**Face Detection Script Documentation**

**Overview**

This script performs face detection on an image or webcam stream using OpenCV's deep learning module. It can also estimate the age and gender of detected faces.

**Dependencies**

* Python 3.x
* OpenCV (cv2)
* argparse module (standard library)

**File Structure**

* highlightFace(net, frame, conf\_threshold=0.7): Function to detect faces in a given frame.
* main(): Main function that handles argument parsing, model loading, and image/video processing.

**Functions**

**highlightFace(net, frame, conf\_threshold=0.7)**

Detects faces in a given frame and highlights them with rectangles.

* **Parameters**:
  + net: The neural network model for face detection.
  + frame: The image frame in which to detect faces.
  + conf\_threshold: Confidence threshold for filtering weak detections.
* **Returns**:
  + frameOpencvDnn: The frame with highlighted faces.
  + faceBoxes: List of bounding boxes of detected faces.

**main()**

Handles argument parsing, loads models, and processes input (either image or webcam stream).

* **Arguments**:
  + --image: Path to the image file for face detection.

**Usage**

To run the script, use the following command in the terminal:

bash

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python script\_name.py --image path\_to\_image.jpg

* If the --image argument is not provided, the script will attempt to use the webcam.

**Model Files**

The script requires several model files for face, age, and gender detection:

* opencv\_face\_detector.pbtxt
* opencv\_face\_detector\_uint8.pb
* age\_deploy.prototxt
* age\_net.caffemodel
* gender\_deploy.prototxt
* gender\_net.caffemodel

These files should be present in the working directory.

**Example**

To detect faces in an image:

bash

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python script\_name.py --image example.jpg

To detect faces using the webcam:

bash

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python script\_name.py

**Notes**

* The script uses a confidence threshold of 0.7 for face detection.
* The models for age and gender estimation are pre-trained Caffe models.
* Detected faces are highlighted with green rectangles.