```
D:\DeepFake\pythonProject1\.venv\Scripts\python.exe D:\DeepFake\pythonProject1\Main\main.py
2025-09-24 15:04:05.788836: I tensorflow/core/util/port.cc:153] oneDNN custom operations are on. You may see slightly different numerical results due to floating-point round-off errors from different computation orders. To turn them off, set the environment variable `TF_ENABLE_ONEDNN_OPTS=0`.
2025-09-24 15:04:09.132101: I tensorflow/core/util/port.cc:153] oneDNN custom operations are on. You may see slightly different numerical results due to floating-point round-off errors from different computation orders. To turn them off, set the environment variable `TF_ENABLE_ONEDNN_OPTS=0`.
Using TensorFlow 2.19.0
Config: {
  "model_name": "mobilenetv3",
  "data_dir": "D:/DeepFake/pythonProject1/Frames/Celeb-df/Celeb-df 224 EX",
  "epochs": 20,
  "batch_size": 32,
  "seed": 42,
  "base_trainable_at": -40,
  "warmup_epochs": 3,
  "learning_rate": 0.001,
  "fine_tune_lr": 2e-05,
  "use_class_weights": false,
  "mixed_precision": false,
  "output_dir": "D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a"
}
Found 56902 images belonging to 2 classes.
Found 12197 images belonging to 2 classes.
Found 12195 images belonging to 2 classes.
2025-09-24 15:04:20.524617: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.
To enable the following instructions: SSE3 SSE4.1 SSE4.2 AVX AVX2 AVX_VNNI FMA, in other operations, rebuild TensorFlow with the appropriate compiler
```

```
flags.
D:\DeepFake\pythonProject1\.venv\Lib\site-packages\keras\src\trainers\data_adapters\py_dataset_adapter.py:121: UserWarning: Your `PyDataset` class should call `super().__init__(**kwargs)` in its constructor. `**kwargs` can include `workers`, `use_multiprocessing`, `max_queue_size`. Do not pass these arguments to `fit()`, as they will be ignored.
  self._warn_if_super_not_called()
Epoch 1/3
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 457ms/step - accuracy: 0.8969 - loss: 0.3593
Epoch 1: val_accuracy improved from -inf to 0.90407, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_warmup.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 925s 517ms/step - accuracy: 0.8969 - loss: 0.3593 - val_accuracy: 0.9041 - val_loss: 0.3101 - learning_rate: 0.0010
Epoch 2/3
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 461ms/step - accuracy: 0.9028 - loss: 0.3233
Epoch 2: val_accuracy did not improve from 0.90407
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 935s 525ms/step - accuracy: 0.9028 - loss: 0.3233 - val_accuracy: 0.9039 - val_loss: 0.3133 - learning_rate: 0.0010
Epoch 3/3
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 452ms/step - accuracy: 0.9012 - loss: 0.3240
Epoch 3: val_accuracy did not improve from 0.90407
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 913s 513ms/step - accuracy: 0.9012 - loss: 0.3240 - val_accuracy: 0.9041 - val_loss: 0.3096 - learning_rate: 0.0010
Epoch 1/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 497ms/step - accuracy: 0.9017 - loss: 0.3190
Epoch 1: val_accuracy improved from -inf to 0.91063, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1004s 560ms/step - accuracy: 0.9017 - loss: 0.3190 - val_accuracy: 0.9106 - val_loss: 0.2696 - learning_rate: 2.0000e-05
```

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Epoch 2/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 498ms/step - accuracy: 0.9095 - loss: 0.2720
Epoch 2: val_accuracy improved from 0.91063 to 0.91637, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 996s 560ms/step - accuracy: 0.9095 - loss: 0.2720 - val_accuracy: 0.9164 - val_loss: 0.2443 - learning_rate: 2.0000e-05
Epoch 3/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 499ms/step - accuracy: 0.9172 - loss: 0.2442
Epoch 3: val_accuracy improved from 0.91637 to 0.91949, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 994s 559ms/step - accuracy: 0.9172 - loss: 0.2442 - val_accuracy: 0.9195 - val_loss: 0.2281 - learning_rate: 2.0000e-05
Epoch 4/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 519ms/step - accuracy: 0.9200 - loss: 0.2338
Epoch 4: val_accuracy improved from 0.91949 to 0.92490, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1052s 591ms/step - accuracy: 0.9200 - loss: 0.2338 - val_accuracy: 0.9249 - val_loss: 0.2147 - learning_rate: 2.0000e-05
Epoch 5/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 566ms/step - accuracy: 0.9230 - loss: 0.2160
Epoch 5: val_accuracy did not improve from 0.92490
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1123s 631ms/step - accuracy: 0.9230 - loss: 0.2160 - val_accuracy: 0.9190 - val_loss: 0.2172 - learning_rate: 2.0000e-05
Epoch 6/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 499ms/step - accuracy: 0.9273 - loss: 0.2064
Epoch 6: val_accuracy improved from 0.92490 to 0.92679, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1002s 563ms/step -
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accuracy: 0.9273 - loss: 0.2064 - val_accuracy: 0.
9268 - val_loss: 0.2008 - learning_rate: 2.0000e-05
Epoch 7/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 495ms/step -
accuracy: 0.9303 - loss: 0.1936
Epoch 7: val_accuracy did not improve from 0.92679
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 995s 559ms/step -
accuracy: 0.9303 - loss: 0.1936 - val_accuracy: 0.
9251 - val_loss: 0.2001 - learning_rate: 2.0000e-05
Epoch 8/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 493ms/step -
accuracy: 0.9314 - loss: 0.1904
Epoch 8: val_accuracy improved from 0.92679 to 0.
92793, saving model to D:/DeepFake/pythonProject1/
Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 987s 555ms/step -
accuracy: 0.9314 - loss: 0.1904 - val_accuracy: 0.
9279 - val_loss: 0.1948 - learning_rate: 2.0000e-05
Epoch 9/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 499ms/step -
accuracy: 0.9324 - loss: 0.1858
Epoch 9: val_accuracy did not improve from 0.92793
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1002s 563ms/step -
accuracy: 0.9324 - loss: 0.1858 - val_accuracy: 0.
9149 - val_loss: 0.2193 - learning_rate: 2.0000e-05
Epoch 10/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 500ms/step -
accuracy: 0.9349 - loss: 0.1779
Epoch 10: val_accuracy did not improve from 0.92793
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1005s 565ms/step -
accuracy: 0.9349 - loss: 0.1779 - val_accuracy: 0.
9106 - val_loss: 0.2248 - learning_rate: 2.0000e-05
Epoch 11/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 553ms/step -
accuracy: 0.9353 - loss: 0.1776
Epoch 11: val_accuracy did not improve from 0.92793
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1103s 620ms/step -
accuracy: 0.9353 - loss: 0.1776 - val_accuracy: 0.
9156 - val_loss: 0.2119 - learning_rate: 2.0000e-05
Epoch 12/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 499ms/step -
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accuracy: 0.9384 - loss: 0.1659
Epoch 12: val_accuracy improved from 0.92793 to 0.93162, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1002s 563ms/step - accuracy: 0.9384 - loss: 0.1659 - val_accuracy: 0.9316 - val_loss: 0.1806 - learning_rate: 1.0000e-05
Epoch 13/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 499ms/step - accuracy: 0.9378 - loss: 0.1675
Epoch 13: val_accuracy did not improve from 0.93162
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1002s 563ms/step - accuracy: 0.9378 - loss: 0.1675 - val_accuracy: 0.9273 - val_loss: 0.1925 - learning_rate: 1.0000e-05
Epoch 14/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 500ms/step - accuracy: 0.9398 - loss: 0.1634
Epoch 14: val_accuracy improved from 0.93162 to 0.93867, saving model to D:/DeepFake/pythonProject1/Main/Celeb-df/mobilenetv3_1a\best_finetune.keras
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1081s 607ms/step - accuracy: 0.9398 - loss: 0.1634 - val_accuracy: 0.9387 - val_loss: 0.1705 - learning_rate: 1.0000e-05
Epoch 15/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 1s/step - accuracy: 0.9399 - loss: 0.1602
Epoch 15: val_accuracy did not improve from 0.93867
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 2202s 1s/step - accuracy: 0.9399 - loss: 0.1602 - val_accuracy: 0.9320 - val_loss: 0.1828 - learning_rate: 1.0000e-05
Epoch 16/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 502ms/step - accuracy: 0.9398 - loss: 0.1636
Epoch 16: val_accuracy did not improve from 0.93867
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1008s 567ms/step - accuracy: 0.9398 - loss: 0.1636 - val_accuracy: 0.9365 - val_loss: 0.1711 - learning_rate: 1.0000e-05
Epoch 17/20
1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 499ms/step - accuracy: 0.9400 - loss: 0.1612
Epoch 17: val_accuracy did not improve from 0.93867
```

```
105 1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1002s 563ms/step -
    accuracy: 0.9400 - loss: 0.1612 - val_accuracy: 0.
    9324 - val_loss: 0.1787 - learning_rate: 1.0000e-05
106 Epoch 18/20
107 1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 491ms/step -
    accuracy: 0.9422 - loss: 0.1523
108 Epoch 18: val_accuracy did not improve from 0.93867
109 1779/1779 ━━━━━━━━━━━━━━━━━━━━ 989s 556ms/step -
    accuracy: 0.9422 - loss: 0.1523 - val_accuracy: 0.
    9345 - val_loss: 0.1732 - learning_rate: 5.0000e-06
110 Epoch 19/20
111 1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 550ms/step -
    accuracy: 0.9443 - loss: 0.1494
112 Epoch 19: val_accuracy did not improve from 0.93867
113 1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1190s 669ms/step -
    accuracy: 0.9443 - loss: 0.1494 - val_accuracy: 0.
    9351 - val_loss: 0.1732 - learning_rate: 5.0000e-06
114 Epoch 20/20
115 1779/1779 ━━━━━━━━━━━━━━━━━━━━ 0s 668ms/step -
    accuracy: 0.9433 - loss: 0.1528
116 Epoch 20: val_accuracy did not improve from 0.93867
117 1779/1779 ━━━━━━━━━━━━━━━━━━━━ 1306s 734ms/step -
    accuracy: 0.9433 - loss: 0.1528 - val_accuracy: 0.
    9306 - val_loss: 0.1810 - learning_rate: 5.0000e-06
118 Saved final model to: D:/DeepFake/pythonProject1/
    Main/Celeb-df/mobilenetv3_1a\mobilenetv3.keras
119 Evaluating on test set...
120 382/382 ━━━━━━━━━━━━━━━━━━━━ 113s 296ms/step -
    accuracy: 0.8370 - loss: 0.4180
121 Test accuracy: 0.9423 | Test loss: 0.1672
122 382/382 ━━━━━━━━━━━━━━━━━━━━ 117s 299ms/step
123
124 Classification Report:
125
126                   precision    recall  f1-score
    support
127
128      Celeb-real       0.83      0.51      0.63
    1172
129 Celeb-synthesis       0.95      0.99      0.97
    11023
```

```
130
131         accuracy                           0.94
    12195
132        macro avg       0.89      0.75      0.80
    12195
133     weighted avg       0.94      0.94      0.94
    12195
134
135 Confusion Matrix:
136  [[  592   580]
137  [  124 10899]]
138
139 Process finished with exit code 0
140
```