```
from google.colab import drive
drive.mount('/content/drive')
```

⥮ Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

```
!pip install deepface
from deepface import DeepFace
import matplotlib.pyplot as plt
```

⥮ Requirement already satisfied: tqdm>=4.30.0 in /usr/local/lib/python3.10/dist-packages (from deepface) (4.66.6)
   Requirement already satisfied: Pillow>=5.2.0 in /usr/local/lib/python3.10/dist-packages (from deepface) (10.4.0)
   Requirement already satisfied: opencv-python>=4.5.5.64 in /usr/local/lib/python3.10/dist-packages (from deepface) (4.10.0.84)
   Requirement already satisfied: tensorflow>=1.9.0 in /usr/local/lib/python3.10/dist-packages (from deepface) (2.17.0)
   Requirement already satisfied: keras>=2.2.0 in /usr/local/lib/python3.10/dist-packages (from deepface) (3.4.1)
   Requirement already satisfied: Flask>=1.1.2 in /usr/local/lib/python3.10/dist-packages (from deepface) (2.2.5)
   Requirement already satisfied: flask-cors>=4.0.1 in /usr/local/lib/python3.10/dist-packages (from deepface) (5.0.0)
   Requirement already satisfied: mtcnn>=0.1.0 in /usr/local/lib/python3.10/dist-packages (from deepface) (1.0.0)
   Requirement already satisfied: retina-face>=0.0.1 in /usr/local/lib/python3.10/dist-packages (from deepface) (0.0.17)
   Requirement already satisfied: fire>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from deepface) (0.7.0)
   Requirement already satisfied: gunicorn>=20.1.0 in /usr/local/lib/python3.10/dist-packages (from deepface) (23.0.0)
   Requirement already satisfied: termcolor in /usr/local/lib/python3.10/dist-packages (from fire>=0.4.0->deepface) (2.5.0)
   Requirement already satisfied: Werkzeug>=2.2.2 in /usr/local/lib/python3.10/dist-packages (from Flask>=1.1.2->deepface) (3.0.6)
   Requirement already satisfied: Jinja2>=3.0 in /usr/local/lib/python3.10/dist-packages (from Flask>=1.1.2->deepface) (3.1.4)
   Requirement already satisfied: itsdangerous>=2.0 in /usr/local/lib/python3.10/dist-packages (from Flask>=1.1.2->deepface) (2.2.0)
   Requirement already satisfied: click>=8.0 in /usr/local/lib/python3.10/dist-packages (from Flask>=1.1.2->deepface) (8.1.7)
   Requirement already satisfied: beautifulsoup4 in /usr/local/lib/python3.10/dist-packages (from gdown>=3.10.1->deepface) (4.12.3)
   Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from gdown>=3.10.1->deepface) (3.16.1)
   Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from gunicorn>=20.1.0->deepface) (24.1)
   Requirement already satisfied: absl-py in /usr/local/lib/python3.10/dist-packages (from keras>=2.2.0->deepface) (1.4.0)
   Requirement already satisfied: rich in /usr/local/lib/python3.10/dist-packages (from keras>=2.2.0->deepface) (13.9.3)
   Requirement already satisfied: namex in /usr/local/lib/python3.10/dist-packages (from keras>=2.2.0->deepface) (0.0.8)
   Requirement already satisfied: h5py in /usr/local/lib/python3.10/dist-packages (from keras>=2.2.0->deepface) (3.12.1)
   Requirement already satisfied: optree in /usr/local/lib/python3.10/dist-packages (from keras>=2.2.0->deepface) (0.13.0)
   Requirement already satisfied: ml-dtypes in /usr/local/lib/python3.10/dist-packages (from keras>=2.2.0->deepface) (0.4.1)
   Requirement already satisfied: joblib>=1.4.2 in /usr/local/lib/python3.10/dist-packages (from mtcnn>=0.1.0->deepface) (1.4.2)
   Requirement already satisfied: lz4>=4.3.3 in /usr/local/lib/python3.10/dist-packages (from mtcnn>=0.1.0->deepface) (4.3.3)
   Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.23.4->deepface) (2.8
   Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.23.4->deepface) (2024.2)
   Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.23.4->deepface) (2024.2)
   Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests>=2.27.1->deepface)
   Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.27.1->deepface) (3.10)
   Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.27.1->deepface) (2.2.3
   Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.27.1->deepface) (2024.
   Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (1.6.3
   Requirement already satisfied: flatbuffers>=24.3.25 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (24
   Requirement already satisfied: gast!=0.5.0,!=0.5.1,!=0.5.2,>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0
   Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (0.2
   Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (18.1.1
   Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (3.4.0
   Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<5.0.0dev,>=3.20.3 in /usr/local/lib/pyt
   Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (75.1.0)
   Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (1.16.0)
   Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface)
   Requirement already satisfied: wrapt>=1.11.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (1.16.0)
   Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface) (1.6
   Requirement already satisfied: tensorboard<2.18,>=2.17 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.0->deepface)
   Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow>=1.9.
   Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/local/lib/python3.10/dist-packages (from astunparse>=1.6.0->tensorflow>=1.9
   Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from Jinja2>=3.0->Flask>=1.1.2->deepface)
   Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.18,>=2.17->tensorflow>=
   Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.1
   Requirement already satisfied: soupsieve>1.2 in /usr/local/lib/python3.10/dist-packages (from beautifulsoup4->gdown>=3.10.1->deepface
   Requirement already satisfied: PySocks!=1.5.7,>=1.5.6 in /usr/local/lib/python3.10/dist-packages (from requests[socks]->gdown>=3.10.1
   Requirement already satisfied: markdown-it-py>=2.2.0 in /usr/local/lib/python3.10/dist-packages (from rich->keras>=2.2.0->deepface) (
   Requirement already satisfied: pygments<3.0.0,>=2.13.0 in /usr/local/lib/python3.10/dist-packages (from rich->keras>=2.2.0->deepface)
   Requirement already satisfied: mdurl~=0.1 in /usr/local/lib/python3.10/dist-packages (from markdown-it-py>=2.2.0->rich->keras>=2.2.0-
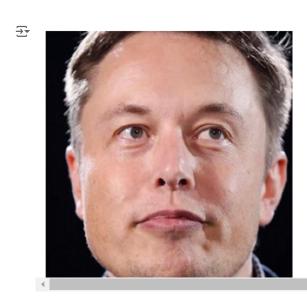
```
#đọc ảnh đầu vào
img1_path = '/content/drive/MyDrive/data/elon_musk1.jpg'
img2_path = '/content/drive/MyDrive/data/elon_musk2.jpg'


# Sử dụng extract_faces và enforce_detection=False để tránh lỗi

img1 = DeepFace.extract_faces(img1_path, enforce_detection=False)
img2 = DeepFace.extract_faces(img2_path, enforce_detection=False)
```

```python
import matplotlib.pyplot as plt

# Kiểm tra xem img2 có phần tử nào không
if len(img1) > 0:
    # Lấy khuôn mặt trong ảnh thứ tự
    face_img = img1[0]['face']  # Hoặc img2[0] nếu không có key 'face'

    # Hiển thị khuôn mặt
    plt.imshow(face_img)
    plt.axis('off')  # Tắt trục
    plt.show()
else:
    print("Không tìm thấy khuôn mặt trong img2.")
```



```python
import matplotlib.pyplot as plt

# Kiểm tra xem img có phần tử nào không
if len(img2) > 0:
    # Lấy khuôn mặt trong ảnh thứ tự
    face_img = img2[0]['face']  # Hoặc img2[0] nếu không có key 'face'

    # Hiển thị khuôn mặt
    plt.imshow(face_img)
    plt.axis('off')  # Tắt trục
    plt.show()
else:
    print("Không tìm thấy khuôn mặt trong img2.")
```



```python
model_name = 'Facenet'
```

```python
resp = DeepFace.verify(img1_path = img1_path, img2_path = img2_path, model_name = model_name)
#verify 2 images that model => one person
```

```python
resp
```

```
{'verified': True,
 'distance': 0.27091213110781764,
 'threshold': 0.4,
 'model': 'Facenet',
 'detector_backend': 'opencv',
 'similarity_metric': 'cosine',
 'facial_areas': {'img1': {'x': 234,
   'y': 114,
   'w': 333,
   'h': 333,
   'left_eye': (459, 253),
   'right_eye': (351, 247)},
  'img2': {'x': 261,
   'y': 68,
   'w': 173,
   'h': 173,
   'left_eye': (378, 135),
   'right_eye': (320, 140)}},
 'time': 3.9}
```

```python
model_name = 'VGG-Face'
```

```python
resp = DeepFace.verify(img1_path = img1_path, img2_path = img2_path, model_name = model_name)
#verify 2 images that model => one person
```

```python
resp
```

```
{'verified': True,
 'distance': 0.4121590164541964,
 'threshold': 0.68,
 'model': 'VGG-Face',
 'detector_backend': 'opencv',
 'similarity_metric': 'cosine',
 'facial_areas': {'img1': {'x': 234,
   'y': 114,
   'w': 333,
   'h': 333,
   'left_eye': (459, 253),
   'right_eye': (351, 247)},
  'img2': {'x': 261,
   'y': 68,
   'w': 173,
   'h': 173,
   'left_eye': (378, 135),
   'right_eye': (320, 140)}},
 'time': 5.58}
```

```python
model_name = 'ArcFace'
```

```python
resp = DeepFace.verify(img1_path = img1_path, img2_path = img2_path, model_name = model_name)
#verify 2 images that model => one person
```

```python
resp
```

```
{'verified': True,
 'distance': 0.4401370892901363,
 'threshold': 0.68,
 'model': 'ArcFace',
 'detector_backend': 'opencv',
 'similarity_metric': 'cosine',
 'facial_areas': {'img1': {'x': 234,
   'y': 114,
   'w': 333,
   'h': 333,
   'left_eye': (459, 253),
   'right_eye': (351, 247)},
  'img2': {'x': 261,
   'y': 68,
   'w': 173,
   'h': 173,
   'left_eye': (378, 135),
```

```
            'right_eye': (320, 140)}},
    'time': 3.14}
```

∨ Test 2

```python
#đọc ảnh đầu vào
img1_path = '/content/drive/MyDrive/data/elon_musk1.jpg'
img2_path = '/content/drive/MyDrive/data/thanh_long.jpg'


img1 = DeepFace.extract_faces(img1_path, enforce_detection=False)
img2 = DeepFace.extract_faces(img2_path, enforce_detection=False)


import matplotlib.pyplot as plt

# Kiểm tra xem img2 có phần tử nào không
if len(img1) > 0:
    # Lấy khuôn mặt trong ảnh thứ tự
    face_img = img1[0]['face']  # Hoặc img2[0] nếu không có key 'face'

    # Hiển thị khuôn mặt
    plt.imshow(face_img)
    plt.axis('off')  # Tắt trục
    plt.show()
else:
    print("Không tìm thấy khuôn mặt trong img2.")
```



```python
import matplotlib.pyplot as plt

# Kiểm tra xem img có phần tử nào không
if len(img2) > 0:
    # Lấy khuôn mặt trong ảnh thứ tự
    face_img = img2[0]['face']  # Hoặc img2[0] nếu không có key 'face'

    # Hiển thị khuôn mặt
    plt.imshow(face_img)
    plt.axis('off')  # Tắt trục
    plt.show()
else:
    print("Không tìm thấy khuôn mặt trong img2.")
```

```
model_name = 'Facenet'
```

```
resp2 = DeepFace.verify(img1_path = img1_path, img2_path = img2_path, model_name = model_name)
#verify 2 images that model => one person
```

```
resp2
```

```
{'verified': False,
 'distance': 0.8208622667290024,
 'threshold': 0.4,
 'model': 'Facenet',
 'detector_backend': 'opencv',
 'similarity_metric': 'cosine',
 'facial_areas': {'img1': {'x': 234,
   'y': 114,
   'w': 333,
   'h': 333,
   'left_eye': (459, 253),
   'right_eye': (351, 247)},
  'img2': {'x': 78,
   'y': 138,
   'w': 298,
   'h': 298,
   'left_eye': (278, 256),
   'right_eye': (180, 259)}},
 'time': 2.91}
```

```
model_name = 'VGG-Face'
```

```
resp = DeepFace.verify(img1_path = img1_path, img2_path = img2_path, model_name = model_name)
#verify 2 images that model => one person
```

```
resp
```

```
{'verified': False,
 'distance': 0.8552167948607958,
 'threshold': 0.68,
 'model': 'VGG-Face',
 'detector_backend': 'opencv',
 'similarity_metric': 'cosine',
 'facial_areas': {'img1': {'x': 234,
   'y': 114,
   'w': 333,
   'h': 333,
   'left_eye': (459, 253),
   'right_eye': (351, 247)},
  'img2': {'x': 78,
   'y': 138,
   'w': 298,
   'h': 298,
   'left_eye': (278, 256),
   'right_eye': (180, 259)}},
 'time': 2.23}
```

```
model_name = 'ArcFace'


resp2 = DeepFace.verify(img1_path = img1_path, img2_path = img2_path, model_name = model_name)
#verify 2 images that model => one person


resp2
```

```
{'verified': False,
 'distance': 1.0242170555473833,
 'threshold': 0.68,
 'model': 'ArcFace',
 'detector_backend': 'opencv',
 'similarity_metric': 'cosine',
 'facial_areas': {'img1': {'x': 234,
   'y': 114,
   'w': 333,
   'h': 333,
   'left_eye': (459, 253),
   'right_eye': (351, 247)},
  'img2': {'x': 78,
   'y': 138,
   'w': 298,
   'h': 298,
   'left_eye': (278, 256),
   'right_eye': (180, 259)}},
 'time': 1.7}
```

```
df = DeepFace.find(img_path = '/content/drive/MyDrive/data/elon_musk1.jpg', db_path = '/content/drive/MyDrive/data')
```

```
24-11-04 17:34:47 - Found 0 newly added image(s), 0 removed image(s), 3 replaced image(s).
Finding representations: 100%|██████████| 3/3 [00:04<00:00,  1.51s/it]
24-11-04 17:34:52 - There are now 3 representations in ds_model_vggface_detector_opencv_aligned_normalization_base_expand_0.pkl
24-11-04 17:34:52 - Searching /content/drive/MyDrive/data/elon_musk1.jpg in 3 length datastore
24-11-04 17:34:54 - find function duration 6.526907444000244 seconds
```