"C:\Users\TRAN THI THUY TRANG\PycharmProjects\PythonProject\.venv\Scripts\python.exe" "C:\Users\TRAN THI THUY TRANG\PycharmProjects\PythonProject\Deepfake\MODEL.py"

2025-09-30 08:36:22.705838: 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`.

2025-09-30 08:36:30.465299: 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 2.20.0

Config: {

"model\_name": "resnet50",

"data\_dir": "D:/CDU IT/TERM 3/PRT 840 IT THESIS/DATASET/FRAME\_EXTRACTION/FF/FF 224",

"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": "C:/Users/TRAN THI THUY TRANG/PycharmProjects/PythonProject/Deepfake/ResNet\_FF224"

}

Found 60796 images belonging to 2 classes.

Found 13032 images belonging to 2 classes.

Found 13030 images belonging to 2 classes.

2025-09-30 08:36:39.761032: 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 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

C:\Users\TRAN THI THUY TRANG\PycharmProjects\PythonProject\.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

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 2s/step - accuracy: 0.8609 - loss: 0.4406

Epoch 1: val\_accuracy improved from None to 0.87393, saving model to C:/Users/TRAN THI THUY TRANG/PycharmProjects/PythonProject/Deepfake/ResNet\_FF224\best\_warmup.keras

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 4548s 2s/step - accuracy: 0.8660 - loss: 0.4180 - val\_accuracy: 0.8739 - val\_loss: 0.3780 - learning\_rate: 0.0010

Epoch 2/3

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 2s/step - accuracy: 0.8673 - loss: 0.4080

Epoch 2: val\_accuracy did not improve from 0.87393

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 4552s 2s/step - accuracy: 0.8683 - loss: 0.4061 - val\_accuracy: 0.8606 - val\_loss: 0.3993 - learning\_rate: 0.0010

Epoch 3/3

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 2s/step - accuracy: 0.8685 - loss: 0.4057

Epoch 3: val\_accuracy did not improve from 0.87393

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 4760s 3s/step - accuracy: 0.8694 - loss: 0.4053 - val\_accuracy: 0.7443 - val\_loss: 0.5550 - learning\_rate: 0.0010

Epoch 1/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 5s/step - accuracy: 0.8716 - loss: 0.3911

Epoch 1: val\_accuracy improved from None to 0.87477, saving model to C:/Users/TRAN THI THUY TRANG/PycharmProjects/PythonProject/Deepfake/ResNet\_FF224\best\_finetune.keras

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 11339s 6s/step - accuracy: 0.8745 - loss: 0.3820 - val\_accuracy: 0.8748 - val\_loss: 0.3622 - learning\_rate: 2.0000e-05

Epoch 2/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 3s/step - accuracy: 0.8810 - loss: 0.3562

Epoch 2: val\_accuracy improved from 0.87477 to 0.87861, saving model to C:/Users/TRAN THI THUY TRANG/PycharmProjects/PythonProject/Deepfake/ResNet\_FF224\best\_finetune.keras

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 5828s 3s/step - accuracy: 0.8804 - loss: 0.3544 - val\_accuracy: 0.8786 - val\_loss: 0.3511 - learning\_rate: 2.0000e-05

Epoch 3/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 3s/step - accuracy: 0.8841 - loss: 0.3391

Epoch 3: val\_accuracy improved from 0.87861 to 0.87884, saving model to C:/Users/TRAN THI THUY TRANG/PycharmProjects/PythonProject/Deepfake/ResNet\_FF224\best\_finetune.keras

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 5460s 3s/step - accuracy: 0.8837 - loss: 0.3383 - val\_accuracy: 0.8788 - val\_loss: 0.3558 - learning\_rate: 2.0000e-05

Epoch 4/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 3s/step - accuracy: 0.8848 - loss: 0.3309

Epoch 4: val\_accuracy did not improve from 0.87884

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 5619s 3s/step - accuracy: 0.8847 - loss: 0.3304 - val\_accuracy: 0.8554 - val\_loss: 0.3802 - learning\_rate: 2.0000e-05

Epoch 5/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 3s/step - accuracy: 0.8885 - loss: 0.3177

Epoch 5: val\_accuracy improved from 0.87884 to 0.88244, saving model to C:/Users/TRAN THI THUY TRANG/PycharmProjects/PythonProject/Deepfake/ResNet\_FF224\best\_finetune.keras

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 5836s 3s/step - accuracy: 0.8852 - loss: 0.3239 - val\_accuracy: 0.8824 - val\_loss: 0.3349 - learning\_rate: 2.0000e-05

Epoch 6/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 3s/step - accuracy: 0.8876 - loss: 0.3174

Epoch 6: val\_accuracy did not improve from 0.88244

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 5544s 3s/step - accuracy: 0.8874 - loss: 0.3175 - val\_accuracy: 0.8728 - val\_loss: 0.3471 - learning\_rate: 2.0000e-05

Epoch 7/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 3s/step - accuracy: 0.8884 - loss: 0.3131

Epoch 7: val\_accuracy did not improve from 0.88244

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 5385s 3s/step - accuracy: 0.8887 - loss: 0.3129 - val\_accuracy: 0.8696 - val\_loss: 0.3529 - learning\_rate: 2.0000e-05

Epoch 8/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 3s/step - accuracy: 0.8908 - loss: 0.3045

Epoch 8: val\_accuracy did not improve from 0.88244

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 7193s 4s/step - accuracy: 0.8893 - loss: 0.3077 - val\_accuracy: 0.8776 - val\_loss: 0.3363 - learning\_rate: 2.0000e-05

Epoch 9/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 4s/step - accuracy: 0.8924 - loss: 0.2989

Epoch 9: val\_accuracy did not improve from 0.88244

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 7972s 4s/step - accuracy: 0.8926 - loss: 0.2987 - val\_accuracy: 0.8785 - val\_loss: 0.3337 - learning\_rate: 1.0000e-05

Epoch 10/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 4s/step - accuracy: 0.8936 - loss: 0.2904

Epoch 10: val\_accuracy did not improve from 0.88244

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 7975s 4s/step - accuracy: 0.8924 - loss: 0.2946 - val\_accuracy: 0.8689 - val\_loss: 0.3552 - learning\_rate: 1.0000e-05

Epoch 11/20

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 0s 2s/step - accuracy: 0.8966 - loss: 0.2854

Epoch 11: val\_accuracy did not improve from 0.88244

1900/1900 ━━━━━━━━━━━━━━━━━━━━ 4552s 2s/step - accuracy: 0.8943 - loss: 0.2910 - val\_accuracy: 0.8663 - val\_loss: 0.3578 - learning\_rate: 1.0000e-05

Saved final model to: C:/Users/TRAN THI THUY TRANG/PycharmProjects/PythonProject/Deepfake/ResNet\_FF224\resnet50.keras

Evaluating on test set...

408/408 ━━━━━━━━━━━━━━━━━━━━ 559s 1s/step - accuracy: 0.8823 - loss: 0.3331

Test accuracy: 0.8823 | Test loss: 0.3331

408/408 ━━━━━━━━━━━━━━━━━━━━ 540s 1s/step

Classification Report:

precision recall f1-score support

df 0.90 0.98 0.94 11428

real 0.56 0.20 0.30 1602

accuracy 0.88 13030

macro avg 0.73 0.59 0.62 13030

weighted avg 0.86 0.88 0.86 13030

Confusion Matrix:

[[11170 258]

[ 1276 326]]

Process finished with exit code 0