087532043, 0.8404255509376526]
3/3              0s 29ms/step
Classification Report:
            precision    recall  f1-score   support

     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 1/20
27/27               2s 63ms/step -
accuracy: 0.5201 - loss: 0.6916 - val_accuracy: 0.4362 - val_loss: 0.7125 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 61ms/step -
accuracy: 0.5868 - loss: 0.6467 - val_accuracy: 0.7234 - val_loss: 0.5959 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 60ms/step -
accuracy: 0.7497 - loss: 0.5218 - val_accuracy: 0.7447 - val_loss: 0.5120 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7315 - loss: 0.5201 - val_accuracy: 0.7660 - val_loss: 0.5555 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7313 - loss: 0.5181 - val_accuracy: 0.7553 - val_loss: 0.6430 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7727 - loss: 0.5007 - val_accuracy: 0.7872 - val_loss: 0.4837 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7976 - loss: 0.4381 - val_accuracy: 0.7766 - val_loss: 0.4303 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 59ms/step -
accuracy: 0.7827 - loss: 0.4399 - val_accuracy: 0.8298 - val_loss: 0.5668 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8274 - loss: 0.4171 - val_accuracy: 0.8617 - val_loss: 0.3979 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 62ms/step -
accuracy: 0.7985 - loss: 0.4145 - val_accuracy: 0.8191 - val_loss: 0.4175 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8305 - loss: 0.3731 - val_accuracy: 0.8404 - val_loss: 0.4707 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8492 - loss: 0.3508 - val_accuracy: 0.8617 - val_loss: 0.4264 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8791 - loss: 0.3322 - val_accuracy: 0.8723 - val_loss: 0.3471 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8427 - loss: 0.3165 - val_accuracy: 0.8511 - val_loss: 0.3336 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8485 - loss: 0.3516 - val_accuracy: 0.8191 - val_loss: 0.3759 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27               2s 60ms/step -
accuracy: 0.8905 - loss: 0.2773 - val_accuracy: 0.8617 - val_loss: 0.4440 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27               2s 60ms/step -
accuracy: 0.8653 - loss: 0.3062 - val_accuracy: 0.8404 - val_loss: 0.3701 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27               2s 60ms/step -
accuracy: 0.9012 - loss: 0.2445 - val_accuracy: 0.8617 - val_loss: 0.3140 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27               2s 61ms/step -
accuracy: 0.9198 - loss: 0.2435 - val_accuracy: 0.8298 - val_loss: 0.3488 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27               2s 61ms/step -
accuracy: 0.8748 - loss: 0.2889 - val_accuracy: 0.8191 - val_loss: 0.4416 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8833922147750854
Current validation accuracy: 0.8191489577293396
Reseting all weights…
Current number of trials: 26
```
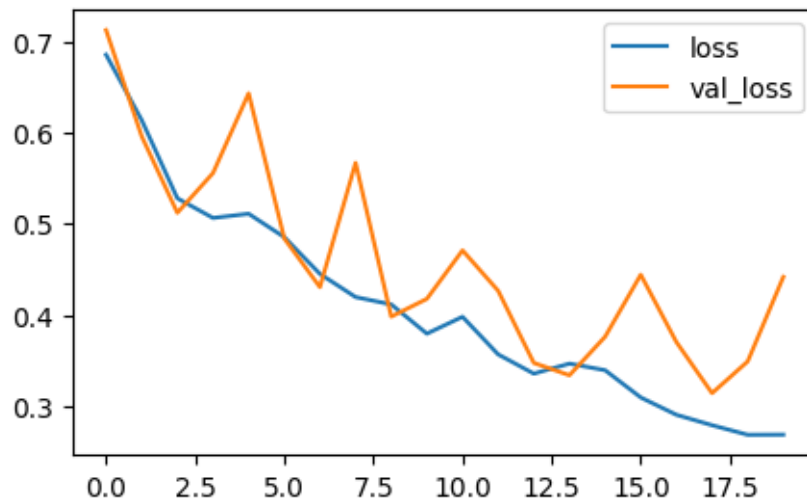
```
['loss', 'compile_metrics']
3/3                0s 16ms/step -
accuracy: 0.8080 - loss: 0.5053
[0.4415516257286072, 0.8191489577293396]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.79      0.80      0.80        41
        Male       0.85      0.83      0.84        53

    accuracy                           0.82        94
   macro avg       0.82      0.82      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 1/20
27/27              2s 64ms/step -
accuracy: 0.5208 - loss: 0.7003 - val_accuracy: 0.6064 - val_loss: 0.6550 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6473 - loss: 0.6097 - val_accuracy: 0.7021 - val_loss: 0.7048 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7353 - loss: 0.5222 - val_accuracy: 0.7340 - val_loss: 0.5132 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 59ms/step -
accuracy: 0.8002 - loss: 0.4811 - val_accuracy: 0.8085 - val_loss: 0.5002 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7581 - loss: 0.4797 - val_accuracy: 0.6915 - val_loss: 0.4982 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7570 - loss: 0.5053 - val_accuracy: 0.7660 - val_loss: 0.4835 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.8016 - loss: 0.4366 - val_accuracy: 0.8191 - val_loss: 0.5180 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8052 - loss: 0.4259 - val_accuracy: 0.8511 - val_loss: 0.4761 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 61ms/step -
accuracy: 0.8136 - loss: 0.4009 - val_accuracy: 0.8404 - val_loss: 0.4242 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 59ms/step -
accuracy: 0.8527 - loss: 0.3796 - val_accuracy: 0.8298 - val_loss: 0.4368 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8523 - loss: 0.3341 - val_accuracy: 0.8511 - val_loss: 0.4629 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8613 - loss: 0.3172 - val_accuracy: 0.8617 - val_loss: 0.4036 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8504 - loss: 0.3324 - val_accuracy: 0.8617 - val_loss: 0.3476 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8834 - loss: 0.3155 - val_accuracy: 0.8191 - val_loss: 0.4898 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8514 - loss: 0.3476 - val_accuracy: 0.8191 - val_loss: 0.4760 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 59ms/step -
accuracy: 0.8834 - loss: 0.2911 - val_accuracy: 0.8617 - val_loss: 0.3323 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 59ms/step -
accuracy: 0.9151 - loss: 0.2548 - val_accuracy: 0.8723 - val_loss: 0.3990 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8991 - loss: 0.2397 - val_accuracy: 0.8723 - val_loss: 0.3852 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.9054 - loss: 0.2278 - val_accuracy: 0.8298 - val_loss: 0.3627 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.8910 - loss: 0.2440 - val_accuracy: 0.8723 - val_loss: 0.4584 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8928150534629822
Current validation accuracy: 0.8723404407501221
Reseting all weights…
Current number of trials: 27
```
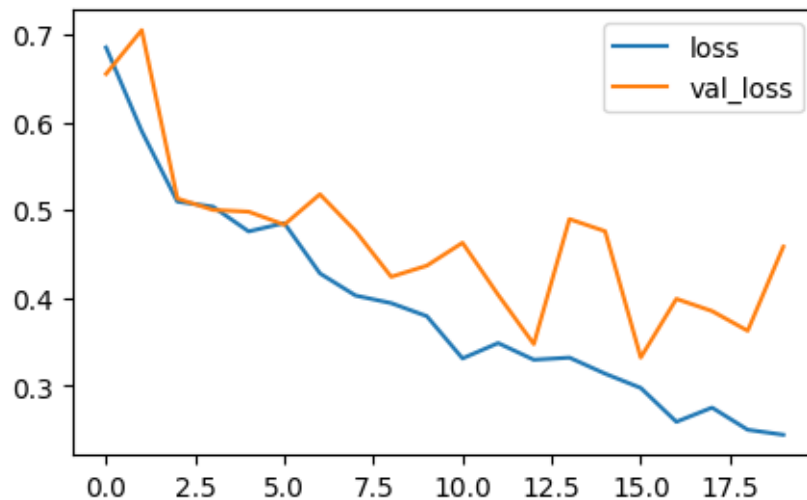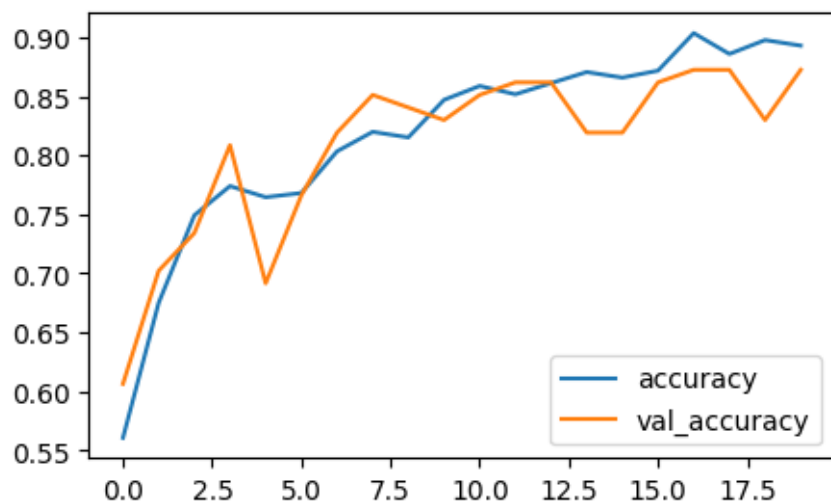
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8620 - loss: 0.5270
[0.45839959383010864, 0.8723404407501221]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 63ms/step -
accuracy: 0.4807 - loss: 0.7176 - val_accuracy: 0.4362 - val_loss: 0.6960 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 61ms/step -
accuracy: 0.5837 - loss: 0.6635 - val_accuracy: 0.7021 - val_loss: 0.6076 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.6893 - loss: 0.5945 - val_accuracy: 0.7234 - val_loss: 0.5401 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 59ms/step -
accuracy: 0.7444 - loss: 0.5086 - val_accuracy: 0.7447 - val_loss: 0.6321 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7603 - loss: 0.4948 - val_accuracy: 0.7447 - val_loss: 0.5486 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7860 - loss: 0.4624 - val_accuracy: 0.8298 - val_loss: 0.4523 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7961 - loss: 0.4565 - val_accuracy: 0.8191 - val_loss: 0.4623 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.8277 - loss: 0.3994 - val_accuracy: 0.8404 - val_loss: 0.3724 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8335 - loss: 0.3640 - val_accuracy: 0.8511 - val_loss: 0.4025 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 59ms/step -
accuracy: 0.8319 - loss: 0.4017 - val_accuracy: 0.8298 - val_loss: 0.4376 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8209 - loss: 0.4051 - val_accuracy: 0.8298 - val_loss: 0.4003 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8408 - loss: 0.3563 - val_accuracy: 0.8404 - val_loss: 0.3726 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8358 - loss: 0.3568 - val_accuracy: 0.8298 - val_loss: 0.4063 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8756 - loss: 0.2926 - val_accuracy: 0.8191 - val_loss: 0.4221 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8823 - loss: 0.3065 - val_accuracy: 0.8298 - val_loss: 0.4223 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 59ms/step -
accuracy: 0.8396 - loss: 0.3480 - val_accuracy: 0.7979 - val_loss: 0.5031 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 59ms/step -
accuracy: 0.8797 - loss: 0.2859 - val_accuracy: 0.8298 - val_loss: 0.3958 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8906 - loss: 0.2479 - val_accuracy: 0.8404 - val_loss: 0.4033 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 59ms/step -
accuracy: 0.8637 - loss: 0.3217 - val_accuracy: 0.7660 - val_loss: 0.4700 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.8733 - loss: 0.3031 - val_accuracy: 0.8298 - val_loss: 0.3968 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8916372060775757
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 28
```
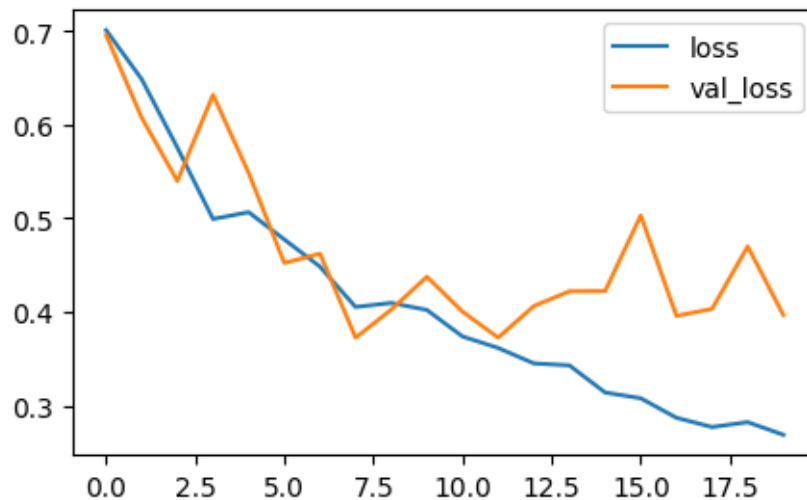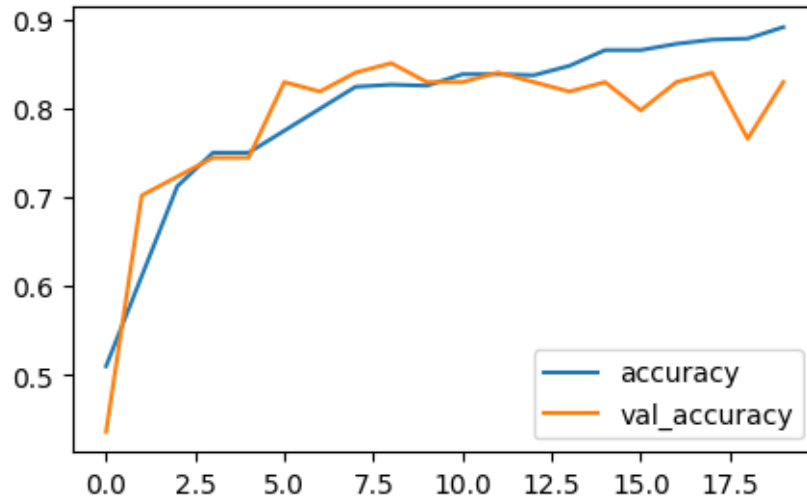
```
['loss', 'compile_metrics']
3/3              0s 15ms/step -
accuracy: 0.8172 - loss: 0.4382
[0.3967728316783905, 0.8297872543334961]
3/3              0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.80      0.80      0.80        41
        Male       0.85      0.85      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 1/20
27/27              2s 63ms/step -
accuracy: 0.5778 - loss: 0.6837 - val_accuracy: 0.6596 - val_loss: 0.6591 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.7012 - loss: 0.5797 - val_accuracy: 0.6596 - val_loss: 0.6512 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7375 - loss: 0.5396 - val_accuracy: 0.7340 - val_loss: 0.4970 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 59ms/step -
accuracy: 0.7705 - loss: 0.4925 - val_accuracy: 0.7872 - val_loss: 0.4596 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 60ms/step -
accuracy: 0.7383 - loss: 0.5094 - val_accuracy: 0.7979 - val_loss: 0.4859 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 60ms/step -
accuracy: 0.7693 - loss: 0.4924 - val_accuracy: 0.8191 - val_loss: 0.4431 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 61ms/step -
accuracy: 0.8050 - loss: 0.4010 - val_accuracy: 0.8617 - val_loss: 0.4348 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 60ms/step -
accuracy: 0.8157 - loss: 0.4198 - val_accuracy: 0.8404 - val_loss: 0.3552 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 60ms/step -
accuracy: 0.8304 - loss: 0.3845 - val_accuracy: 0.8404 - val_loss: 0.4174 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 60ms/step -
accuracy: 0.8210 - loss: 0.3921 - val_accuracy: 0.8191 - val_loss: 0.3987 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 59ms/step -
accuracy: 0.8458 - loss: 0.3464 - val_accuracy: 0.8298 - val_loss: 0.3249 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 60ms/step -
accuracy: 0.8563 - loss: 0.3601 - val_accuracy: 0.8511 - val_loss: 0.3729 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 59ms/step -
accuracy: 0.8594 - loss: 0.3119 - val_accuracy: 0.8617 - val_loss: 0.3577 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 60ms/step -
accuracy: 0.8738 - loss: 0.2672 - val_accuracy: 0.8298 - val_loss: 0.3888 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 60ms/step -
accuracy: 0.8549 - loss: 0.3505 - val_accuracy: 0.8511 - val_loss: 0.3954 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8932 - loss: 0.2628 - val_accuracy: 0.8617 - val_loss: 0.3512 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.8504 - loss: 0.3227 - val_accuracy: 0.8511 - val_loss: 0.4258 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8887 - loss: 0.2892 - val_accuracy: 0.8404 - val_loss: 0.4432 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.8897 - loss: 0.2756 - val_accuracy: 0.8404 - val_loss: 0.4230 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.9013 - loss: 0.2608 - val_accuracy: 0.8511 - val_loss: 0.4118 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9022379517555237
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 29
```
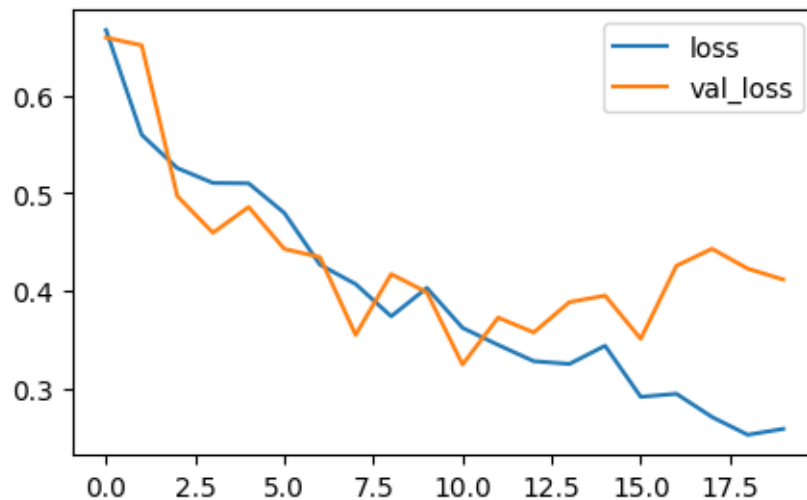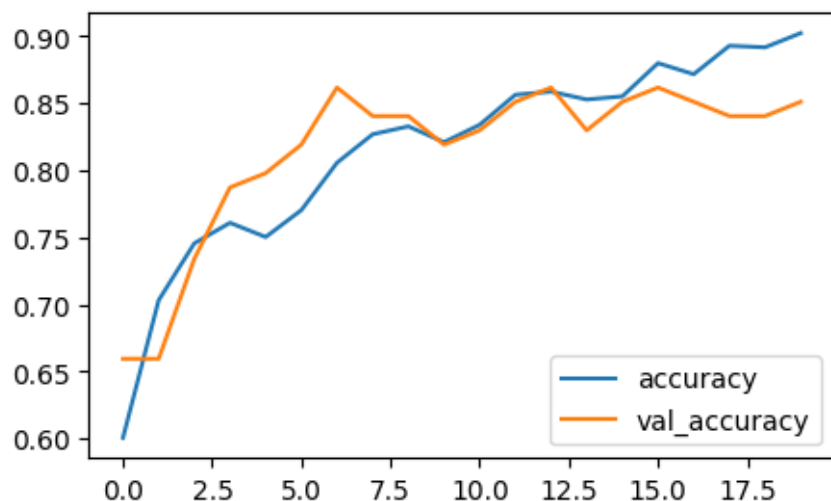
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8435 - loss: 0.4362
[0.41180589795112611, 0.8510638475418091]
3/3                 0s 26ms/step
Classification Report:
               precision    recall  f1-score   support

      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 1/20
27/27               2s 63ms/step -
accuracy: 0.5065 - loss: 0.7094 - val_accuracy: 0.5532 - val_loss: 0.6739 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 60ms/step -
accuracy: 0.6173 - loss: 0.6456 - val_accuracy: 0.6915 - val_loss: 0.5918 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 59ms/step -
accuracy: 0.7541 - loss: 0.5415 - val_accuracy: 0.7766 - val_loss: 0.5015 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7545 - loss: 0.4921 - val_accuracy: 0.8298 - val_loss: 0.4427 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7905 - loss: 0.4720 - val_accuracy: 0.7553 - val_loss: 0.5326 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 61ms/step -
accuracy: 0.8023 - loss: 0.4460 - val_accuracy: 0.8404 - val_loss: 0.4672 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.7898 - loss: 0.4598 - val_accuracy: 0.8191 - val_loss: 0.4042 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8133 - loss: 0.4020 - val_accuracy: 0.8191 - val_loss: 0.4289 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8474 - loss: 0.3613 - val_accuracy: 0.8404 - val_loss: 0.3059 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8289 - loss: 0.3972 - val_accuracy: 0.8404 - val_loss: 0.5461 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8132 - loss: 0.4095 - val_accuracy: 0.8511 - val_loss: 0.4282 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8324 - loss: 0.3423 - val_accuracy: 0.8723 - val_loss: 0.4234 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8440 - loss: 0.3353 - val_accuracy: 0.8191 - val_loss: 0.3922 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 59ms/step -
accuracy: 0.8515 - loss: 0.3285 - val_accuracy: 0.8404 - val_loss: 0.3310 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 59ms/step -
accuracy: 0.8289 - loss: 0.3815 - val_accuracy: 0.8298 - val_loss: 0.4956 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 62ms/step -
accuracy: 0.8758 - loss: 0.3030 - val_accuracy: 0.7979 - val_loss: 0.3938 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8323 - loss: 0.3396 - val_accuracy: 0.8830 - val_loss: 0.3837 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8741 - loss: 0.3004 - val_accuracy: 0.8298 - val_loss: 0.3949 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.8965 - loss: 0.2403 - val_accuracy: 0.8723 - val_loss: 0.4001 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 61ms/step -
accuracy: 0.8980 - loss: 0.2602 - val_accuracy: 0.7872 - val_loss: 0.4473 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8892815113067627
Current validation accuracy: 0.7872340679168701
Reseting all weights…
Current number of trials: 30
```
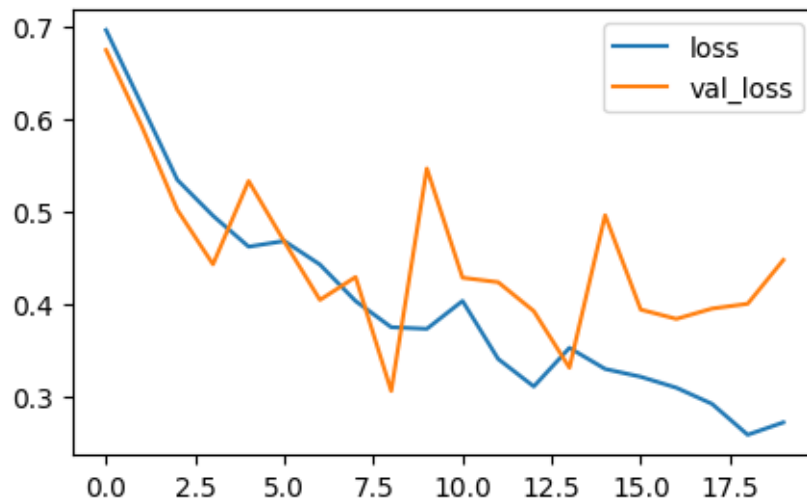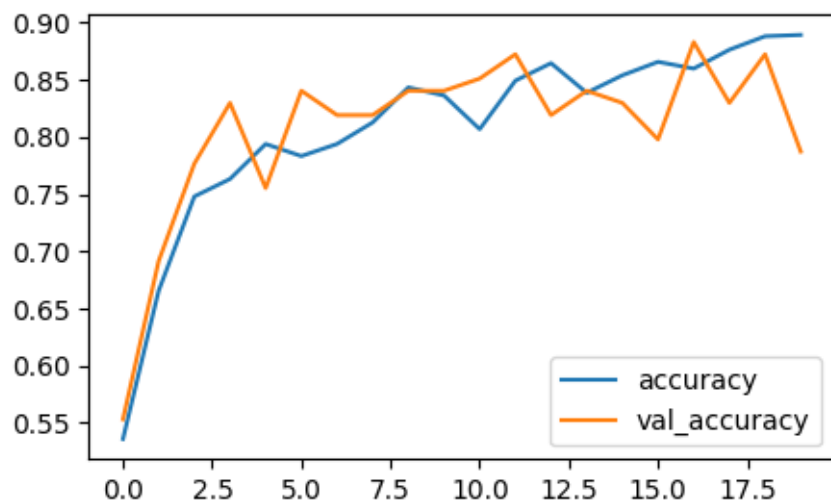
```
['loss', 'compile_metrics']
3/3                0s 16ms/step -
accuracy: 0.7647 - loss: 0.4793
[0.4473065435886383, 0.7872340679168701]
3/3                0s 29ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.77      0.73      0.75        41
        Male       0.80      0.83      0.81        53

    accuracy                           0.79        94
   macro avg       0.78      0.78      0.78        94
weighted avg       0.79      0.79      0.79        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 1/20
27/27              2s 64ms/step -
accuracy: 0.5422 - loss: 0.6971 - val_accuracy: 0.4362 - val_loss: 0.7023 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 61ms/step -
accuracy: 0.6272 - loss: 0.6380 - val_accuracy: 0.6809 - val_loss: 0.6071 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7111 - loss: 0.5651 - val_accuracy: 0.7447 - val_loss: 0.5795 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 62ms/step -
accuracy: 0.7676 - loss: 0.5225 - val_accuracy: 0.7660 - val_loss: 0.4830 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 62ms/step -
accuracy: 0.7444 - loss: 0.5167 - val_accuracy: 0.7766 - val_loss: 0.4856 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 61ms/step -
accuracy: 0.7922 - loss: 0.4664 - val_accuracy: 0.7766 - val_loss: 0.6644 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 62ms/step -
accuracy: 0.7913 - loss: 0.4306 - val_accuracy: 0.7766 - val_loss: 0.4964 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 61ms/step -
accuracy: 0.8366 - loss: 0.3849 - val_accuracy: 0.7766 - val_loss: 0.3841 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 62ms/step -
accuracy: 0.8262 - loss: 0.3982 - val_accuracy: 0.8085 - val_loss: 0.4143 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8084 - loss: 0.4331 - val_accuracy: 0.8404 - val_loss: 0.3832 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8820 - loss: 0.3182 - val_accuracy: 0.8298 - val_loss: 0.4621 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8701 - loss: 0.3291 - val_accuracy: 0.7979 - val_loss: 0.4155 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8462 - loss: 0.3632 - val_accuracy: 0.8511 - val_loss: 0.3918 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8681 - loss: 0.3334 - val_accuracy: 0.8191 - val_loss: 0.3759 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 61ms/step -
accuracy: 0.8826 - loss: 0.2996 - val_accuracy: 0.8511 - val_loss: 0.3144 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 59ms/step -
accuracy: 0.9024 - loss: 0.2496 - val_accuracy: 0.8298 - val_loss: 0.3036 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.8713 - loss: 0.3263 - val_accuracy: 0.8191 - val_loss: 0.3361 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 59ms/step -
accuracy: 0.8631 - loss: 0.2912 - val_accuracy: 0.8404 - val_loss: 0.3484 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.9088 - loss: 0.2468 - val_accuracy: 0.8936 - val_loss: 0.3963 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.9050 - loss: 0.2382 - val_accuracy: 0.8298 - val_loss: 0.4592 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9022379517555237
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 31
```
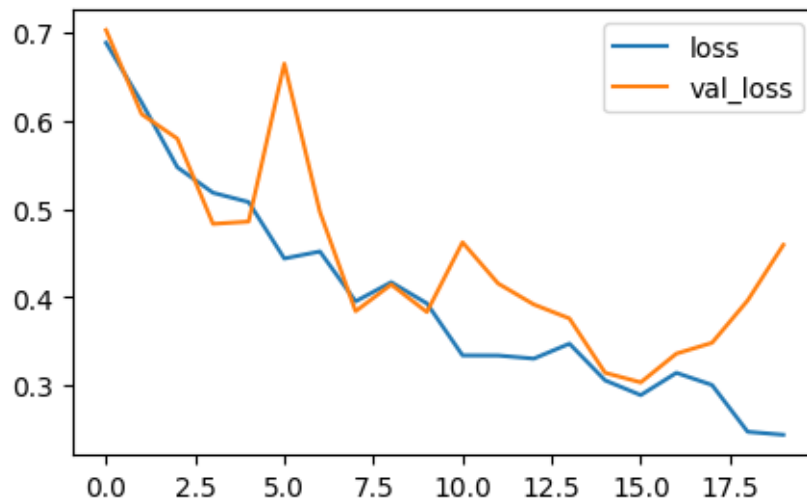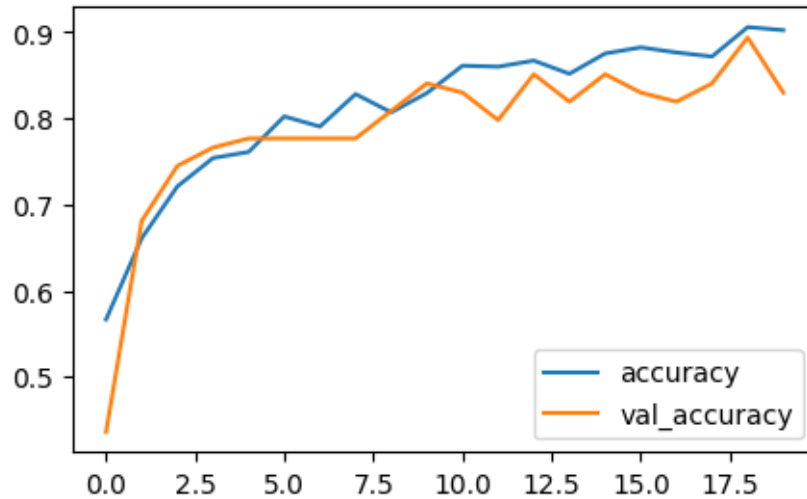
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8133 - loss: 0.5078
[0.4591975212097168, 0.8297872543334961]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 64ms/step -
accuracy: 0.5858 - loss: 0.6674 - val_accuracy: 0.6277 - val_loss: 0.6505 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 61ms/step -
accuracy: 0.6643 - loss: 0.6084 - val_accuracy: 0.6915 - val_loss: 0.5967 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7357 - loss: 0.5181 - val_accuracy: 0.7553 - val_loss: 0.5332 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 61ms/step -
accuracy: 0.7398 - loss: 0.5188 - val_accuracy: 0.7660 - val_loss: 0.5030 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 61ms/step -
accuracy: 0.7458 - loss: 0.5210 - val_accuracy: 0.7766 - val_loss: 0.4982 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.7923 - loss: 0.4431 - val_accuracy: 0.7766 - val_loss: 0.4735 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.8117 - loss: 0.4098 - val_accuracy: 0.8191 - val_loss: 0.4447 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8205 - loss: 0.4074 - val_accuracy: 0.8085 - val_loss: 0.5115 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8122 - loss: 0.4122 - val_accuracy: 0.8085 - val_loss: 0.6006 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8166 - loss: 0.3732 - val_accuracy: 0.8085 - val_loss: 0.3706 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8610 - loss: 0.3317 - val_accuracy: 0.8191 - val_loss: 0.3791 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8715 - loss: 0.3451 - val_accuracy: 0.8298 - val_loss: 0.3980 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 62ms/step -
accuracy: 0.8773 - loss: 0.3060 - val_accuracy: 0.8085 - val_loss: 0.3819 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8670 - loss: 0.3174 - val_accuracy: 0.8191 - val_loss: 0.3689 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 61ms/step -
accuracy: 0.8869 - loss: 0.2854 - val_accuracy: 0.8617 - val_loss: 0.3244 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8537 - loss: 0.3293 - val_accuracy: 0.8404 - val_loss: 0.2971 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8692 - loss: 0.2697 - val_accuracy: 0.8617 - val_loss: 0.3039 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8660 - loss: 0.2967 - val_accuracy: 0.8298 - val_loss: 0.3196 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.9123 - loss: 0.2490 - val_accuracy: 0.8511 - val_loss: 0.3357 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 62ms/step -
accuracy: 0.8747 - loss: 0.2743 - val_accuracy: 0.8723 - val_loss: 0.4092 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8716136813163757
Current validation accuracy: 0.8723404407501221
Reseting all weights…
Current number of trials: 32
```
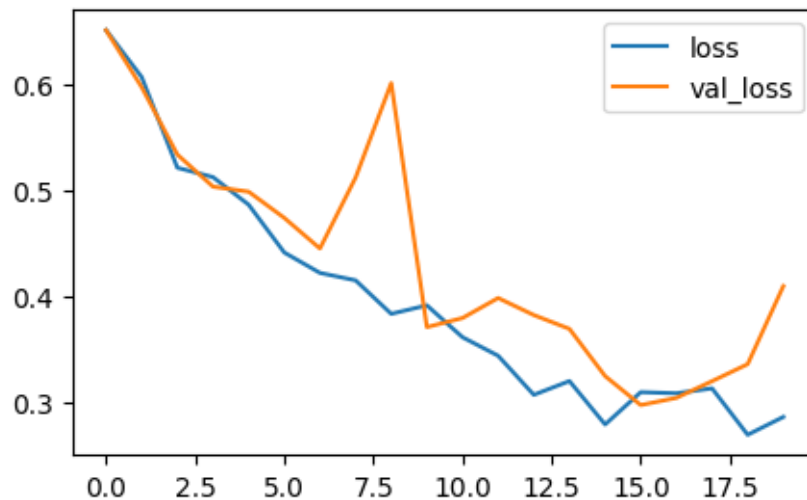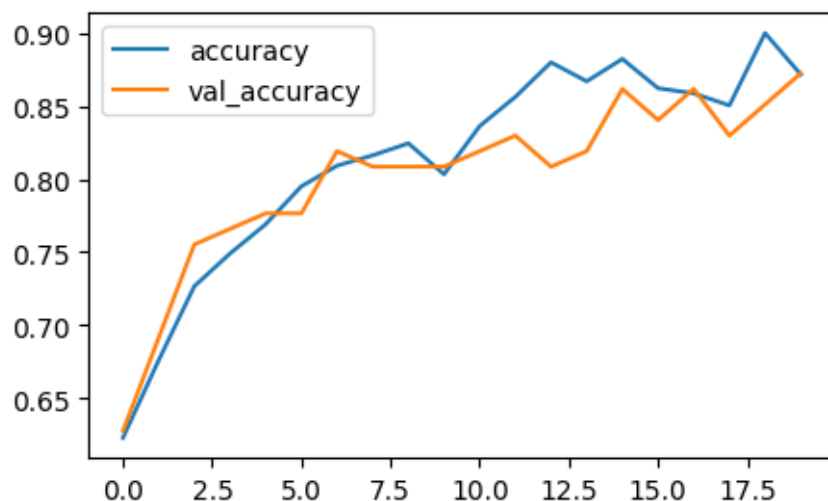
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8580 - loss: 0.4301
[0.4092239737510681, 0.8723404407501221]
3/3              0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.78      0.98      0.87        41
        Male       0.98      0.79      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.

2025-05-07 11:24:17.465279: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence

Epoch 1/20
27/27              2s 65ms/step -
accuracy: 0.5361 - loss: 0.6882 - val_accuracy: 0.5213 - val_loss: 0.7257 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 61ms/step -
accuracy: 0.6940 - loss: 0.5992 - val_accuracy: 0.7234 - val_loss: 0.5181 -
learning_rate: 5.0000e-04
```

```
Epoch 3/20
27/27              2s 62ms/step -
accuracy: 0.7207 - loss: 0.5325 - val_accuracy: 0.7872 - val_loss: 0.4838 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7253 - loss: 0.5094 - val_accuracy: 0.7447 - val_loss: 0.4757 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7689 - loss: 0.4906 - val_accuracy: 0.8404 - val_loss: 0.4575 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.8017 - loss: 0.4522 - val_accuracy: 0.8723 - val_loss: 0.4151 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7995 - loss: 0.4383 - val_accuracy: 0.8830 - val_loss: 0.3956 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8050 - loss: 0.4040 - val_accuracy: 0.8298 - val_loss: 0.4019 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8238 - loss: 0.4067 - val_accuracy: 0.8723 - val_loss: 0.3845 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8318 - loss: 0.3811 - val_accuracy: 0.8511 - val_loss: 0.3872 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8637 - loss: 0.3456 - val_accuracy: 0.8511 - val_loss: 0.3621 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8437 - loss: 0.3432 - val_accuracy: 0.8511 - val_loss: 0.3447 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8494 - loss: 0.3257 - val_accuracy: 0.8298 - val_loss: 0.3671 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8550 - loss: 0.3468 - val_accuracy: 0.8298 - val_loss: 0.4376 -
learning_rate: 5.0000e-04
```

```
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8272 - loss: 0.3431 - val_accuracy: 0.8617 - val_loss: 0.3930 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27              2s 60ms/step -
accuracy: 0.8840 - loss: 0.2645 - val_accuracy: 0.7979 - val_loss: 0.4116 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27              2s 60ms/step -
accuracy: 0.8804 - loss: 0.2807 - val_accuracy: 0.8404 - val_loss: 0.4129 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27              2s 61ms/step -
accuracy: 0.8894 - loss: 0.2688 - val_accuracy: 0.8511 - val_loss: 0.3447 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27              2s 61ms/step -
accuracy: 0.8887 - loss: 0.2455 - val_accuracy: 0.8617 - val_loss: 0.4314 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27              2s 60ms/step -
accuracy: 0.9220 - loss: 0.2122 - val_accuracy: 0.8511 - val_loss: 0.3943 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9104829430580139
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 33
```
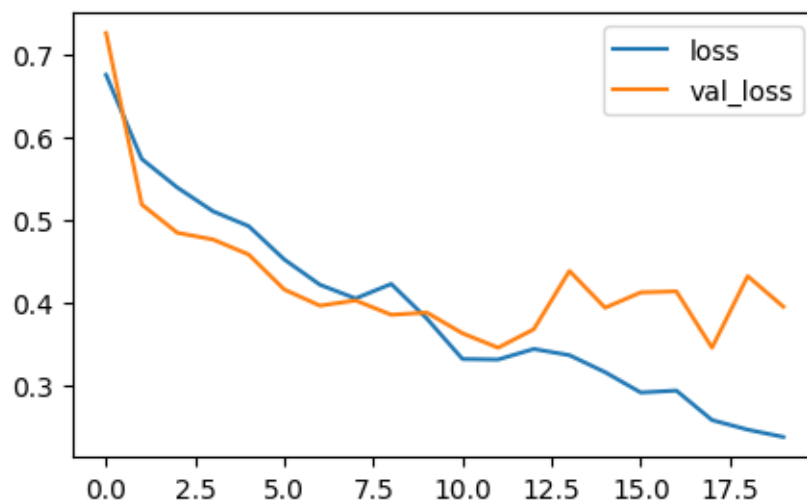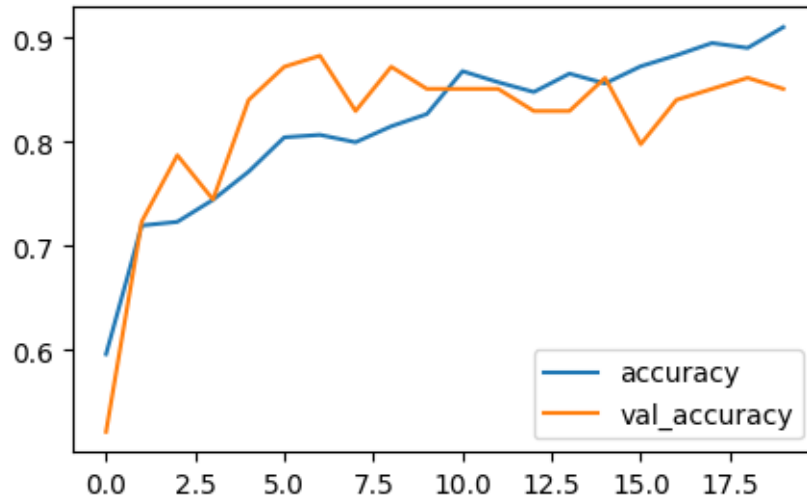
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8396 - loss: 0.4289
[0.394329309463501, 0.8510638475418091]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.80      0.88      0.84        41
        Male       0.90      0.83      0.86        53

    accuracy                           0.85        94
   macro avg       0.85      0.85      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 1/20
27/27              2s 65ms/step -
accuracy: 0.5127 - loss: 0.6983 - val_accuracy: 0.6596 - val_loss: 0.6415 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 63ms/step -
accuracy: 0.7158 - loss: 0.6037 - val_accuracy: 0.7128 - val_loss: 0.5667 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 62ms/step -
accuracy: 0.7703 - loss: 0.5106 - val_accuracy: 0.7766 - val_loss: 0.5092 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 61ms/step -
accuracy: 0.7771 - loss: 0.4716 - val_accuracy: 0.8298 - val_loss: 0.4341 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7843 - loss: 0.4549 - val_accuracy: 0.8191 - val_loss: 0.4258 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 61ms/step -
accuracy: 0.7962 - loss: 0.4498 - val_accuracy: 0.8191 - val_loss: 0.4107 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 61ms/step -
accuracy: 0.8211 - loss: 0.4214 - val_accuracy: 0.8404 - val_loss: 0.4552 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7998 - loss: 0.4165 - val_accuracy: 0.8191 - val_loss: 0.3852 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8466 - loss: 0.3676 - val_accuracy: 0.8404 - val_loss: 0.3740 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8694 - loss: 0.3290 - val_accuracy: 0.8298 - val_loss: 0.4399 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 62ms/step -
accuracy: 0.8878 - loss: 0.2916 - val_accuracy: 0.8191 - val_loss: 0.4180 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8652 - loss: 0.3175 - val_accuracy: 0.8617 - val_loss: 0.3820 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8497 - loss: 0.3479 - val_accuracy: 0.8191 - val_loss: 0.3703 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8527 - loss: 0.3098 - val_accuracy: 0.8511 - val_loss: 0.4021 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8730 - loss: 0.2875 - val_accuracy: 0.8404 - val_loss: 0.4335 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                 2s 60ms/step -
accuracy: 0.8838 - loss: 0.3105 - val_accuracy: 0.8617 - val_loss: 0.4564 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                 2s 60ms/step -
accuracy: 0.8470 - loss: 0.3100 - val_accuracy: 0.8830 - val_loss: 0.3878 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                 2s 60ms/step -
accuracy: 0.9024 - loss: 0.2464 - val_accuracy: 0.8511 - val_loss: 0.3560 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                 2s 61ms/step -
accuracy: 0.9021 - loss: 0.2385 - val_accuracy: 0.8191 - val_loss: 0.3656 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                 2s 60ms/step -
accuracy: 0.9000 - loss: 0.2350 - val_accuracy: 0.8617 - val_loss: 0.3671 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8963486552238464
Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 34
```
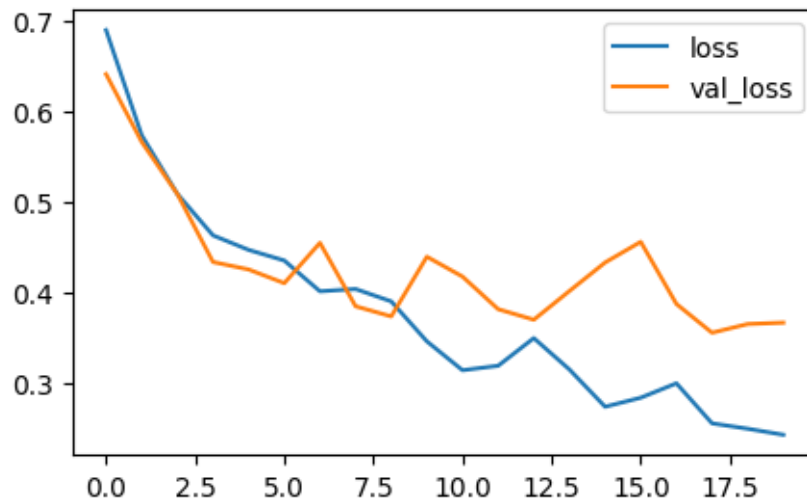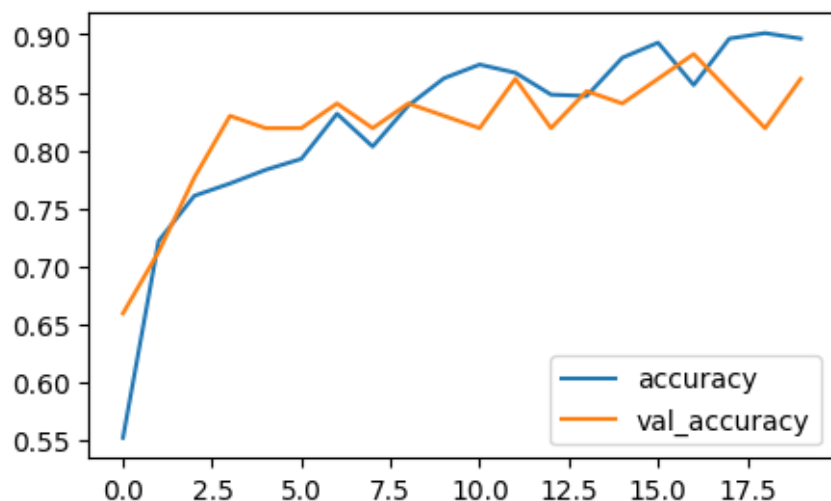
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8644 - loss: 0.3616
[0.36707431077957153, 0.8617021441459656]
3/3                0s 26ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 65ms/step -
accuracy: 0.5375 - loss: 0.6860 - val_accuracy: 0.6383 - val_loss: 0.6130 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 62ms/step -
accuracy: 0.7196 - loss: 0.5722 - val_accuracy: 0.7021 - val_loss: 0.6279 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
accuracy: 0.7479 - loss: 0.5210 - val_accuracy: 0.7872 - val_loss: 0.5134 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 60ms/step -
accuracy: 0.7491 - loss: 0.4997 - val_accuracy: 0.7979 - val_loss: 0.4409 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 61ms/step -
accuracy: 0.7926 - loss: 0.4595 - val_accuracy: 0.8085 - val_loss: 0.4497 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 62ms/step -
accuracy: 0.7789 - loss: 0.4777 - val_accuracy: 0.8511 - val_loss: 0.4004 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 61ms/step -
accuracy: 0.8051 - loss: 0.4279 - val_accuracy: 0.7872 - val_loss: 0.4678 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 61ms/step -
accuracy: 0.8343 - loss: 0.3812 - val_accuracy: 0.8298 - val_loss: 0.4208 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 61ms/step -
accuracy: 0.8365 - loss: 0.3557 - val_accuracy: 0.8723 - val_loss: 0.4046 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 63ms/step -
accuracy: 0.8255 - loss: 0.3998 - val_accuracy: 0.8298 - val_loss: 0.4036 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 61ms/step -
accuracy: 0.8408 - loss: 0.3537 - val_accuracy: 0.8298 - val_loss: 0.4544 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 61ms/step -
accuracy: 0.8838 - loss: 0.3034 - val_accuracy: 0.8404 - val_loss: 0.4943 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 61ms/step -
accuracy: 0.8687 - loss: 0.3225 - val_accuracy: 0.8404 - val_loss: 0.4354 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 60ms/step -
accuracy: 0.8956 - loss: 0.2655 - val_accuracy: 0.8298 - val_loss: 0.3738 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 61ms/step -
accuracy: 0.8716 - loss: 0.2996 - val_accuracy: 0.8404 - val_loss: 0.5546 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8763 - loss: 0.2634 - val_accuracy: 0.8723 - val_loss: 0.3396 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.9047 - loss: 0.2511 - val_accuracy: 0.8404 - val_loss: 0.4160 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8949 - loss: 0.2407 - val_accuracy: 0.8404 - val_loss: 0.3921 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 60ms/step -
accuracy: 0.9271 - loss: 0.2041 - val_accuracy: 0.8404 - val_loss: 0.3987 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 62ms/step -
accuracy: 0.8716 - loss: 0.2657 - val_accuracy: 0.8298 - val_loss: 0.3318 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8869258165359497
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 35
```
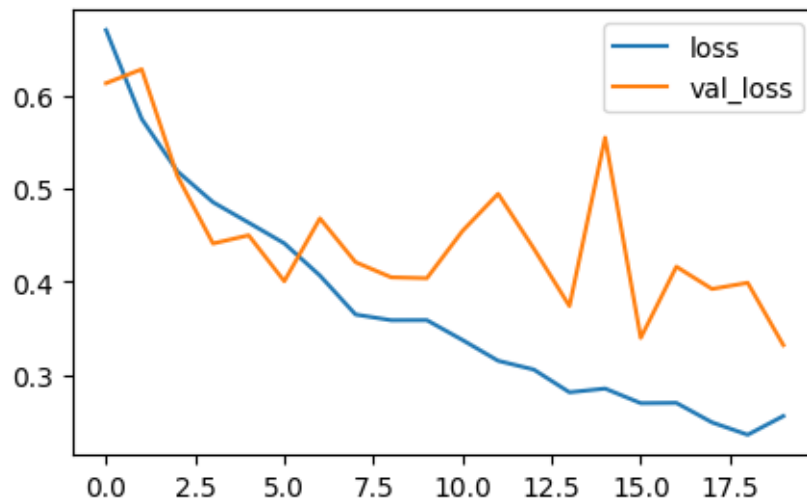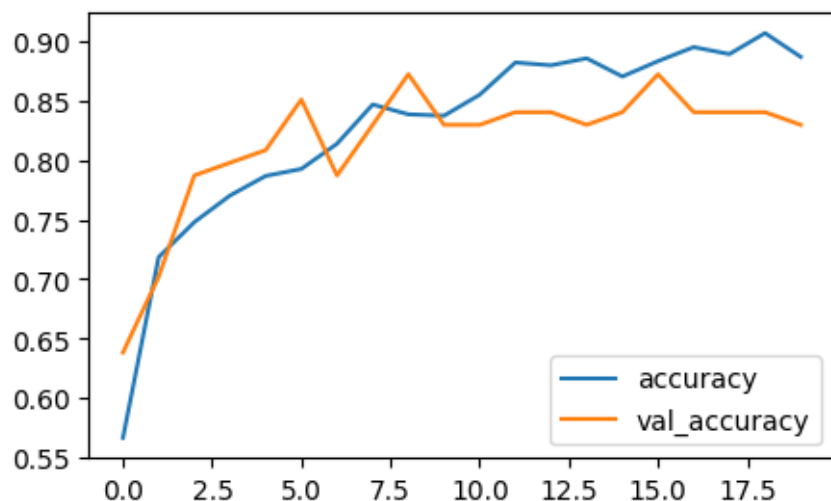
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8055 - loss: 0.3607
[0.331775963306427, 0.8297872543334961]
3/3              0s 28ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.80      0.80      0.80        41
        Male       0.85      0.85      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 1/20
27/27              2s 64ms/step -
accuracy: 0.5158 - loss: 0.7139 - val_accuracy: 0.6915 - val_loss: 0.6703 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 61ms/step -
accuracy: 0.6601 - loss: 0.6388 - val_accuracy: 0.6915 - val_loss: 0.6238 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7594 - loss: 0.5358 - val_accuracy: 0.7340 - val_loss: 0.5724 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7736 - loss: 0.5030 - val_accuracy: 0.7128 - val_loss: 0.7011 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 61ms/step -
accuracy: 0.7643 - loss: 0.5154 - val_accuracy: 0.7128 - val_loss: 0.6015 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 61ms/step -
accuracy: 0.7318 - loss: 0.4915 - val_accuracy: 0.8191 - val_loss: 0.5028 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 62ms/step -
accuracy: 0.7861 - loss: 0.4534 - val_accuracy: 0.7766 - val_loss: 0.5482 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7913 - loss: 0.4436 - val_accuracy: 0.8511 - val_loss: 0.4840 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 61ms/step -
accuracy: 0.8050 - loss: 0.4217 - val_accuracy: 0.8298 - val_loss: 0.4234 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8271 - loss: 0.3943 - val_accuracy: 0.8511 - val_loss: 0.3715 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8012 - loss: 0.4070 - val_accuracy: 0.7553 - val_loss: 0.6177 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8246 - loss: 0.4015 - val_accuracy: 0.7979 - val_loss: 0.4632 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 61ms/step -
accuracy: 0.8576 - loss: 0.3547 - val_accuracy: 0.8298 - val_loss: 0.4358 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 62ms/step -
accuracy: 0.8519 - loss: 0.3338 - val_accuracy: 0.7766 - val_loss: 0.3779 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8653 - loss: 0.3200 - val_accuracy: 0.8404 - val_loss: 0.3470 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                    2s 60ms/step -
accuracy: 0.8815 - loss: 0.2813 - val_accuracy: 0.8298 - val_loss: 0.3414 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                    2s 61ms/step -
accuracy: 0.8665 - loss: 0.3046 - val_accuracy: 0.8404 - val_loss: 0.3856 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                    2s 61ms/step -
accuracy: 0.8916 - loss: 0.2631 - val_accuracy: 0.8404 - val_loss: 0.3724 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                    2s 61ms/step -
accuracy: 0.8623 - loss: 0.2793 - val_accuracy: 0.8830 - val_loss: 0.3286 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                    2s 61ms/step -
accuracy: 0.8876 - loss: 0.2580 - val_accuracy: 0.8298 - val_loss: 0.3051 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8833922147750854
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 36
```
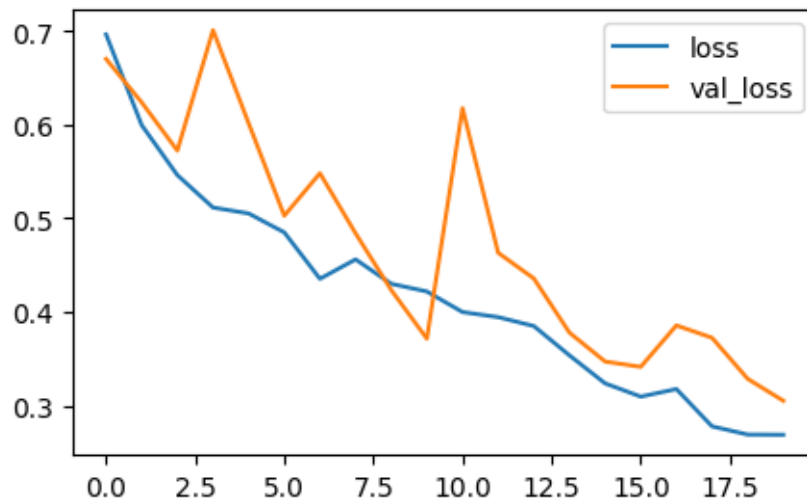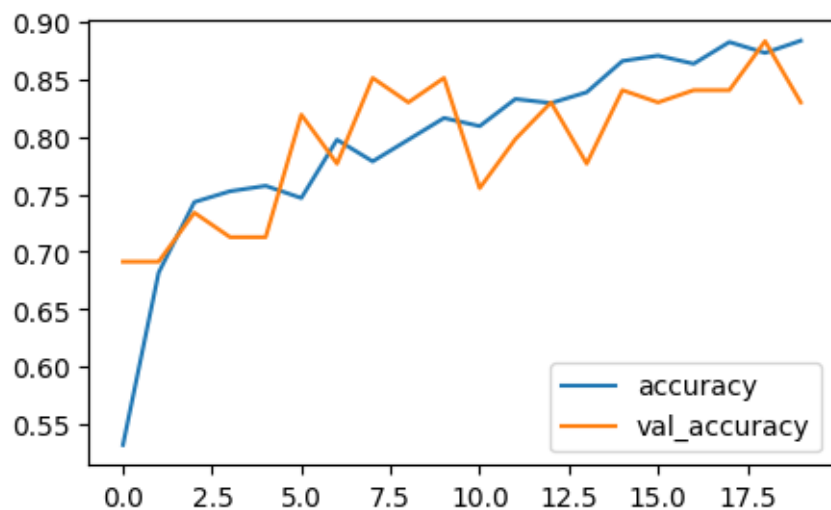
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8290 - loss: 0.3206
[0.30510199069976807, 0.8297872543334961]
3/3              0s 28ms/step
Classification Report:
             precision   recall   f1-score   support

     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 1/20
27/27              3s 63ms/step -
accuracy: 0.5239 - loss: 0.6970 - val_accuracy: 0.6596 - val_loss: 0.6348 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6519 - loss: 0.6096 - val_accuracy: 0.7234 - val_loss: 0.5791 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 61ms/step -
```

```
accuracy: 0.6837 - loss: 0.5855 - val_accuracy: 0.6915 - val_loss: 0.6668 -
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 59ms/step -
accuracy: 0.7537 - loss: 0.4874 - val_accuracy: 0.7766 - val_loss: 0.5095 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7879 - loss: 0.4611 - val_accuracy: 0.7766 - val_loss: 0.4748 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.8142 - loss: 0.4118 - val_accuracy: 0.8085 - val_loss: 0.4304 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 61ms/step -
accuracy: 0.8183 - loss: 0.4152 - val_accuracy: 0.7979 - val_loss: 0.5450 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8009 - loss: 0.4286 - val_accuracy: 0.7979 - val_loss: 0.4512 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8343 - loss: 0.3759 - val_accuracy: 0.8404 - val_loss: 0.4401 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8446 - loss: 0.3607 - val_accuracy: 0.8298 - val_loss: 0.5325 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8330 - loss: 0.4003 - val_accuracy: 0.8085 - val_loss: 0.5035 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8509 - loss: 0.3480 - val_accuracy: 0.8191 - val_loss: 0.5091 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8583 - loss: 0.3306 - val_accuracy: 0.8404 - val_loss: 0.4253 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8927 - loss: 0.2780 - val_accuracy: 0.8298 - val_loss: 0.3798 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
```

```
accuracy: 0.8903 - loss: 0.2718 - val_accuracy: 0.8191 - val_loss: 0.4306 -
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8810 - loss: 0.2684 - val_accuracy: 0.8404 - val_loss: 0.5135 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.8788 - loss: 0.3177 - val_accuracy: 0.8191 - val_loss: 0.5107 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8807 - loss: 0.3042 - val_accuracy: 0.8617 - val_loss: 0.4669 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 59ms/step -
accuracy: 0.8900 - loss: 0.2643 - val_accuracy: 0.8298 - val_loss: 0.5572 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.8901 - loss: 0.2680 - val_accuracy: 0.8298 - val_loss: 0.5127 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8904593586921692
Current validation accuracy: 0.8297872543334961
Reseting all weights…
Current number of trials: 37
```
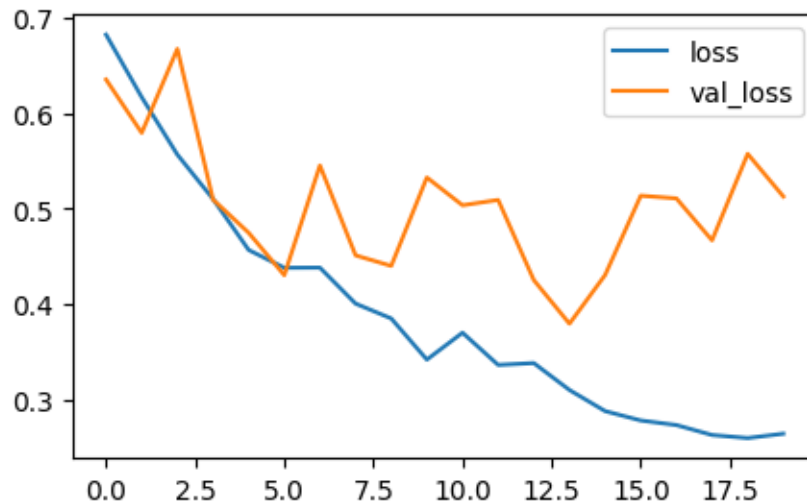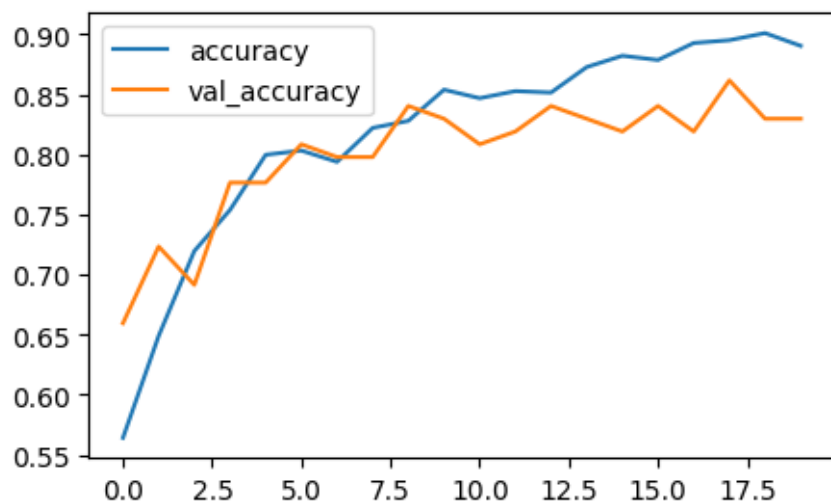
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8250 - loss: 0.5413
[0.5126548409461975, 0.8297872543334961]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.76      0.90      0.82        41
        Male       0.91      0.77      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 1/20
27/27                2s 63ms/step -
accuracy: 0.5528 - loss: 0.7110 - val_accuracy: 0.4468 - val_loss: 0.7049 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 60ms/step -
accuracy: 0.6444 - loss: 0.6357 - val_accuracy: 0.6489 - val_loss: 0.6927 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 60ms/step -
accuracy: 0.7170 - loss: 0.5730 - val_accuracy: 0.7021 - val_loss: 0.6384 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 61ms/step -
accuracy: 0.7689 - loss: 0.5051 - val_accuracy: 0.6915 - val_loss: 0.5457 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 60ms/step -
accuracy: 0.7772 - loss: 0.4770 - val_accuracy: 0.7660 - val_loss: 0.6270 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 61ms/step -
accuracy: 0.8077 - loss: 0.4506 - val_accuracy: 0.8191 - val_loss: 0.4974 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 60ms/step -
accuracy: 0.8027 - loss: 0.4441 - val_accuracy: 0.7979 - val_loss: 0.4449 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 61ms/step -
accuracy: 0.8155 - loss: 0.4125 - val_accuracy: 0.7872 - val_loss: 0.5341 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 59ms/step -
accuracy: 0.8059 - loss: 0.4189 - val_accuracy: 0.8404 - val_loss: 0.3497 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 60ms/step -
accuracy: 0.8205 - loss: 0.3850 - val_accuracy: 0.8191 - val_loss: 0.3727 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 59ms/step -
accuracy: 0.8346 - loss: 0.3816 - val_accuracy: 0.8404 - val_loss: 0.3866 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 60ms/step -
accuracy: 0.8534 - loss: 0.3353 - val_accuracy: 0.8298 - val_loss: 0.3823 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 59ms/step -
accuracy: 0.8404 - loss: 0.3640 - val_accuracy: 0.8191 - val_loss: 0.3410 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 60ms/step -
accuracy: 0.8538 - loss: 0.3655 - val_accuracy: 0.8404 - val_loss: 0.4209 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 60ms/step -
accuracy: 0.8888 - loss: 0.2889 - val_accuracy: 0.8404 - val_loss: 0.4121 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 62ms/step -
accuracy: 0.8586 - loss: 0.3125 - val_accuracy: 0.8511 - val_loss: 0.3854 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8783 - loss: 0.2965 - val_accuracy: 0.8085 - val_loss: 0.3543 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.9023 - loss: 0.2425 - val_accuracy: 0.8298 - val_loss: 0.4138 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 59ms/step -
accuracy: 0.8615 - loss: 0.3170 - val_accuracy: 0.7872 - val_loss: 0.4284 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 59ms/step -
accuracy: 0.8966 - loss: 0.2620 - val_accuracy: 0.8404 - val_loss: 0.4389 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8916372060775757
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 38
```
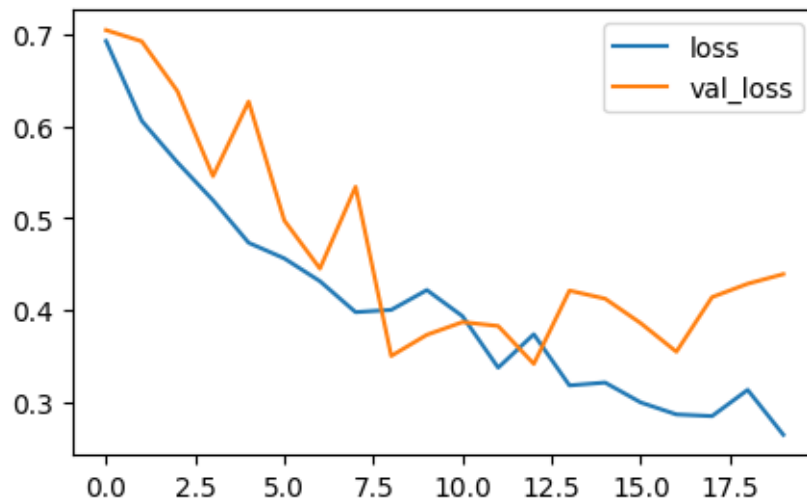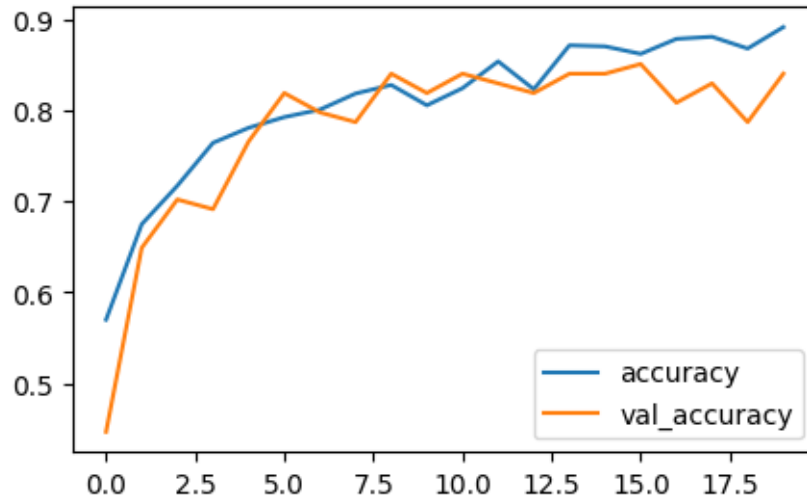
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8147 - loss: 0.4863
[0.4388839304447174, 0.8404255509376526]
3/3              0s 28ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 64ms/step -
accuracy: 0.5502 - loss: 0.6842 - val_accuracy: 0.6170 - val_loss: 0.6738 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 61ms/step -
accuracy: 0.7177 - loss: 0.6019 - val_accuracy: 0.7021 - val_loss: 0.5778 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7665 - loss: 0.5314 - val_accuracy: 0.7340 - val_loss: 0.6173 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 60ms/step -
accuracy: 0.7656 - loss: 0.5117 - val_accuracy: 0.8298 - val_loss: 0.5197 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 60ms/step -
accuracy: 0.7585 - loss: 0.4884 - val_accuracy: 0.7872 - val_loss: 0.5323 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 61ms/step -
accuracy: 0.7683 - loss: 0.4960 - val_accuracy: 0.8191 - val_loss: 0.4970 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 60ms/step -
accuracy: 0.8144 - loss: 0.3987 - val_accuracy: 0.7979 - val_loss: 0.4501 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 60ms/step -
accuracy: 0.7818 - loss: 0.4528 - val_accuracy: 0.8191 - val_loss: 0.4647 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 60ms/step -
accuracy: 0.8246 - loss: 0.3972 - val_accuracy: 0.8191 - val_loss: 0.4197 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 60ms/step -
accuracy: 0.8139 - loss: 0.4185 - val_accuracy: 0.8191 - val_loss: 0.5243 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 60ms/step -
accuracy: 0.8407 - loss: 0.3744 - val_accuracy: 0.8617 - val_loss: 0.4311 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 60ms/step -
accuracy: 0.8521 - loss: 0.3362 - val_accuracy: 0.8191 - val_loss: 0.4027 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 60ms/step -
accuracy: 0.8681 - loss: 0.3174 - val_accuracy: 0.8085 - val_loss: 0.4340 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 60ms/step -
accuracy: 0.8768 - loss: 0.2976 - val_accuracy: 0.8298 - val_loss: 0.5496 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 62ms/step -
accuracy: 0.8272 - loss: 0.3789 - val_accuracy: 0.7766 - val_loss: 0.5483 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8386 - loss: 0.3473 - val_accuracy: 0.7979 - val_loss: 0.4064 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8756 - loss: 0.3019 - val_accuracy: 0.8298 - val_loss: 0.4460 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8737 - loss: 0.2791 - val_accuracy: 0.8298 - val_loss: 0.5419 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.8973 - loss: 0.2663 - val_accuracy: 0.8404 - val_loss: 0.3863 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.9080 - loss: 0.2267 - val_accuracy: 0.8617 - val_loss: 0.4713 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8963486552238464
Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 39
```
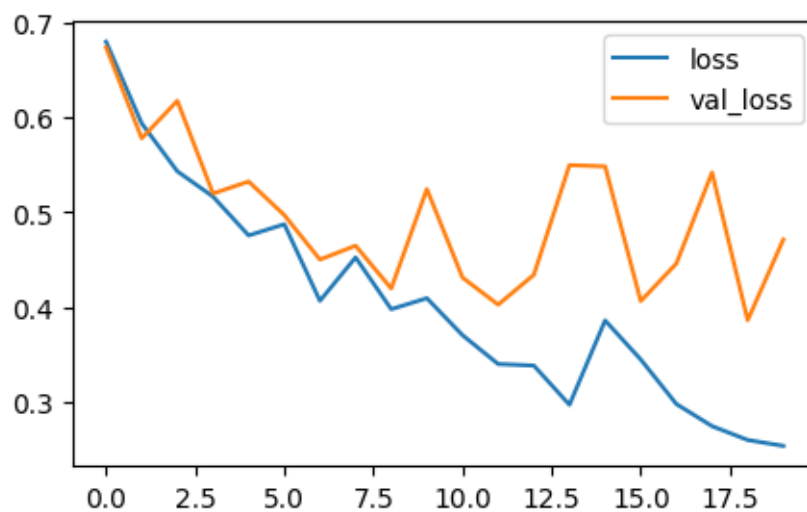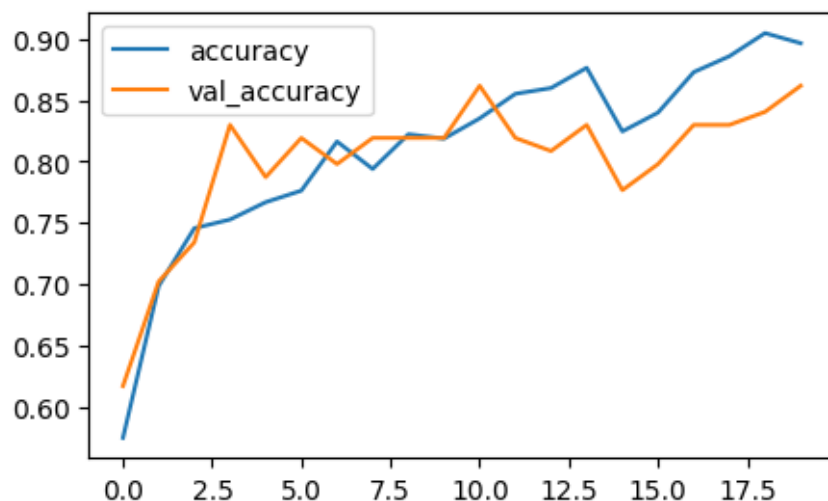
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8644 - loss: 0.4867
[0.4712854027748108, 0.8617021441459656]
3/3                0s 28ms/step
Classification Report:
             precision    recall  f1-score   support

      Female       0.77      0.98      0.86        41
        Male       0.98      0.77      0.86        53

    accuracy                           0.86        94
   macro avg       0.87      0.87      0.86        94
weighted avg       0.89      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 1/20
27/27                2s 65ms/step -
accuracy: 0.5831 - loss: 0.6858 - val_accuracy: 0.6489 - val_loss: 0.6651 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27                2s 61ms/step -
accuracy: 0.6742 - loss: 0.5995 - val_accuracy: 0.6489 - val_loss: 0.5979 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27                2s 60ms/step -
accuracy: 0.7289 - loss: 0.5597 - val_accuracy: 0.7340 - val_loss: 0.5211 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 61ms/step -
accuracy: 0.7340 - loss: 0.5213 - val_accuracy: 0.7660 - val_loss: 0.5092 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 61ms/step -
accuracy: 0.7812 - loss: 0.4657 - val_accuracy: 0.7766 - val_loss: 0.5062 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 60ms/step -
accuracy: 0.7669 - loss: 0.4728 - val_accuracy: 0.8191 - val_loss: 0.4634 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 60ms/step -
accuracy: 0.7974 - loss: 0.4393 - val_accuracy: 0.8085 - val_loss: 0.4136 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 60ms/step -
accuracy: 0.8143 - loss: 0.4280 - val_accuracy: 0.8191 - val_loss: 0.4417 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 60ms/step -
accuracy: 0.8127 - loss: 0.4259 - val_accuracy: 0.8511 - val_loss: 0.4855 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 60ms/step -
accuracy: 0.7976 - loss: 0.4210 - val_accuracy: 0.8298 - val_loss: 0.4045 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 60ms/step -
accuracy: 0.8363 - loss: 0.3865 - val_accuracy: 0.8511 - val_loss: 0.3639 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 62ms/step -
accuracy: 0.8652 - loss: 0.3548 - val_accuracy: 0.8511 - val_loss: 0.3629 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 61ms/step -
accuracy: 0.8421 - loss: 0.3553 - val_accuracy: 0.8085 - val_loss: 0.4716 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 62ms/step -
accuracy: 0.8510 - loss: 0.3376 - val_accuracy: 0.8085 - val_loss: 0.3974 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 60ms/step -
accuracy: 0.8379 - loss: 0.3470 - val_accuracy: 0.8511 - val_loss: 0.3283 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                 2s 60ms/step -
accuracy: 0.8659 - loss: 0.3213 - val_accuracy: 0.8511 - val_loss: 0.4063 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                 2s 60ms/step -
accuracy: 0.8733 - loss: 0.3109 - val_accuracy: 0.8404 - val_loss: 0.4103 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                 2s 60ms/step -
accuracy: 0.8680 - loss: 0.3118 - val_accuracy: 0.8723 - val_loss: 0.3830 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                 2s 60ms/step -
accuracy: 0.8795 - loss: 0.2903 - val_accuracy: 0.8617 - val_loss: 0.3306 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                 2s 60ms/step -
accuracy: 0.9098 - loss: 0.2176 - val_accuracy: 0.8404 - val_loss: 0.3156 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8998821973800659
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 40
```
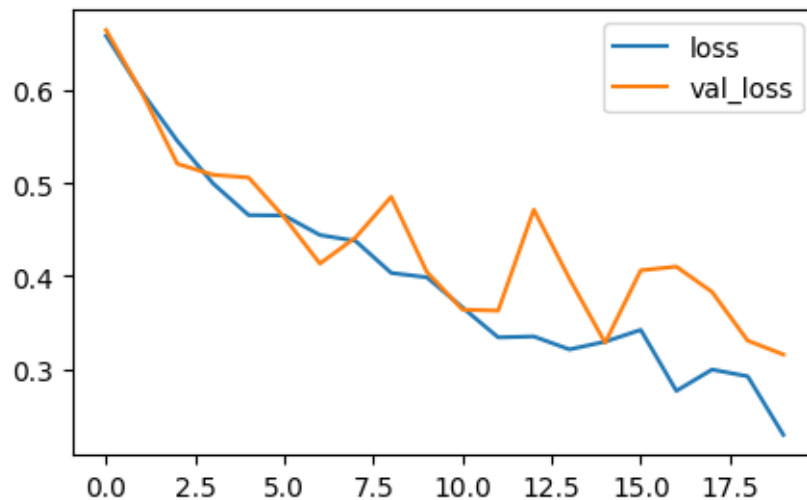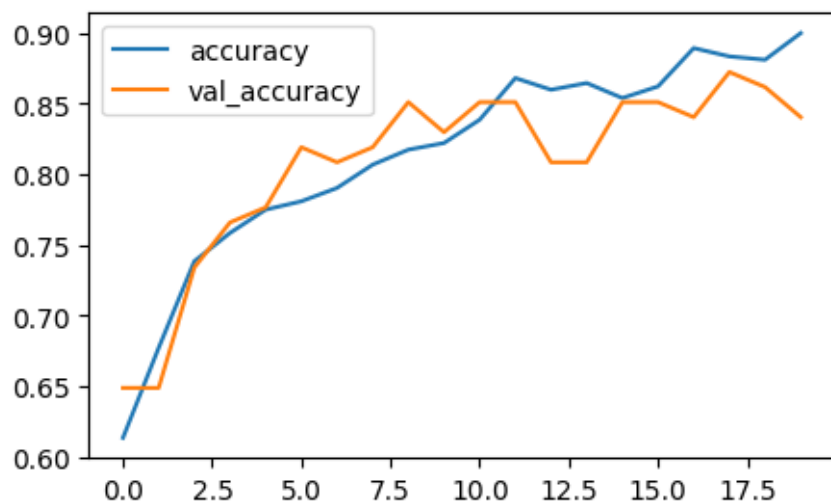
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8226 - loss: 0.3414
[0.3156454265117645, 0.8404255509376526]
3/3                0s 26ms/step
Classification Report:
            precision    recall  f1-score   support

     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 1/20
27/27              2s 64ms/step -
accuracy: 0.5445 - loss: 0.6862 - val_accuracy: 0.6383 - val_loss: 0.6361 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.7149 - loss: 0.5746 - val_accuracy: 0.7021 - val_loss: 0.5777 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 62ms/step -
accuracy: 0.7698 - loss: 0.5000 - val_accuracy: 0.8085 - val_loss: 0.4645 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7831 - loss: 0.4744 - val_accuracy: 0.7234 - val_loss: 0.4453 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.8113 - loss: 0.4124 - val_accuracy: 0.7766 - val_loss: 0.5085 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.8209 - loss: 0.4419 - val_accuracy: 0.7872 - val_loss: 0.5364 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.8294 - loss: 0.4111 - val_accuracy: 0.7979 - val_loss: 0.3887 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8322 - loss: 0.3964 - val_accuracy: 0.8191 - val_loss: 0.4531 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8522 - loss: 0.3557 - val_accuracy: 0.7872 - val_loss: 0.5617 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8409 - loss: 0.3555 - val_accuracy: 0.8085 - val_loss: 0.3824 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8715 - loss: 0.3130 - val_accuracy: 0.8085 - val_loss: 0.3927 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 60ms/step -
accuracy: 0.8724 - loss: 0.3108 - val_accuracy: 0.7979 - val_loss: 0.4329 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 62ms/step -
accuracy: 0.8449 - loss: 0.3287 - val_accuracy: 0.8191 - val_loss: 0.3901 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 61ms/step -
accuracy: 0.8732 - loss: 0.2960 - val_accuracy: 0.8191 - val_loss: 0.5306 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8641 - loss: 0.2897 - val_accuracy: 0.8298 - val_loss: 0.3290 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                   2s 61ms/step -
accuracy: 0.9020 - loss: 0.2473 - val_accuracy: 0.7872 - val_loss: 0.3965 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                   2s 60ms/step -
accuracy: 0.8650 - loss: 0.2812 - val_accuracy: 0.8191 - val_loss: 0.3663 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                   2s 60ms/step -
accuracy: 0.8805 - loss: 0.2800 - val_accuracy: 0.8298 - val_loss: 0.5098 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                   2s 61ms/step -
accuracy: 0.8724 - loss: 0.2725 - val_accuracy: 0.8511 - val_loss: 0.4358 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                   2s 61ms/step -
accuracy: 0.9074 - loss: 0.2338 - val_accuracy: 0.8404 - val_loss: 0.5106 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8963486552238464
Current validation accuracy: 0.8404255509376526
Reseting all weights…
Current number of trials: 41
```
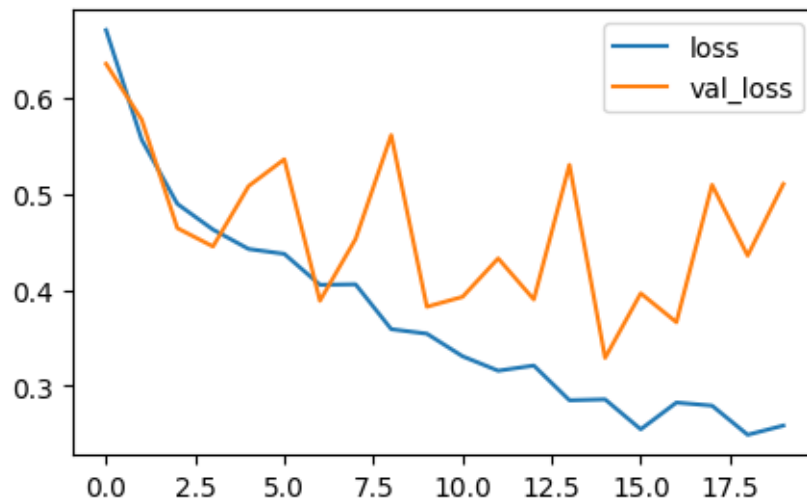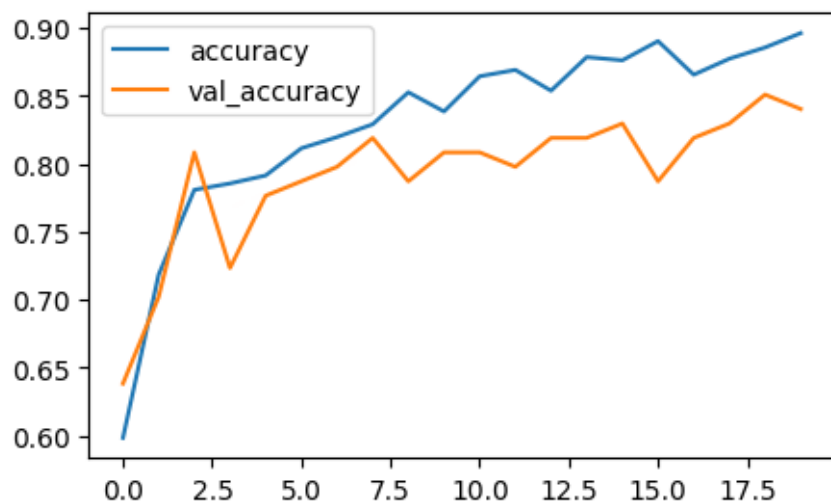
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8421 - loss: 0.5180
[0.5105862021446228, 0.8404255509376526]
3/3                0s 28ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.77      0.90      0.83        41
        Male       0.91      0.79      0.85        53

    accuracy                           0.84        94
   macro avg       0.84      0.85      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 1/20
27/27              2s 64ms/step -
accuracy: 0.5883 - loss: 0.6851 - val_accuracy: 0.6596 - val_loss: 0.6443 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 62ms/step -
accuracy: 0.7162 - loss: 0.5580 - val_accuracy: 0.7234 - val_loss: 0.6407 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 60ms/step -
accuracy: 0.7511 - loss: 0.4822 - val_accuracy: 0.7979 - val_loss: 0.4540 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 60ms/step -
accuracy: 0.7803 - loss: 0.4554 - val_accuracy: 0.8085 - val_loss: 0.4920 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 59ms/step -
accuracy: 0.7752 - loss: 0.4701 - val_accuracy: 0.8511 - val_loss: 0.3596 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 61ms/step -
accuracy: 0.7778 - loss: 0.4817 - val_accuracy: 0.8617 - val_loss: 0.3916 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 60ms/step -
accuracy: 0.8406 - loss: 0.3909 - val_accuracy: 0.8404 - val_loss: 0.4768 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 60ms/step -
accuracy: 0.8260 - loss: 0.4307 - val_accuracy: 0.8723 - val_loss: 0.3380 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 61ms/step -
accuracy: 0.8609 - loss: 0.3401 - val_accuracy: 0.8723 - val_loss: 0.3448 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 61ms/step -
accuracy: 0.8448 - loss: 0.3446 - val_accuracy: 0.8298 - val_loss: 0.3106 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 59ms/step -
accuracy: 0.8477 - loss: 0.3585 - val_accuracy: 0.8617 - val_loss: 0.3339 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 62ms/step -
accuracy: 0.8533 - loss: 0.3307 - val_accuracy: 0.8617 - val_loss: 0.4130 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 59ms/step -
accuracy: 0.8633 - loss: 0.3258 - val_accuracy: 0.8298 - val_loss: 0.3771 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 60ms/step -
accuracy: 0.8577 - loss: 0.3180 - val_accuracy: 0.8085 - val_loss: 0.3307 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 60ms/step -
accuracy: 0.9184 - loss: 0.2467 - val_accuracy: 0.8298 - val_loss: 0.3205 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8749 - loss: 0.2896 - val_accuracy: 0.8511 - val_loss: 0.4503 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 61ms/step -
accuracy: 0.8818 - loss: 0.2614 - val_accuracy: 0.8298 - val_loss: 0.3612 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 60ms/step -
accuracy: 0.8989 - loss: 0.2527 - val_accuracy: 0.8617 - val_loss: 0.4082 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.8908 - loss: 0.2852 - val_accuracy: 0.8404 - val_loss: 0.4310 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 60ms/step -
accuracy: 0.8928 - loss: 0.2446 - val_accuracy: 0.8830 - val_loss: 0.3292 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9034157991409302
Current validation accuracy: 0.8829787373542786
Reseting all weights…
Current number of trials: 42
```
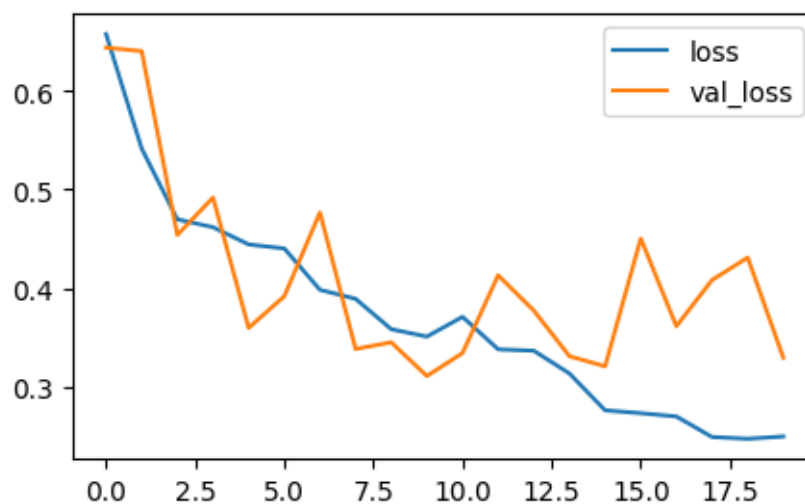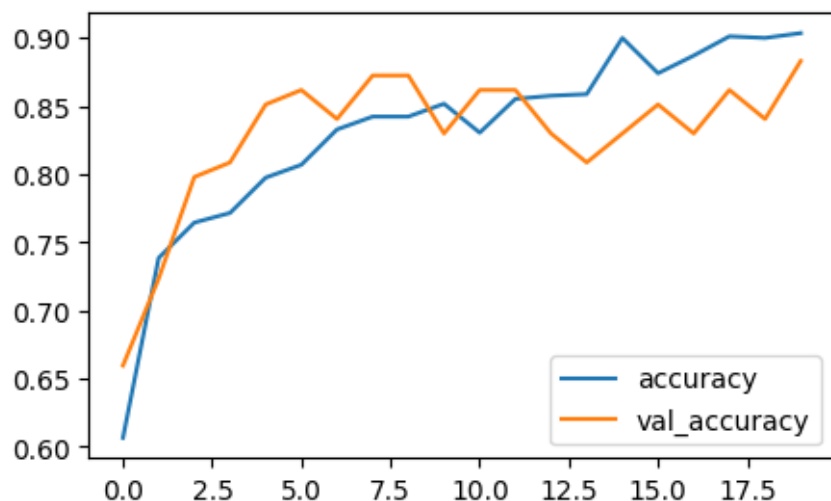
```
['loss', 'compile_metrics']
3/3              0s 16ms/step -
accuracy: 0.8673 - loss: 0.3453
[0.329234778881073, 0.8829787373542786]
3/3              0s 29ms/step
Classification Report:
             precision    recall   f1-score    support

     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 1/20
27/27               2s 65ms/step -
accuracy: 0.5845 - loss: 0.6846 - val_accuracy: 0.7766 - val_loss: 0.5634 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 60ms/step -
accuracy: 0.7243 - loss: 0.5562 - val_accuracy: 0.7447 - val_loss: 0.5196 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 60ms/step -
accuracy: 0.7637 - loss: 0.5141 - val_accuracy: 0.8085 - val_loss: 0.4744 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 61ms/step -
accuracy: 0.8038 - loss: 0.4601 - val_accuracy: 0.8085 - val_loss: 0.4696 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 60ms/step -
accuracy: 0.7641 - loss: 0.4756 - val_accuracy: 0.8723 - val_loss: 0.3375 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 60ms/step -
accuracy: 0.8387 - loss: 0.3976 - val_accuracy: 0.8617 - val_loss: 0.3960 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 61ms/step -
accuracy: 0.8407 - loss: 0.3584 - val_accuracy: 0.8298 - val_loss: 0.3420 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 60ms/step -
accuracy: 0.8426 - loss: 0.3875 - val_accuracy: 0.8298 - val_loss: 0.4402 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 60ms/step -
accuracy: 0.8378 - loss: 0.3548 - val_accuracy: 0.8404 - val_loss: 0.3358 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 60ms/step -
accuracy: 0.8546 - loss: 0.3291 - val_accuracy: 0.8511 - val_loss: 0.3426 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 62ms/step -
accuracy: 0.8679 - loss: 0.3389 - val_accuracy: 0.8511 - val_loss: 0.3456 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 60ms/step -
accuracy: 0.8842 - loss: 0.3116 - val_accuracy: 0.8617 - val_loss: 0.3652 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 60ms/step -
accuracy: 0.8669 - loss: 0.3106 - val_accuracy: 0.8617 - val_loss: 0.3079 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 59ms/step -
accuracy: 0.8771 - loss: 0.2760 - val_accuracy: 0.8191 - val_loss: 0.3462 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 60ms/step -
accuracy: 0.8949 - loss: 0.2500 - val_accuracy: 0.8511 - val_loss: 0.3326 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                 2s 61ms/step -
accuracy: 0.8995 - loss: 0.2607 - val_accuracy: 0.8617 - val_loss: 0.3830 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                 2s 61ms/step -
accuracy: 0.8805 - loss: 0.2763 - val_accuracy: 0.8511 - val_loss: 0.3683 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                 2s 61ms/step -
accuracy: 0.8857 - loss: 0.2674 - val_accuracy: 0.8617 - val_loss: 0.3148 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                 2s 61ms/step -
accuracy: 0.9128 - loss: 0.2192 - val_accuracy: 0.8830 - val_loss: 0.3635 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                 2s 61ms/step -
accuracy: 0.8954 - loss: 0.2389 - val_accuracy: 0.8723 - val_loss: 0.3781 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8881036639213562
Current validation accuracy: 0.8723404407501221
Reseting all weights…
Current number of trials: 43
```
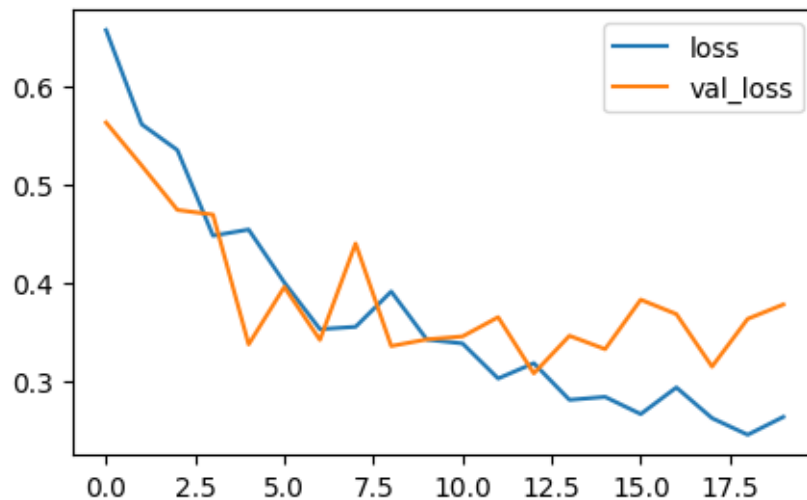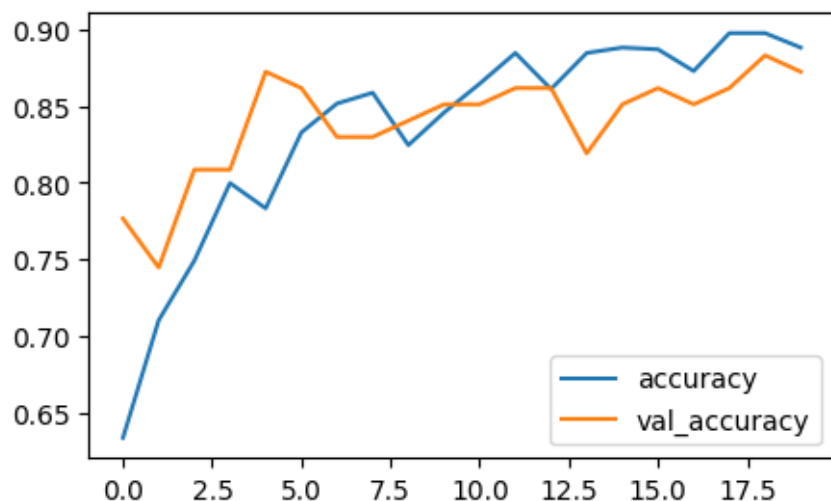
```
['loss', 'compile_metrics']
3/3                0s 16ms/step -
accuracy: 0.8463 - loss: 0.3998
[0.3780640959739685, 0.8723404407501221]
3/3                0s 29ms/step
Classification Report:
              precision     recall   f1-score    support

      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 1/20
27/27               2s 64ms/step -
accuracy: 0.5368 - loss: 0.7287 - val_accuracy: 0.6064 - val_loss: 0.6767 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 60ms/step -
accuracy: 0.6567 - loss: 0.6445 - val_accuracy: 0.6064 - val_loss: 0.6404 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 61ms/step -
accuracy: 0.7296 - loss: 0.5571 - val_accuracy: 0.7128 - val_loss: 0.6795 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7360 - loss: 0.5196 - val_accuracy: 0.7766 - val_loss: 0.5805 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 60ms/step -
accuracy: 0.7699 - loss: 0.4720 - val_accuracy: 0.7979 - val_loss: 0.5064 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7927 - loss: 0.4684 - val_accuracy: 0.8191 - val_loss: 0.4595 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.8206 - loss: 0.4018 - val_accuracy: 0.8617 - val_loss: 0.3982 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8438 - loss: 0.3847 - val_accuracy: 0.7979 - val_loss: 0.4445 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8292 - loss: 0.3870 - val_accuracy: 0.8298 - val_loss: 0.4143 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 62ms/step -
accuracy: 0.8183 - loss: 0.4417 - val_accuracy: 0.8085 - val_loss: 0.5073 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 61ms/step -
accuracy: 0.8314 - loss: 0.3817 - val_accuracy: 0.8298 - val_loss: 0.3592 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 59ms/step -
accuracy: 0.8533 - loss: 0.3452 - val_accuracy: 0.8298 - val_loss: 0.4920 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 60ms/step -
accuracy: 0.8610 - loss: 0.3416 - val_accuracy: 0.8191 - val_loss: 0.4646 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8359 - loss: 0.3552 - val_accuracy: 0.8085 - val_loss: 0.4476 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8482 - loss: 0.3485 - val_accuracy: 0.8404 - val_loss: 0.4381 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 60ms/step -
accuracy: 0.8819 - loss: 0.2653 - val_accuracy: 0.8723 - val_loss: 0.3147 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 60ms/step -
accuracy: 0.8516 - loss: 0.3544 - val_accuracy: 0.8723 - val_loss: 0.3619 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                2s 61ms/step -
accuracy: 0.8744 - loss: 0.2896 - val_accuracy: 0.8511 - val_loss: 0.3852 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                2s 61ms/step -
accuracy: 0.8665 - loss: 0.2866 - val_accuracy: 0.8404 - val_loss: 0.4873 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                2s 62ms/step -
accuracy: 0.8902 - loss: 0.2511 - val_accuracy: 0.8511 - val_loss: 0.5322 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8975265026092529
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 44
```
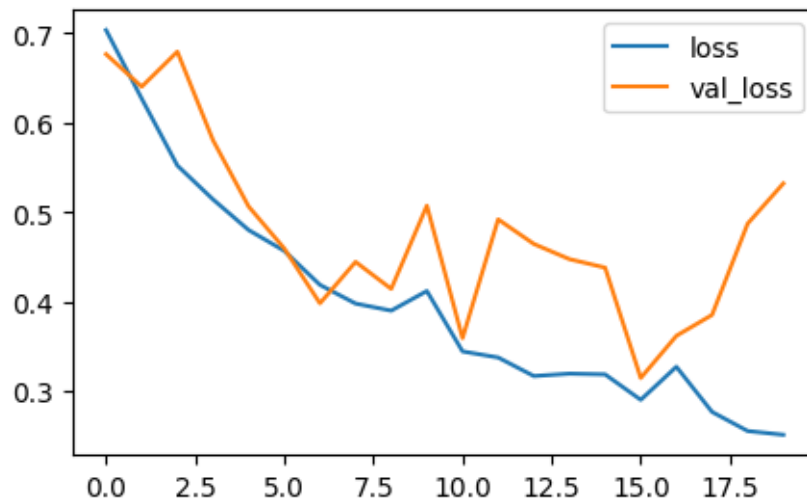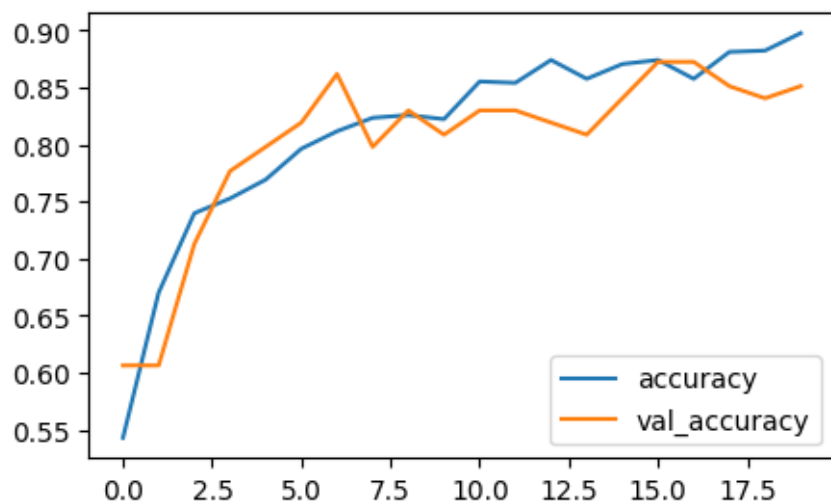
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8513 - loss: 0.5855
[0.5322202444076538, 0.8510638475418091]
3/3                 0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.80      0.88      0.84        41
        Male       0.90      0.83      0.86        53

    accuracy                           0.85        94
   macro avg       0.85      0.85      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 1/20
27/27               2s 63ms/step -
accuracy: 0.4950 - loss: 0.7197 - val_accuracy: 0.4468 - val_loss: 0.7193 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 60ms/step -
accuracy: 0.6364 - loss: 0.6177 - val_accuracy: 0.6702 - val_loss: 0.6333 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 60ms/step -
accuracy: 0.7578 - loss: 0.5318 - val_accuracy: 0.7340 - val_loss: 0.4993 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27                2s 60ms/step -
accuracy: 0.7587 - loss: 0.5071 - val_accuracy: 0.7660 - val_loss: 0.5555 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27                2s 60ms/step -
accuracy: 0.7866 - loss: 0.4557 - val_accuracy: 0.8191 - val_loss: 0.4613 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27                2s 60ms/step -
accuracy: 0.7937 - loss: 0.4345 - val_accuracy: 0.8723 - val_loss: 0.3856 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27                2s 60ms/step -
accuracy: 0.8020 - loss: 0.4223 - val_accuracy: 0.7766 - val_loss: 0.4867 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27                2s 61ms/step -
accuracy: 0.8283 - loss: 0.3847 - val_accuracy: 0.8404 - val_loss: 0.4795 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27                2s 60ms/step -
accuracy: 0.8053 - loss: 0.3824 - val_accuracy: 0.8404 - val_loss: 0.3584 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27                2s 60ms/step -
accuracy: 0.8277 - loss: 0.3760 - val_accuracy: 0.8511 - val_loss: 0.3579 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27                2s 59ms/step -
accuracy: 0.8586 - loss: 0.3524 - val_accuracy: 0.8404 - val_loss: 0.3934 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27                2s 61ms/step -
accuracy: 0.8509 - loss: 0.3497 - val_accuracy: 0.8298 - val_loss: 0.3272 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27                2s 59ms/step -
accuracy: 0.8226 - loss: 0.3803 - val_accuracy: 0.7660 - val_loss: 0.5294 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27                2s 59ms/step -
accuracy: 0.8556 - loss: 0.3615 - val_accuracy: 0.8191 - val_loss: 0.4809 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27                2s 59ms/step -
accuracy: 0.8688 - loss: 0.2740 - val_accuracy: 0.8404 - val_loss: 0.4359 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                  2s 58ms/step -
accuracy: 0.8892 - loss: 0.3007 - val_accuracy: 0.8723 - val_loss: 0.3851 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                  2s 60ms/step -
accuracy: 0.8847 - loss: 0.2732 - val_accuracy: 0.8723 - val_loss: 0.3205 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                  2s 59ms/step -
accuracy: 0.8861 - loss: 0.2828 - val_accuracy: 0.8191 - val_loss: 0.4154 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                  2s 61ms/step -
accuracy: 0.8772 - loss: 0.2850 - val_accuracy: 0.8404 - val_loss: 0.3831 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                  2s 59ms/step -
accuracy: 0.9002 - loss: 0.2386 - val_accuracy: 0.8191 - val_loss: 0.6668 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8881036639213562
Current validation accuracy: 0.8191489577293396
Reseting all weights…
Current number of trials: 45
```
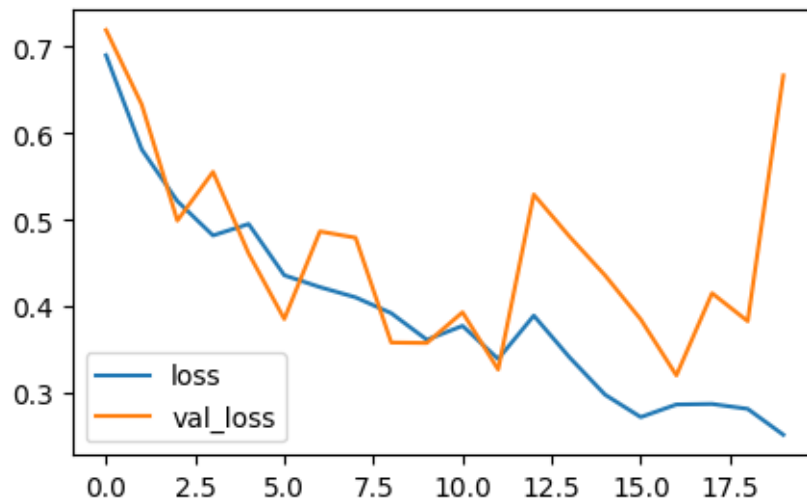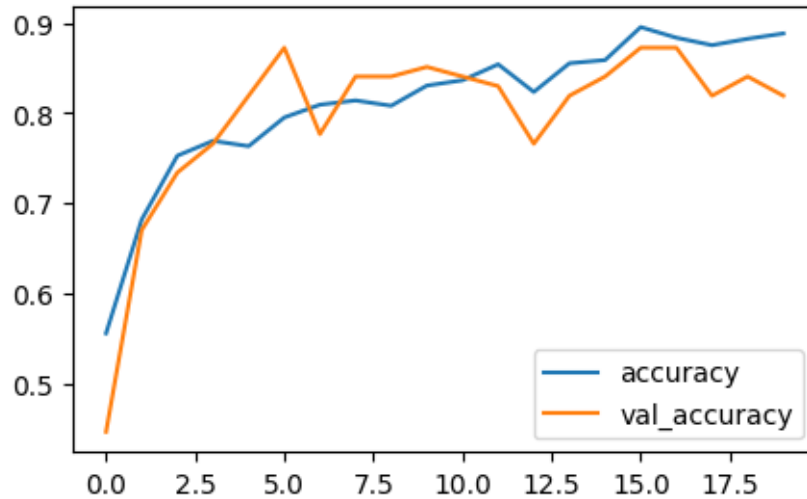
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8119 - loss: 0.7175
[0.6668013334274292, 0.8191489577293396]
3/3                 0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27               2s 63ms/step -
accuracy: 0.5362 - loss: 0.6953 - val_accuracy: 0.5957 - val_loss: 0.6831 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 60ms/step -
accuracy: 0.6915 - loss: 0.6334 - val_accuracy: 0.7021 - val_loss: 0.6048 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 59ms/step -
accuracy: 0.7173 - loss: 0.5485 - val_accuracy: 0.7021 - val_loss: 0.5783 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 59ms/step -
accuracy: 0.7640 - loss: 0.5121 - val_accuracy: 0.7553 - val_loss: 0.5449 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7924 - loss: 0.4614 - val_accuracy: 0.7872 - val_loss: 0.5292 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 59ms/step -
accuracy: 0.7702 - loss: 0.4751 - val_accuracy: 0.7872 - val_loss: 0.5062 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 59ms/step -
accuracy: 0.8035 - loss: 0.4303 - val_accuracy: 0.7766 - val_loss: 0.4583 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7966 - loss: 0.4349 - val_accuracy: 0.7660 - val_loss: 0.4467 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 59ms/step -
accuracy: 0.7809 - loss: 0.4472 - val_accuracy: 0.7766 - val_loss: 0.5339 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 60ms/step -
accuracy: 0.8042 - loss: 0.4196 - val_accuracy: 0.8191 - val_loss: 0.4260 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 59ms/step -
accuracy: 0.8318 - loss: 0.3682 - val_accuracy: 0.7766 - val_loss: 0.4352 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 59ms/step -
accuracy: 0.8428 - loss: 0.3687 - val_accuracy: 0.8191 - val_loss: 0.4904 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 59ms/step -
accuracy: 0.8319 - loss: 0.3832 - val_accuracy: 0.8298 - val_loss: 0.3774 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 59ms/step -
accuracy: 0.8558 - loss: 0.3560 - val_accuracy: 0.8191 - val_loss: 0.4385 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8609 - loss: 0.3334 - val_accuracy: 0.8191 - val_loss: 0.4078 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                 2s 59ms/step -
accuracy: 0.8590 - loss: 0.3238 - val_accuracy: 0.8404 - val_loss: 0.3996 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                 2s 59ms/step -
accuracy: 0.8589 - loss: 0.3320 - val_accuracy: 0.8298 - val_loss: 0.4484 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                 2s 61ms/step -
accuracy: 0.8987 - loss: 0.2686 - val_accuracy: 0.8404 - val_loss: 0.3928 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                 2s 60ms/step -
accuracy: 0.8832 - loss: 0.3001 - val_accuracy: 0.8191 - val_loss: 0.4287 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                 2s 59ms/step -
accuracy: 0.8744 - loss: 0.2984 - val_accuracy: 0.8511 - val_loss: 0.4007 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8704358339309692
Current validation accuracy: 0.8510638475418091
Reseting all weights…
Current number of trials: 46
```
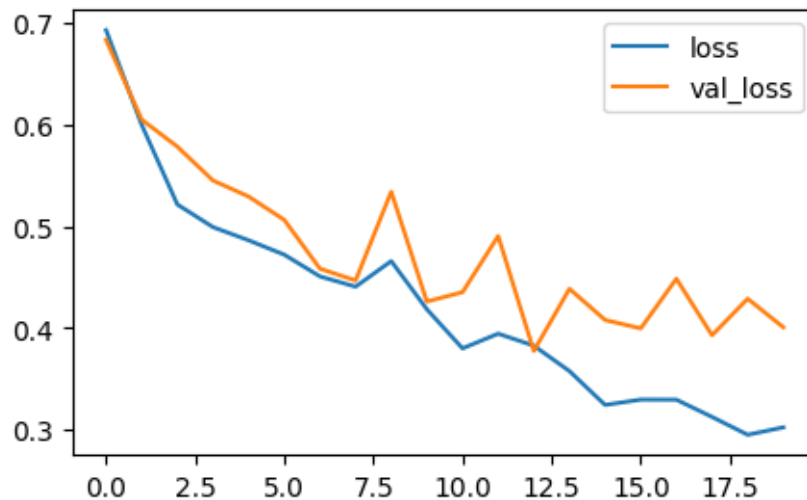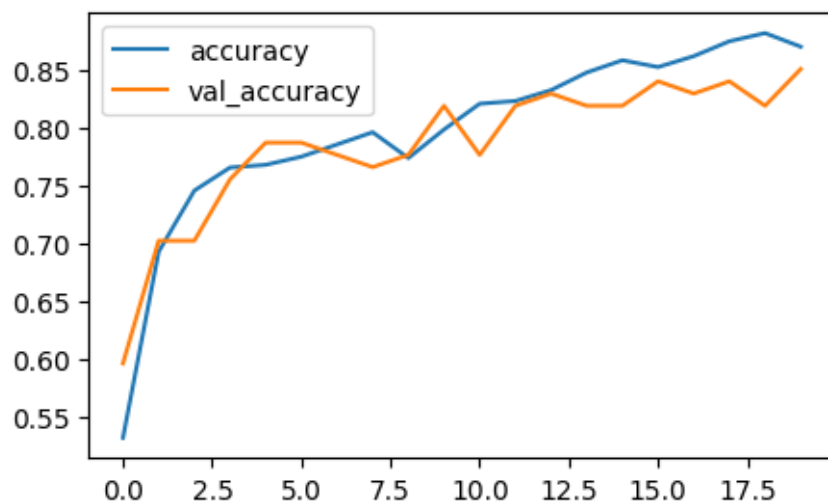
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.8552 - loss: 0.4128
[0.40069255232810974, 0.8510638475418091]
3/3                 0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      Female       0.76      0.95      0.85        41
        Male       0.95      0.77      0.85        53

    accuracy                           0.85        94
   macro avg       0.86      0.86      0.85        94
weighted avg       0.87      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 1/20
27/27               2s 63ms/step -
accuracy: 0.5816 - loss: 0.6822 - val_accuracy: 0.6915 - val_loss: 0.6176 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27               2s 60ms/step -
accuracy: 0.7176 - loss: 0.5740 - val_accuracy: 0.6277 - val_loss: 0.7534 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27               2s 60ms/step -
accuracy: 0.7013 - loss: 0.5687 - val_accuracy: 0.7021 - val_loss: 0.5940 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 59ms/step -
accuracy: 0.7349 - loss: 0.5379 - val_accuracy: 0.7340 - val_loss: 0.6242 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7677 - loss: 0.4780 - val_accuracy: 0.7872 - val_loss: 0.4630 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7863 - loss: 0.4534 - val_accuracy: 0.7234 - val_loss: 0.6366 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 61ms/step -
accuracy: 0.7987 - loss: 0.4236 - val_accuracy: 0.8404 - val_loss: 0.4540 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.8473 - loss: 0.3689 - val_accuracy: 0.8191 - val_loss: 0.4232 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 59ms/step -
accuracy: 0.8153 - loss: 0.3853 - val_accuracy: 0.7872 - val_loss: 0.5153 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 61ms/step -
accuracy: 0.8599 - loss: 0.3628 - val_accuracy: 0.8298 - val_loss: 0.4295 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 60ms/step -
accuracy: 0.8519 - loss: 0.3391 - val_accuracy: 0.8298 - val_loss: 0.4930 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 61ms/step -
accuracy: 0.8720 - loss: 0.3075 - val_accuracy: 0.8085 - val_loss: 0.4504 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 59ms/step -
accuracy: 0.8469 - loss: 0.3467 - val_accuracy: 0.8511 - val_loss: 0.4420 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8854 - loss: 0.2956 - val_accuracy: 0.8617 - val_loss: 0.3856 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 59ms/step -
accuracy: 0.8529 - loss: 0.3351 - val_accuracy: 0.8511 - val_loss: 0.4600 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                 2s 60ms/step -
accuracy: 0.8744 - loss: 0.2966 - val_accuracy: 0.8298 - val_loss: 0.4874 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                 2s 61ms/step -
accuracy: 0.8561 - loss: 0.3211 - val_accuracy: 0.8723 - val_loss: 0.3130 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                 2s 60ms/step -
accuracy: 0.8751 - loss: 0.2911 - val_accuracy: 0.8404 - val_loss: 0.3283 -
learning_rate: 5.0000e-04
Epoch 19/20
27/27                 2s 60ms/step -
accuracy: 0.8939 - loss: 0.2775 - val_accuracy: 0.8617 - val_loss: 0.4573 -
learning_rate: 5.0000e-04
Epoch 20/20
27/27                 2s 60ms/step -
accuracy: 0.8845 - loss: 0.2601 - val_accuracy: 0.8617 - val_loss: 0.4041 -
learning_rate: 5.0000e-04
Current training accuracy: 0.8963486552238464
Current validation accuracy: 0.8617021441459656
Reseting all weights…
Current number of trials: 47
```
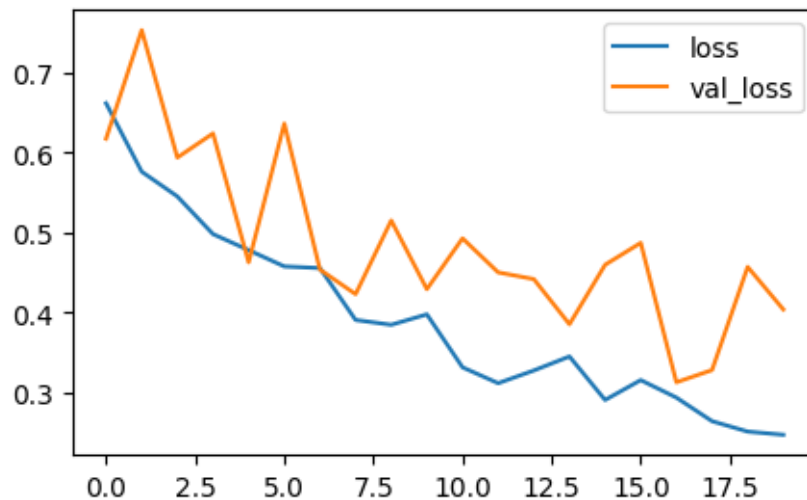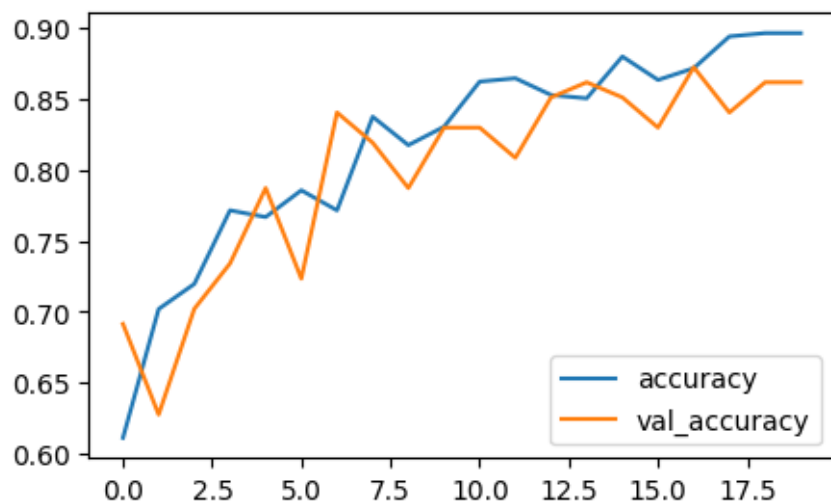
```
['loss', 'compile_metrics']
3/3                0s 15ms/step -
accuracy: 0.8684 - loss: 0.4197
[0.4040776491165161, 0.8617021441459656]
3/3                0s 27ms/step
Classification Report:
              precision    recall  f1-score   support

      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 1/20
27/27              2s 63ms/step -
accuracy: 0.5029 - loss: 0.6948 - val_accuracy: 0.5213 - val_loss: 0.6908 -
learning_rate: 5.0000e-04
Epoch 2/20
27/27              2s 60ms/step -
accuracy: 0.6550 - loss: 0.6305 - val_accuracy: 0.7234 - val_loss: 0.5914 -
learning_rate: 5.0000e-04
Epoch 3/20
27/27              2s 59ms/step -
accuracy: 0.7253 - loss: 0.5501 - val_accuracy: 0.7660 - val_loss: 0.5193 -
```

```
learning_rate: 5.0000e-04
Epoch 4/20
27/27              2s 60ms/step -
accuracy: 0.7397 - loss: 0.5269 - val_accuracy: 0.7872 - val_loss: 0.4847 -
learning_rate: 5.0000e-04
Epoch 5/20
27/27              2s 59ms/step -
accuracy: 0.7965 - loss: 0.4572 - val_accuracy: 0.7660 - val_loss: 0.5069 -
learning_rate: 5.0000e-04
Epoch 6/20
27/27              2s 60ms/step -
accuracy: 0.7669 - loss: 0.4707 - val_accuracy: 0.8085 - val_loss: 0.4789 -
learning_rate: 5.0000e-04
Epoch 7/20
27/27              2s 60ms/step -
accuracy: 0.7711 - loss: 0.4659 - val_accuracy: 0.8191 - val_loss: 0.4670 -
learning_rate: 5.0000e-04
Epoch 8/20
27/27              2s 60ms/step -
accuracy: 0.7926 - loss: 0.4406 - val_accuracy: 0.8085 - val_loss: 0.4441 -
learning_rate: 5.0000e-04
Epoch 9/20
27/27              2s 60ms/step -
accuracy: 0.8461 - loss: 0.3792 - val_accuracy: 0.7872 - val_loss: 0.3869 -
learning_rate: 5.0000e-04
Epoch 10/20
27/27              2s 59ms/step -
accuracy: 0.8715 - loss: 0.3475 - val_accuracy: 0.8298 - val_loss: 0.4848 -
learning_rate: 5.0000e-04
Epoch 11/20
27/27              2s 59ms/step -
accuracy: 0.8625 - loss: 0.3346 - val_accuracy: 0.8511 - val_loss: 0.3586 -
learning_rate: 5.0000e-04
Epoch 12/20
27/27              2s 59ms/step -
accuracy: 0.8805 - loss: 0.2869 - val_accuracy: 0.8085 - val_loss: 0.3992 -
learning_rate: 5.0000e-04
Epoch 13/20
27/27              2s 59ms/step -
accuracy: 0.8646 - loss: 0.3186 - val_accuracy: 0.8511 - val_loss: 0.4004 -
learning_rate: 5.0000e-04
Epoch 14/20
27/27              2s 60ms/step -
accuracy: 0.8669 - loss: 0.3052 - val_accuracy: 0.8404 - val_loss: 0.3553 -
learning_rate: 5.0000e-04
Epoch 15/20
27/27              2s 60ms/step -
accuracy: 0.8649 - loss: 0.3026 - val_accuracy: 0.8617 - val_loss: 0.4256 -
```

```
learning_rate: 5.0000e-04
Epoch 16/20
27/27                2s 61ms/step -
accuracy: 0.8745 - loss: 0.2661 - val_accuracy: 0.8511 - val_loss: 0.3683 -
learning_rate: 5.0000e-04
Epoch 17/20
27/27                2s 59ms/step -
accuracy: 0.8804 - loss: 0.3077 - val_accuracy: 0.8617 - val_loss: 0.4023 -
learning_rate: 5.0000e-04
Epoch 18/20
27/27                0s 58ms/step -
accuracy: 0.9064 - loss: 0.2141Reached desired accuracy so cancelling training!
27/27                2s 59ms/step -
accuracy: 0.9065 - loss: 0.2145 - val_accuracy: 0.9043 - val_loss: 0.2279 -
learning_rate: 5.0000e-04
Current training accuracy: 0.9081271886825562
Current validation accuracy: 0.9042553305625916
Reseting all weights…
Current number of trials: 48
```
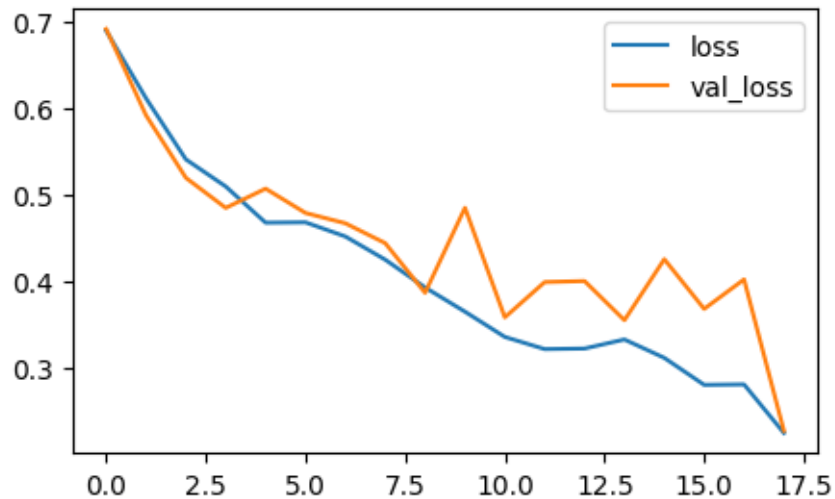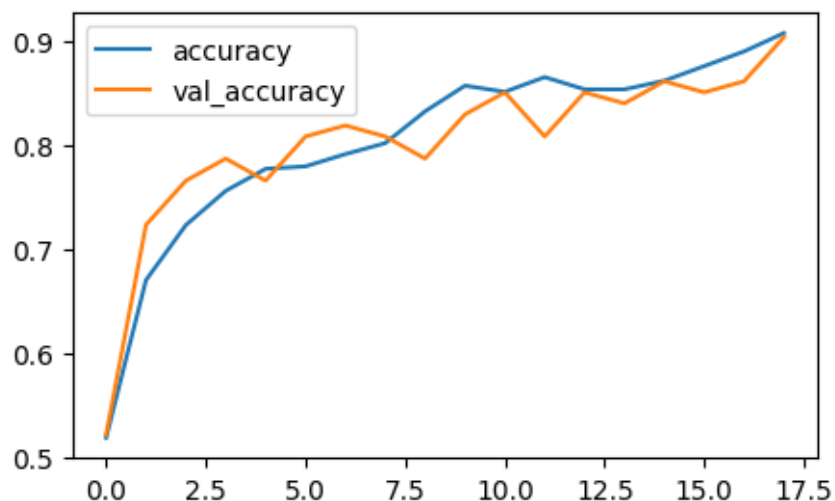
```
['loss', 'compile_metrics']
3/3                 0s 15ms/step -
accuracy: 0.9053 - loss: 0.2333
[0.2279369831085205, 0.9042553305625916]
3/3                 0s 27ms/step
```

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')`.

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	0.518257	0.688935	0.521277	0.690766	0.0005
1	0.670200	0.611009	0.723404	0.591394	0.0005
2	0.723204	0.540585	0.765957	0.519338	0.0005
3	0.756184	0.509368	0.787234	0.484688	0.0005
4	0.777385	0.467668	0.765957	0.506874	0.0005
5	0.779741	0.468087	0.808511	0.478866	0.0005
6	0.791519	0.451787	0.819149	0.466974	0.0005

```
 7   0.802120  0.425069      0.808511  0.444076          0.0005
 8   0.832744  0.393031      0.787234  0.386916          0.0005
 9   0.857479  0.365147      0.829787  0.484808          0.0005
10   0.851590  0.336053      0.851064  0.358613          0.0005
11   0.865724  0.322022      0.808511  0.399240          0.0005
12   0.853946  0.322674      0.851064  0.400419          0.0005
13   0.853946  0.333116      0.840426  0.355331          0.0005
14   0.862191  0.311933      0.861702  0.425609          0.0005
```

```python
from tensorflow.keras.models import Model
from tensorflow.keras.utils import load_img, img_to_array

img_size = img_size
model = tf.keras.models.load_model("trained_model_run77_very_advanced_control.
  ↪h5")


# Load your personal image if you are interested to predict:
#your_image_path = "D:\\Hossein's desktop files in Microsoft Studio␣
  ↪Laptop\\Personal Photos\\Hossein_10.jpg"
your_image_path = "/Users/hossein/Downloads/Hossein.png"


img = load_img(your_image_path, target_size=(img_size, img_size))
final_img = img_to_array(img)
# Adding a batch dimension:
final_img = np.expand_dims(final_img, axis=0)
prediction = model.predict(final_img)
result = "Female" if prediction > 0.5 else "Male"
if result=="Female":
    confidence = (model.predict(final_img)[0][0])*100
else:
    confidence = (1-model.predict(final_img)[0][0])*100
print(f"Prediction result: {result} (confidence= {confidence:.2f} %)")

# Visualize CNN Layers
dummy_input = np.random.rand(1, img_size, img_size, 3)  # Create random input␣
  ↪with correct shape
model.predict(dummy_input)  # Call the model to establish input tensors
visualization_model = Model(inputs=model.inputs, outputs=[layer.output for␣
  ↪layer in model.layers])
successive_feature_maps = visualization_model.predict(final_img)
layer_names = [layer.name for layer in model.layers]

for layer_name, feature_map in zip(layer_names, successive_feature_maps):
    if len(feature_map.shape) == 4:  # Only visualize conv/maxpool layers
        n_features = feature_map.shape[-1]  # Number of filters
        size = feature_map.shape[1]  # Feature map size
        display_grid = np.zeros((size, size * n_features))
```

```python
    for i in range(n_features):
        x = feature_map[0, :, :, i]
        x -= x.mean()
        x /= (x.std() + 1e-8)   # Normalize
        x *= 64
        x += 128
        x = np.clip(x, 0, 255).astype('uint8')   # Convert to image format
        display_grid[:, i * size: (i + 1) * size] = x

    scale = 20. / n_features
    plt.figure(figsize=(scale * n_features, scale))
    plt.title(layer_name)
    plt.grid(False)
    plt.imshow(display_grid, aspect='auto', cmap='cividis')
    plt.show()
```

WARNING:absl:Compiled the loaded model, but the compiled metrics have yet to be built. `model.compile_metrics` will be empty until you train or evaluate the model.

```
1/1                0s 37ms/step
1/1                0s 14ms/step
Prediction result: Male (confidence= 74.16 %)
1/1                0s 13ms/step
```

/opt/anaconda3/envs/mytfenv/lib/python3.12/site-packages/keras/src/models/functional.py:237: UserWarning: The structure of `inputs` doesn't match the expected structure.
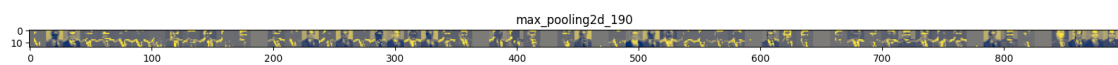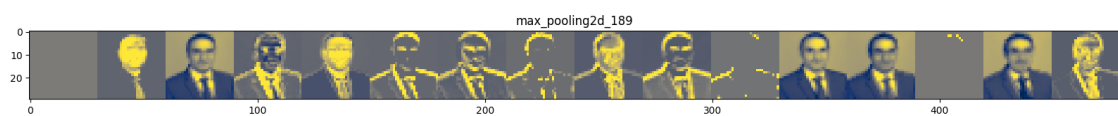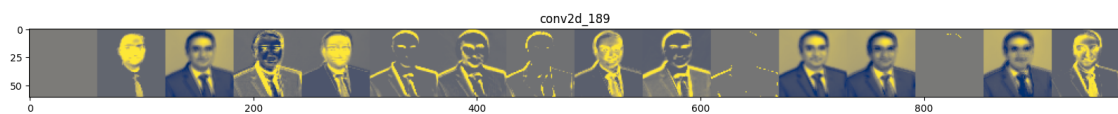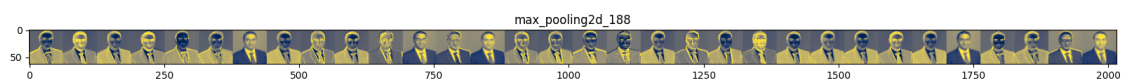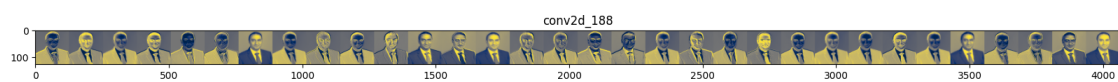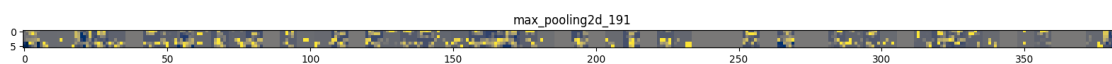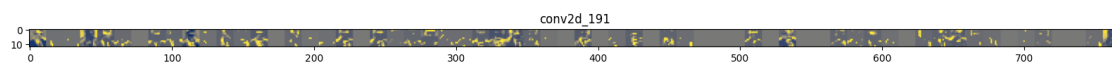Expected: ['input_layer_95']
Received: inputs=Tensor(shape=(1, 130, 130, 3))
  warnings.warn(msg)

```
1/1                0s 146ms/step
```

rescaling_47

conv2d_188

max_pooling2d_188

conv2d_189

max_pooling2d_189

conv2d_190

max_pooling2d_190

conv2d_191

max_pooling2d_191

[ ]:

[ ]:

[ ]: