“Image Display and Processing with Qt Widgets and OpenCV”

Objective:

Develop a Python application that:

- Opens a video stream from either a webcam (default) or a specified video file.
- Displays each video frame in a designated area within the Qt window.
- Implements a basic image processing operation on each frame (e.g., grayscale conversion, edge detection).
- Provides user controls (buttons, sliders, etc.) to:
- Start/stop the video stream.
- Adjust image processing parameters if applicable (e.g., threshold value for edge detection).

QuickStart:

1. Install the requirements.

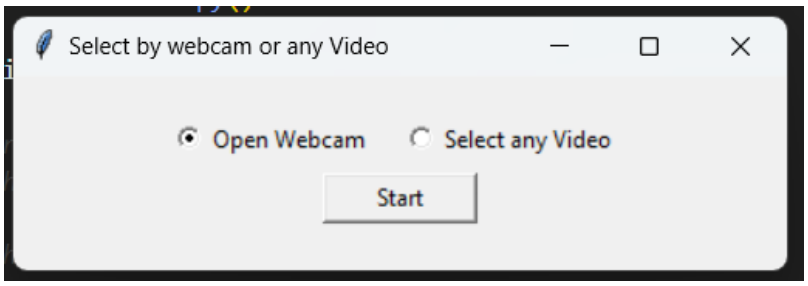
   pip install -r requirements.txt

2. Start the application. python run.py

How does it works (Functionality):

STEP 1:

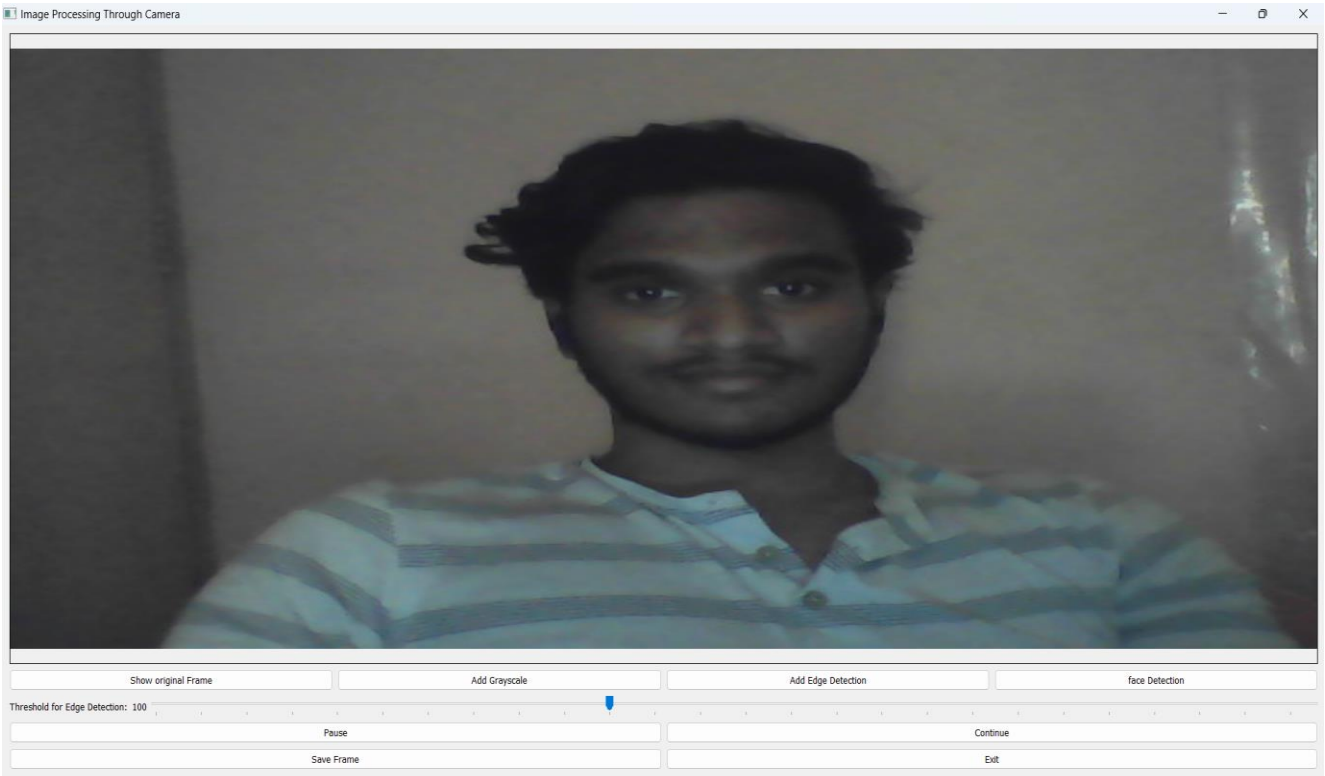
- After you run the application using python run.py you will see a small tkinter window containing two options open webcam or open using any file path
- Select any one option and click on start to open the video stream with selected option.



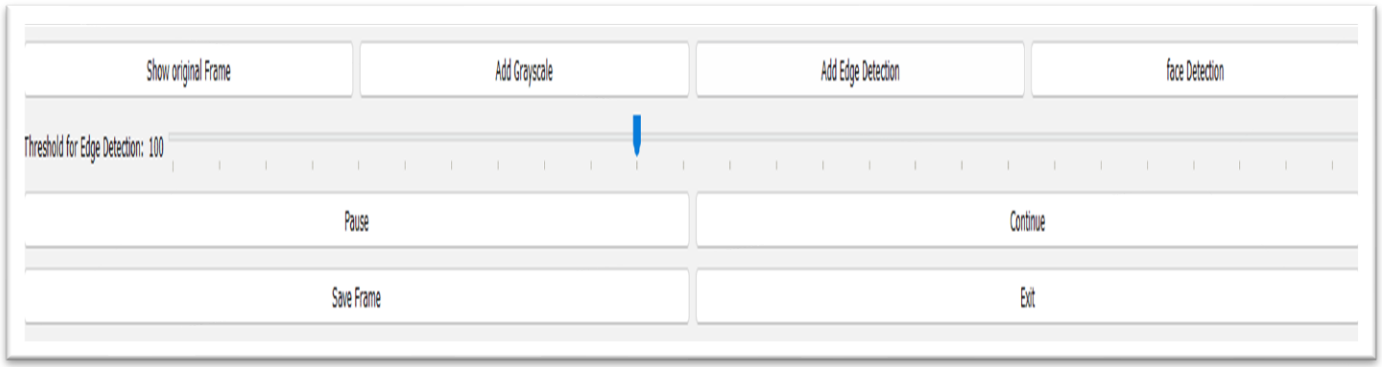
- As the above figure you can select any one option from radio button so that as mentioned you can open on webcam any video file

Open a video stream by Webcam:

- If you have selected webcam python OpenCV library opens the webcam of your laptop and Qt Widgets create a window displaying the webcam stream

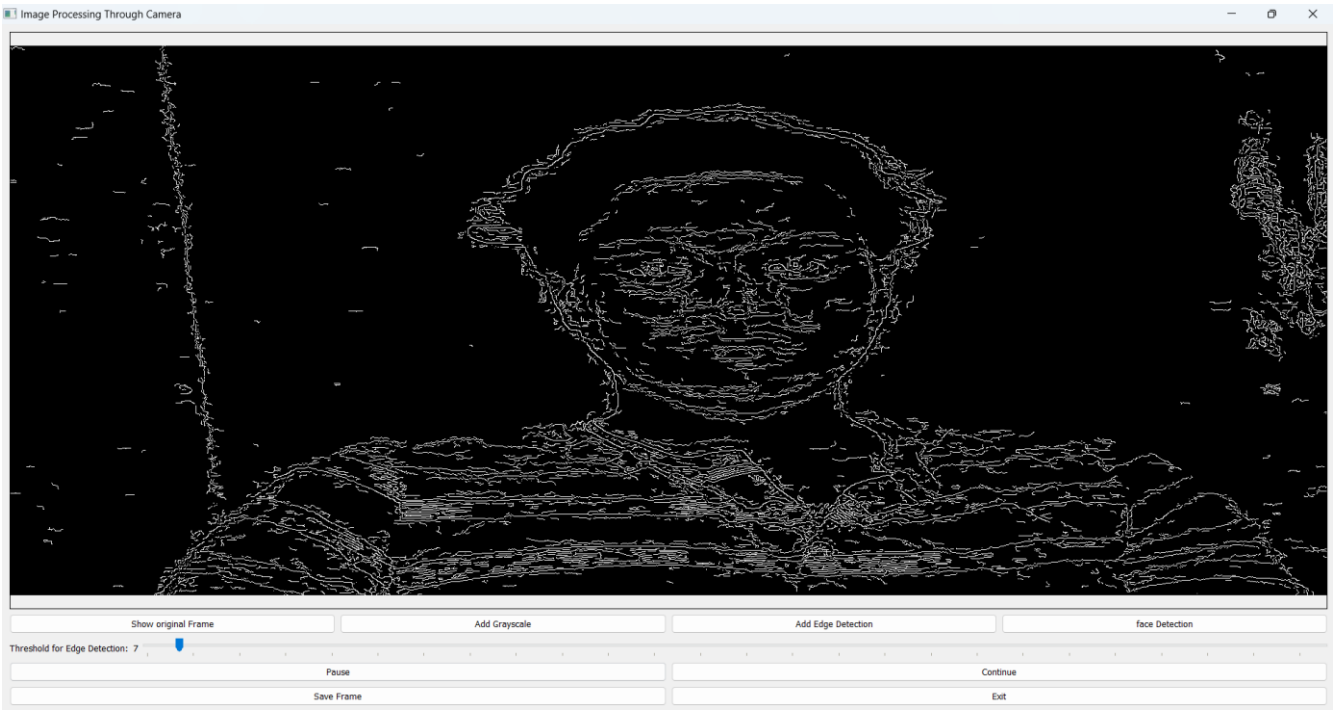


- As you can see in above image you have buttons like
    1. Show original frame
    2. Add Grayscale
    3. Add Edge Detection
    4. Pause and continue buttons
    5. Threshold slider for Edge detection
    6. Exit
    7. Face Detection
    8. Save Frame
- By clicking on pause you can pause the live webcam stream.
- By clicking on continue you can continue the stream

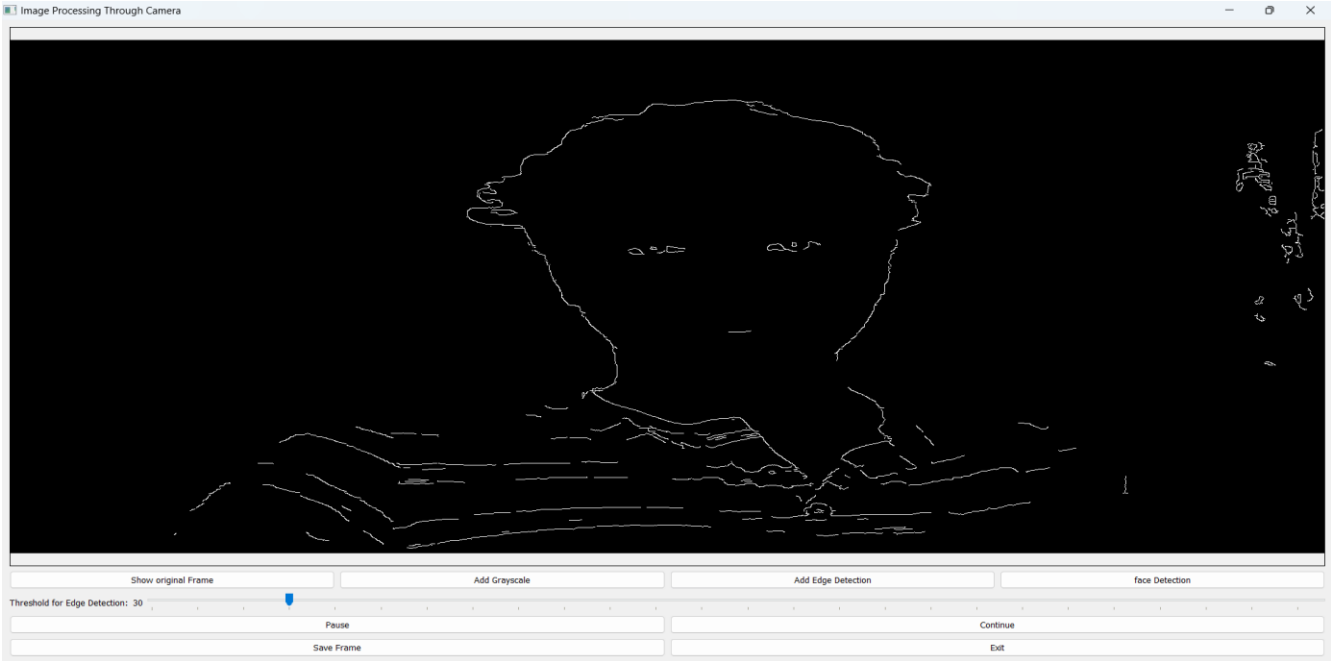


You can convert the video stream to grayscale by clicking add grayscale button on live feed or you can pause and change the stream.

You can make Edge Detection by clicking on the Add Edge Detection button and can adjust the threshold using slider in range of 0 to 255. (Below picture threshold value is 7).



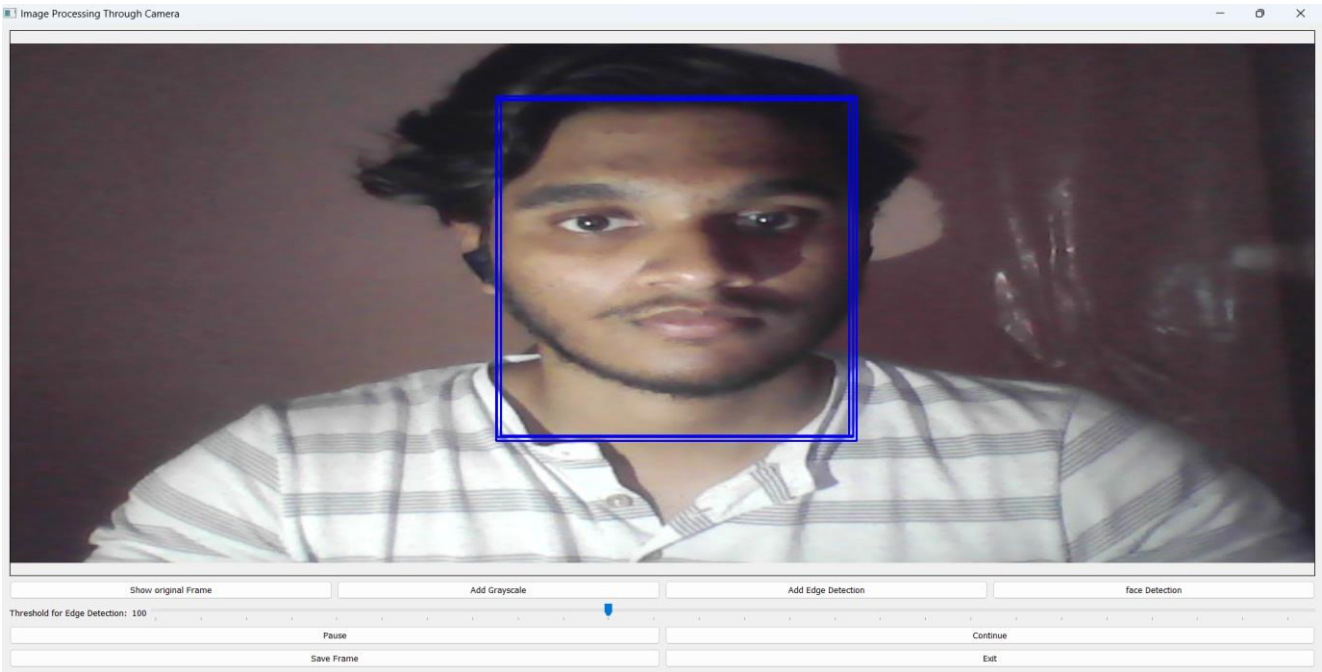
Same picture with threshold value of 30



OPTIONAL EXTENSIONS

1.Face Detection

On Clicking face detection button using OpenCV library we can detect faces on video stream



By adjusting the ScaleFactor, MinSize, and MinNeighbors parameters in OpenCV's face detection, you can improve the efficiency and reduce false positives. Experimenting with these parameters can help you achieve better results for your face detection application.

2.SAVE IMAGES

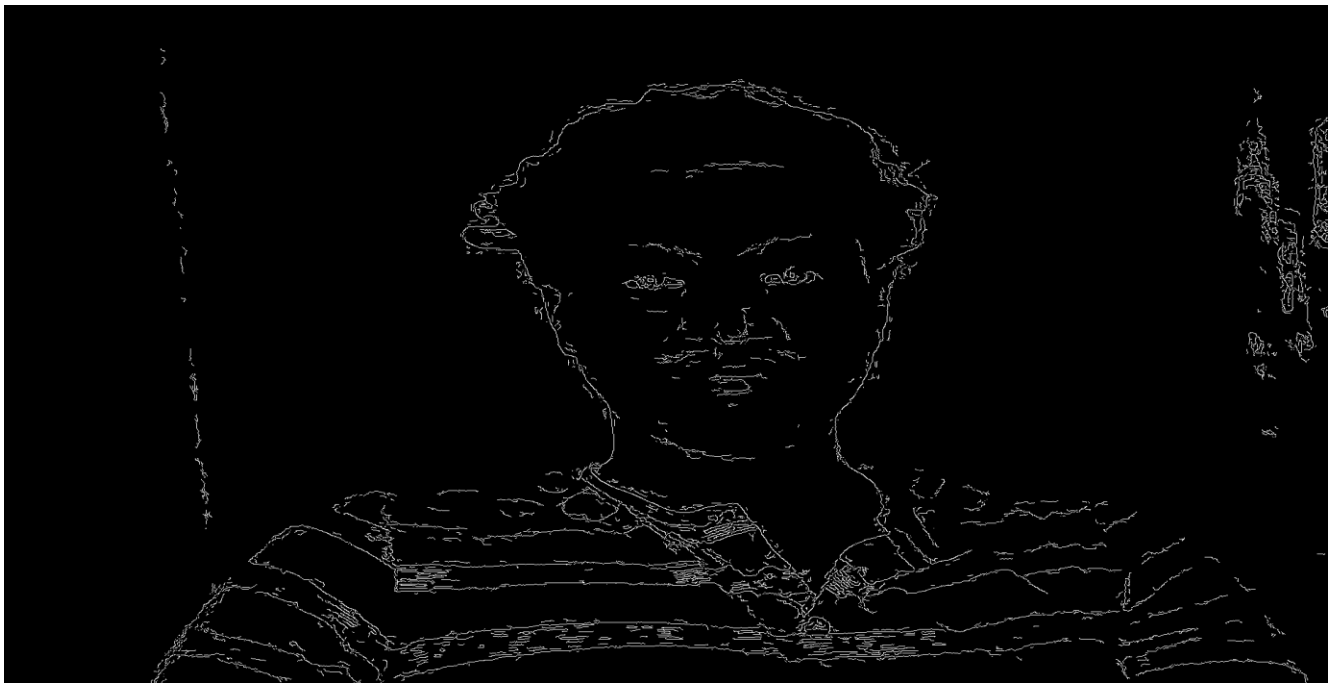
You can save any processed frame like grayscale, edge detection , face detection added frames by clicking on save frame button.

EXAMPLES

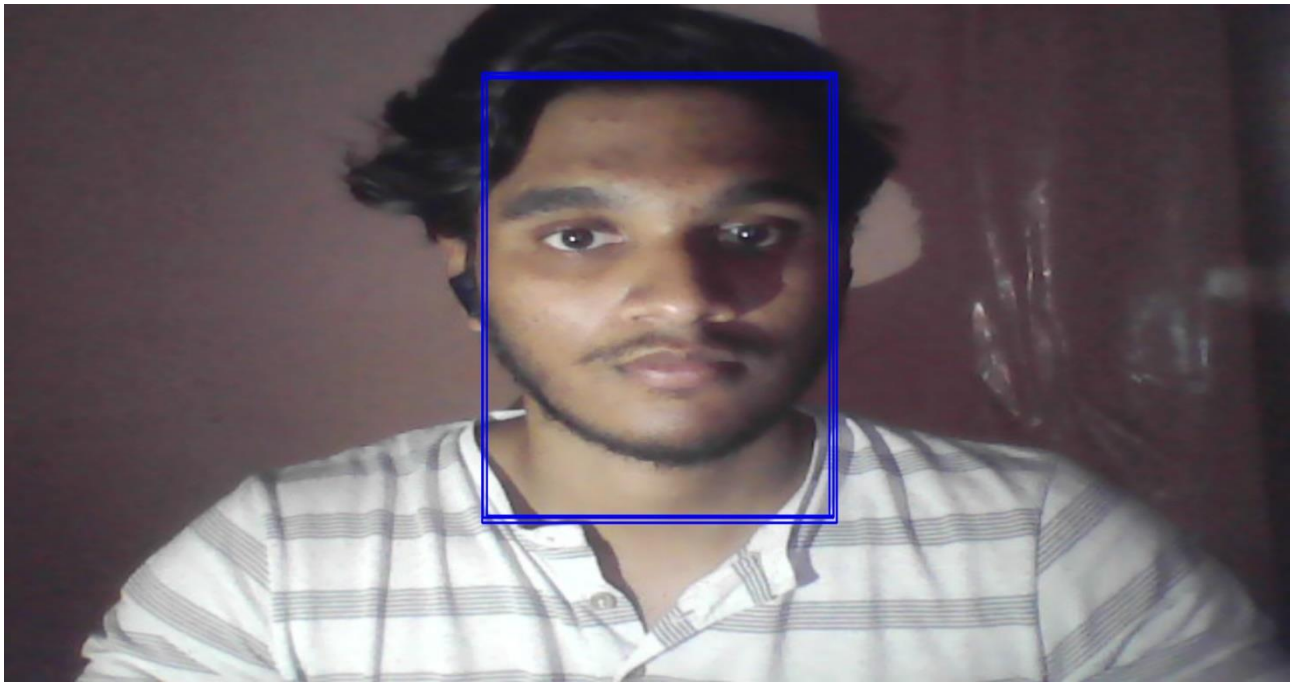
ORIGINAL

GRAYSCALE CONVERSION

EDGE DETECTION

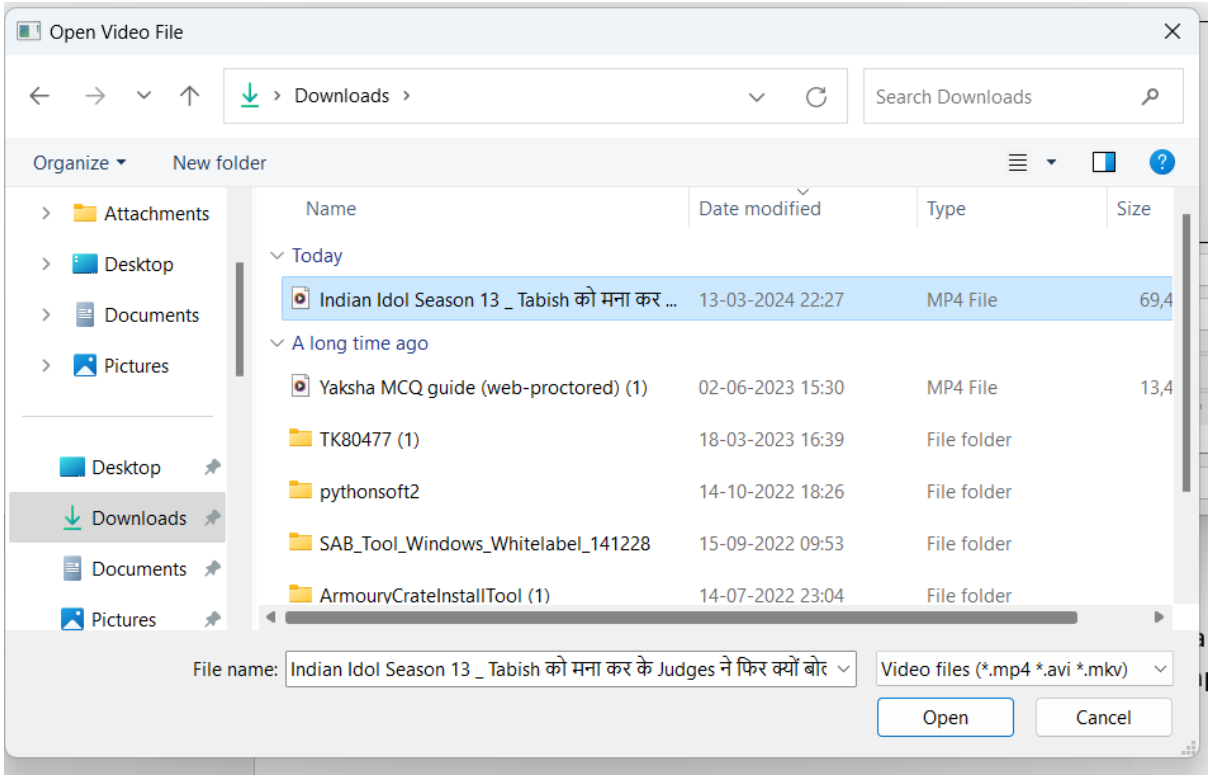


FACE DETECTION

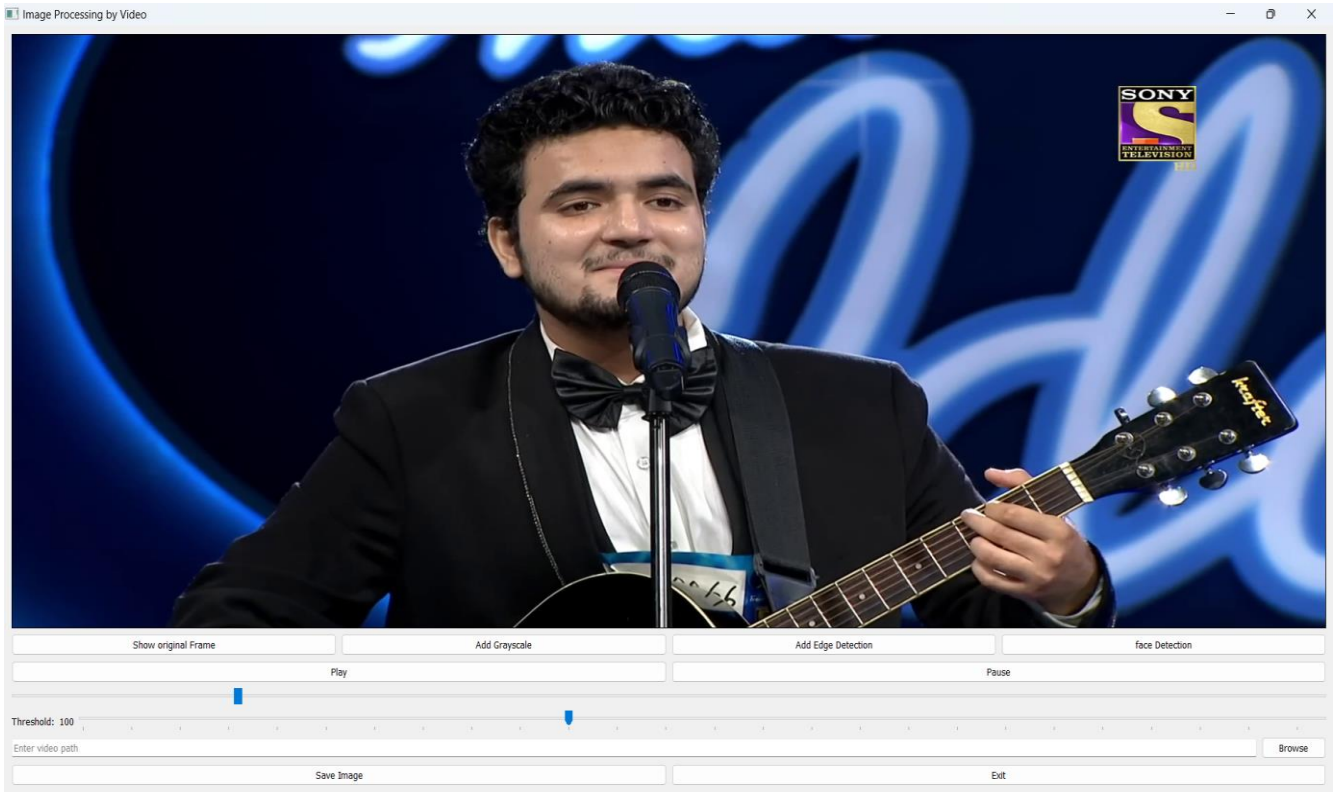


Open a video stream by a video file:

- After selecting select any video button and clicking start OpenCV library contains a QFiledialog which asks you to select any video file present in computer

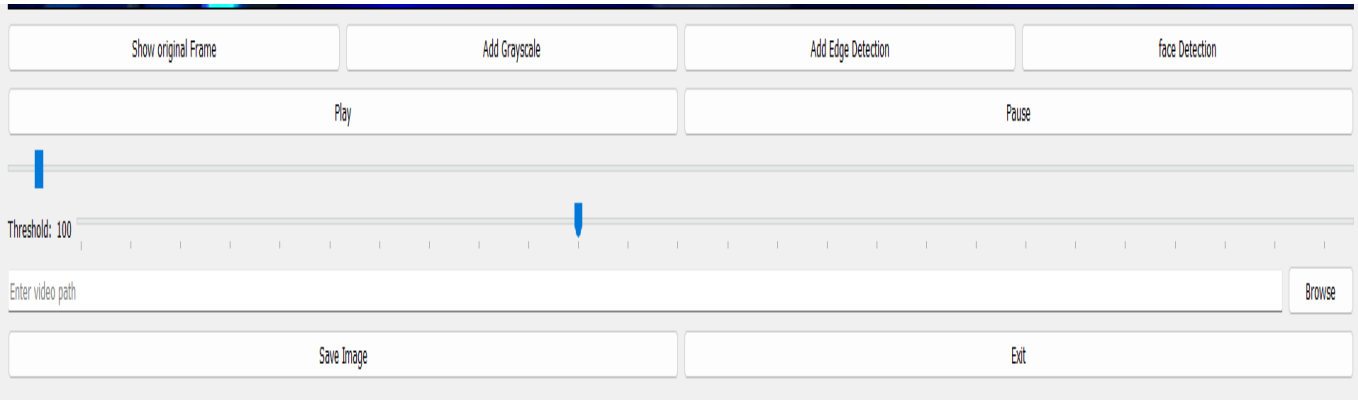


- After selecting the video file or browsing the file it creates a QtWidgets it create a window displaying the video and some buttons

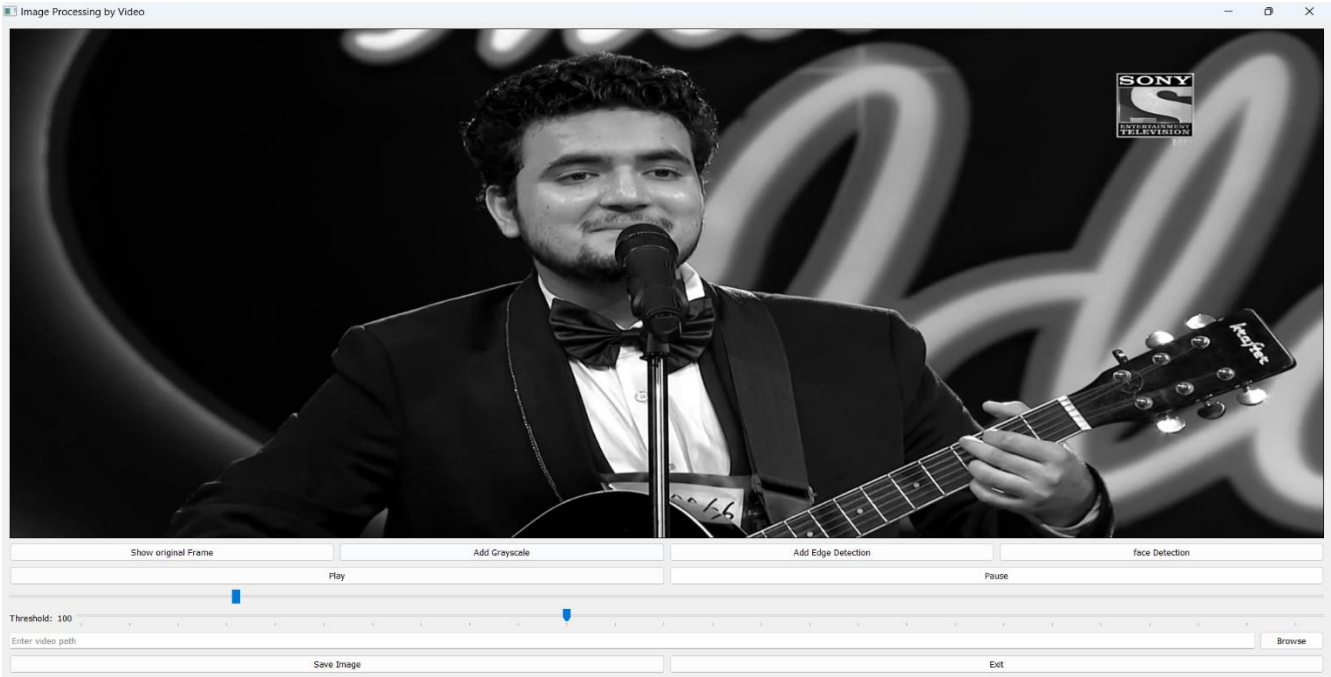


- It Contains various buttons and sliders for image processing like
    1. Play and pause buttons
    2. Video Slider
    3. Threshold slider for edge detection
    4. Show original button
    5. Add grayscale button
    6. Add Edge Detection button
    7. Path input and Browse button
    8. Exit button
    9. Face detection button
    10. Save Image button

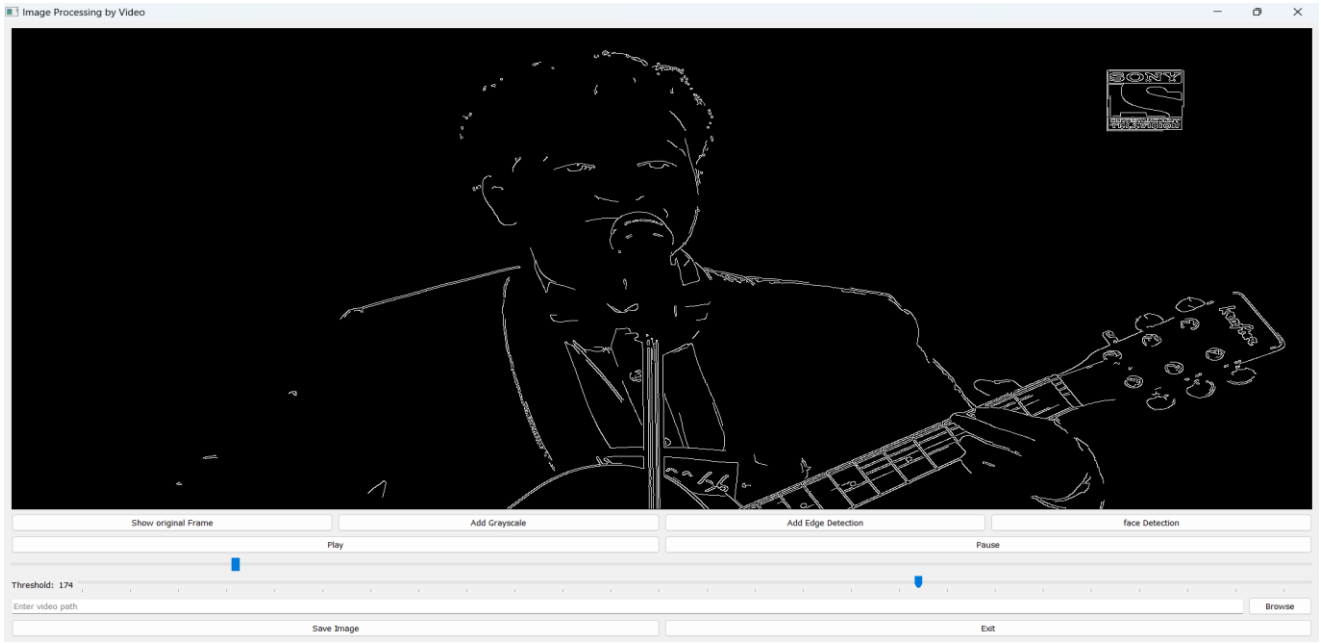
- Play and pause button to pause the video if you want.
- Video slider similar to any video slider to move video to any specified time
- Browse button to browse another video by searching or directly entering path in path input.
- You can exit the application by clicking exit button.



On clicking Add Grayscale



On Clicking Edge detection and setting any threshold value(In this 174)



Face Detection

Save Images:

- On clicking save image button it takes current frame add any image processing if you have applied and you can save in any specified path

EXAMPLES

ORIGINAL IMAGE

GRAYSCALE

EDGE DETECTION

FACE DETECTION

THANK YOU