REAL-TIME FACE DETECTION IN PYTHON WITH OPENCV DNN USING CAFFE SSD RES10 MODEL GOOGLE COLAB IMPLEMENTATION & DEMO

Project Objective

Build a Real-Time Face Detection System using:

✔ Python
✔ OpenCV DNN Module
✔ Caffe Pretrained Model (Res10 SSD)
✔ Webcam Input (Colab Compatible)
✔ Confidence Thresholding
✔ Auto Face Saving
✔ FPS & Face Count Display

🚫 NO External APIs / Cloud Services

Required Files

We need:

`deploy.prototxt` : https://raw.githubusercontent.com/opencv/opencv/master/samples/dnn/face_detector/deploy.prototxt

`res10_300x300_ssd_iter_140000.caffemodel` : https://github.com/opencv/opencv_3rdparty/raw/dnn_samples_face_detector_20170830/res10_300x300_ssd_iter_140000.caffemodel

Upload this in Drive in folder section.

Project Directory

face-detection-colab/

```
  │
  ├──── deploy.prototxt
  ├──── res10_300x300_ssd_iter_140000.caffemodel
  ├──── face_detection_colab.py
  ├──── saved_faces/ ← Generated Automatically
  └──── README.md
```

Act as a Senior Computer Vision Engineer.
Build a production-ready real-time Face Detection system in Google Colab using:
Python
OpenCV DNN
Caffe SSD model (deploy.prototxt + res10_300x300_ssd_iter_140000.caffemodel)
IMPORTANT:
Since cv2.VideoCapture(0) does not work in Colab, use JavaScript-based webcam streaming for real-time frame capture.
Requirements:
Install required dependencies inside Colab
Load model using absolute paths with os.path.join
Add proper error handling
Use confidence threshold > 0.6
Draw bounding boxes with confidence %
Display real-time face count and FPS
Automatically save detected faces into "saved_faces" folder
Structure code professionally
Provide complete working code that runs directly in Google Colab.
No external APIs. Only OpenCV DNN.

Upload These Files to Colab

deploy.prototxt

res10_300x300_ssd_iter_140000.caffemodel

How to Upload:

- Click folder icon in Colab (left panel)
- Click Upload
- Upload both files
- Ensure they are inside: /content/

Model Path Verification

Correct Path Configuration: Make sure that path of prototxt file and model are placed correctly

```
model_dir = "/content"

prototxt_path = os.path.join(model_dir, "deploy.prototxt")
model_path = os.path.join(model_dir, "res10_300x300_ssd_iter_140000.caffemodel")
```

Verify Model Files Before Running

Add This Check:

```
import os


print("Prototxt Exists:", os.path.exists(prototxt_path))
print("Model Exists:", os.path.exists(model_path))
```

Expected Output:

```
Prototxt Exists: True
Model Exists: True
```

MAIN POINT TO SEE:

```
  Prototxt file, rename it to : /content/deploy.prototxt
```

Saving this to drive:

Step 1: Mount Google Drive

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

Authorize when prompted.

Step 2: Save Face Detection File to Drive

This will create a proper project structure inside Drive.

Code : Next PAGE

```
import os

# Define project folder inside Drive
project_path = "/content/drive/MyDrive/Face_Detection_Project"

# Create folder if not exists
os.makedirs(project_path, exist_ok=True)

# File path
file_path = os.path.join(project_path, "face_detection_colab.py")

# Your detection code (paste full code inside triple quotes)
code_content = """
# ================================
# REAL-TIME FACE DETECTION (COLAB)
# ================================

print("This is your saved detection file.")
# Paste your full face detection code here
"""

# Write file
with open(file_path, "w") as f:
    f.write(code_content)

print(f"[INFO] File saved successfully at: {file_path}")
```

After Running this code:

Go to:

Google Drive → MyDrive → Face_Detection_Project

You'll see:

face_detection_colab.py