Marvel App

Dzvezdana Arsovska Pavel Shumejko Ivan Iuschenko

University of Tartu

Abstract

In image processing, skin detection represents the process of finding skin-colored pixels and regions in an image or a video. The purpose of this project is to create an application for skin detection. The created application detects skin and allows the user to recolor the skin. The project is realized in Python with the help of OpenCV and other necessary libraries. The skin detection is done in the HSV color space. An option of changing the skin detection parameters and skin detection in YCrCb is added. By using the GUI the user will be able to choose among various skin colors and display the world in the edge format as well as color the edges.

Considered Factors

• The distinction or separation of skin and non-skin pixels in the image.
• The device for capturing the image. For the same image, different cameras have different output.
• Whether illumination varies drastically in the image?
• Skin tones vary from one person to other.
• Movement of object degrades the quality of image due to blurring of colors.
• Shadows and lightness have a vital role to change the color of the image.
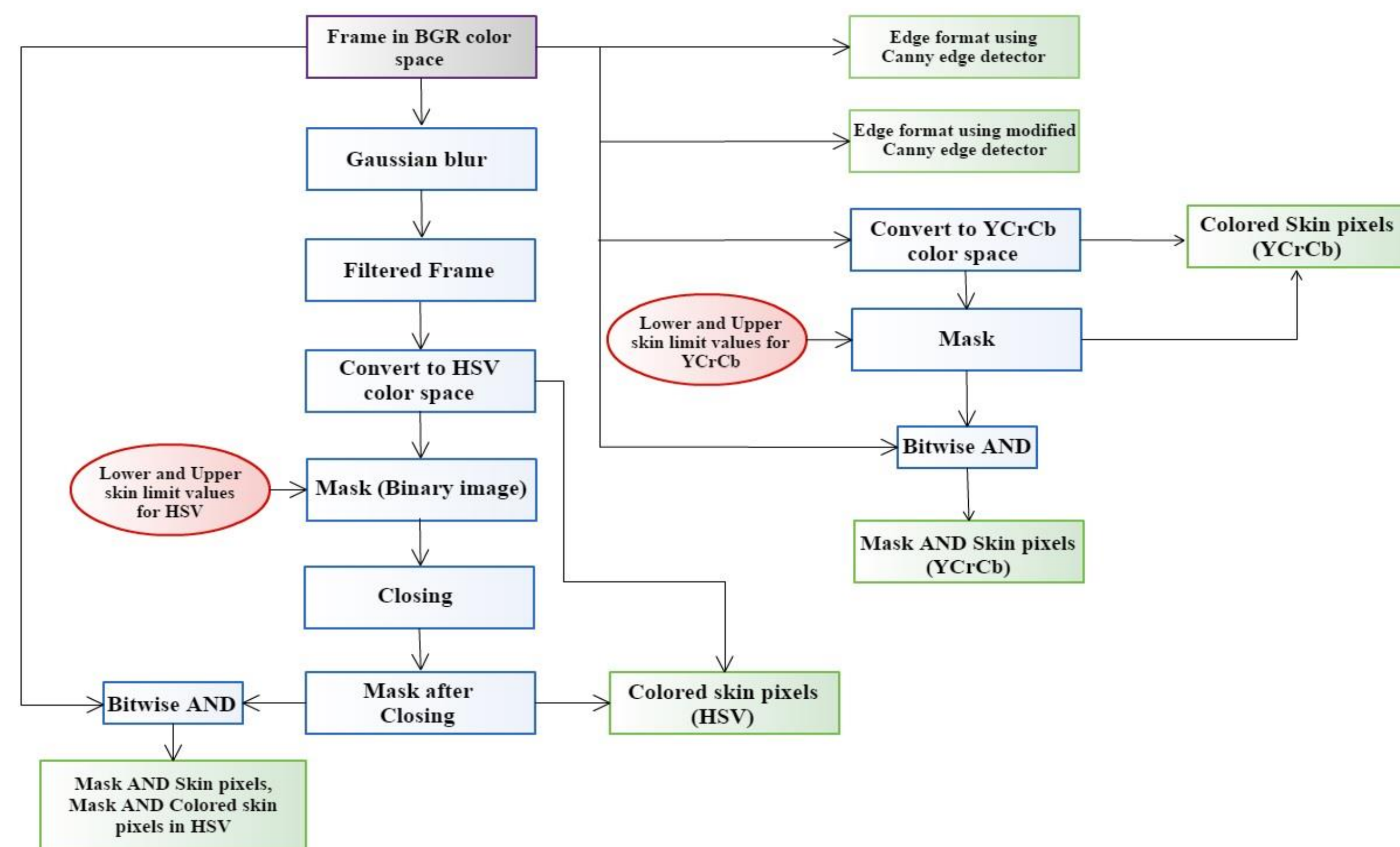• The color space used for the detection or segmentation.

HSV
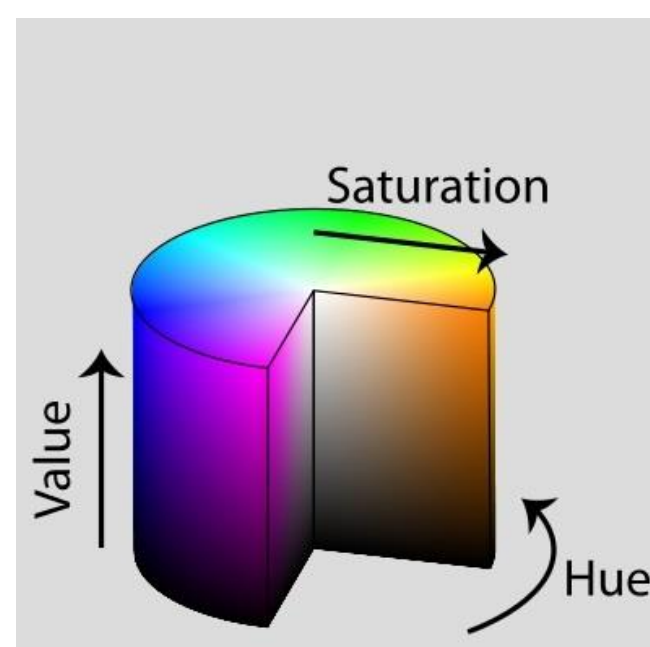
Edge Detector

Canny Edge Detection is done using the following steps:

Step 1: Noise reduction
Step 2: Compute the gradient
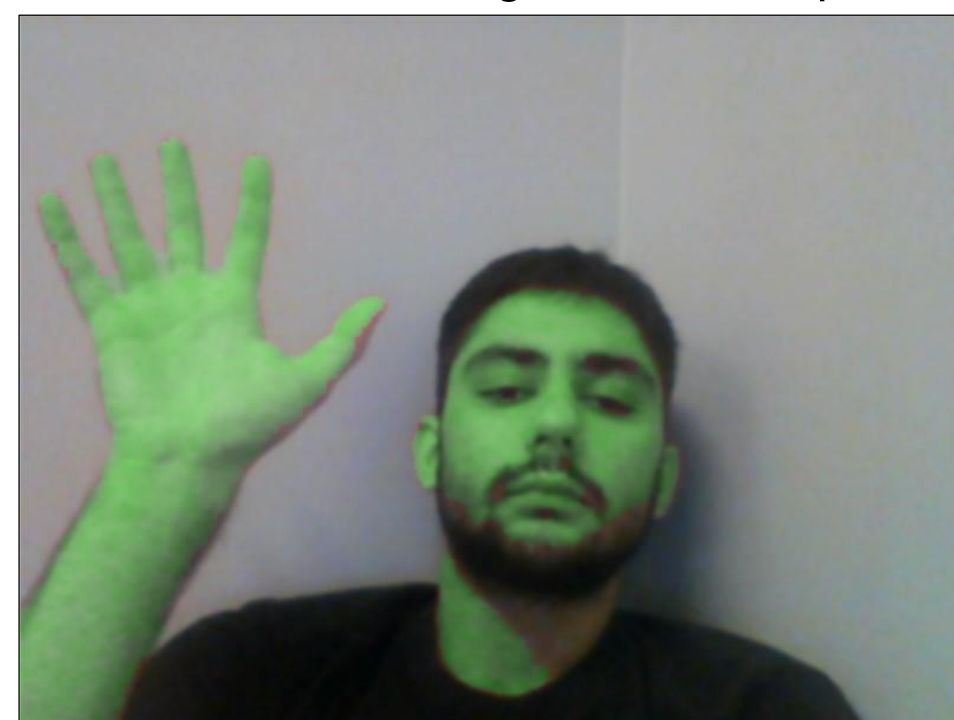Step 3: Apply non-maximum suppression.
Step 4: Apply thresholding.

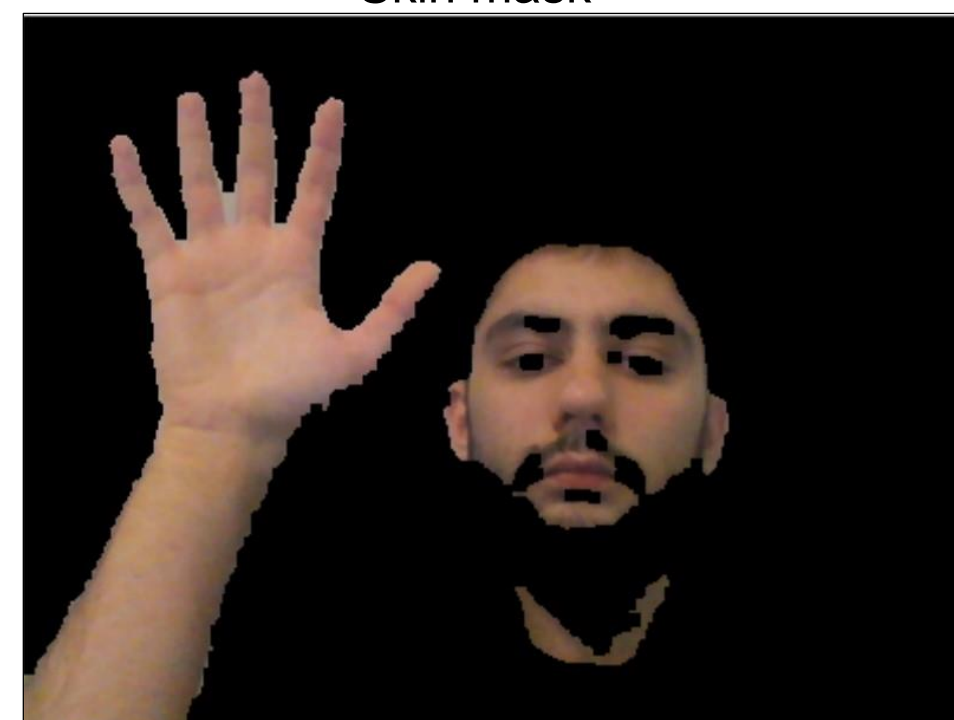## Noise Filtering

• Gaussian Filter
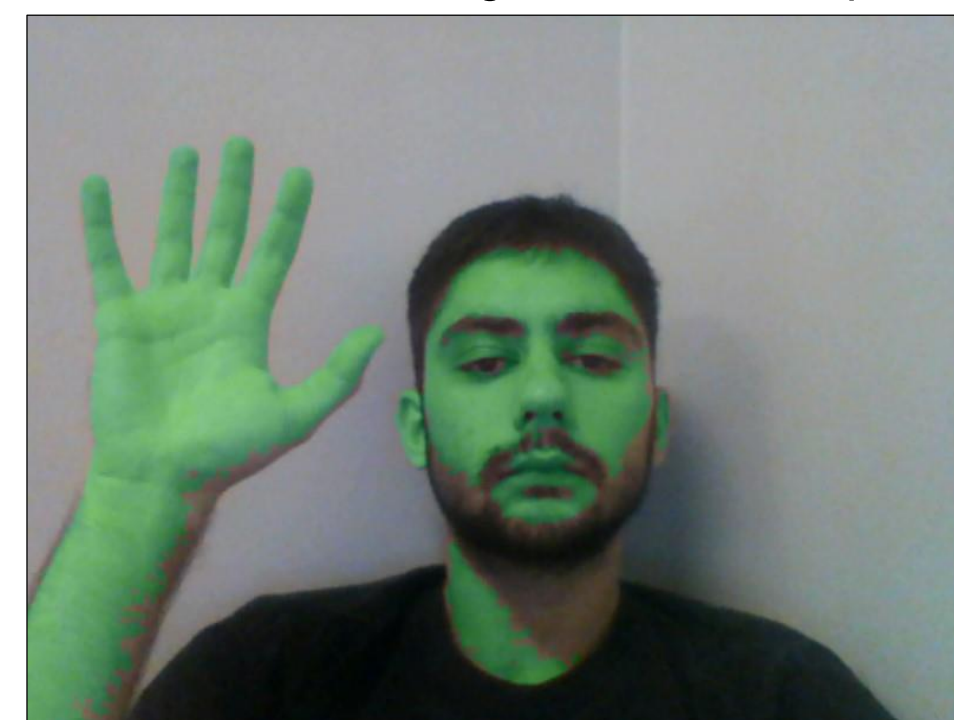• Morphological Operations

Algorithm and Results
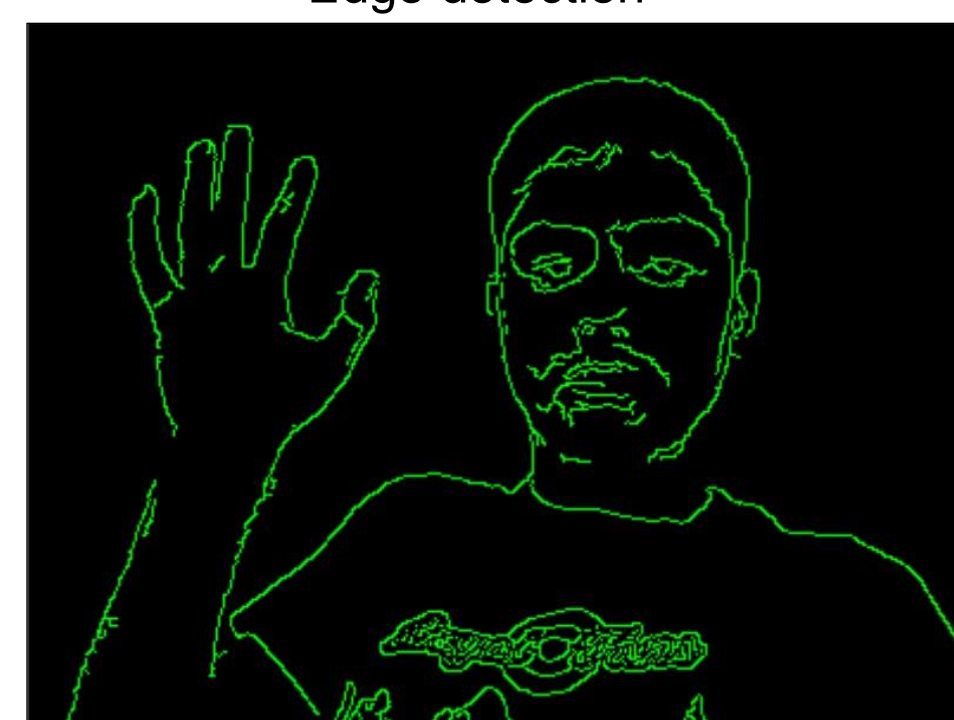

Pavel the Hulk using *HSV* Color space

Pavel the Hulk using *YCbCr* Color space

Skin mask

Edge detection

Conclusion

During the development of the application few challenges we faced few challenges.
For the finished application we can say that:

• The simplicity of the used method makes it ideal from computational perspective and therefore it can be used for real time applications like video processing.

• In a controlled background and environment the application gives satisfactory results. Otherwise, some objects in the background with the similar skin-tone color may cause false detections.

• The usage of a better quality camera will result in a less noisier output.

• The result of skin detection using HSV or YCrCb color space is based on the selection of threshold value.

• Tkinter is not the best Graphical user interface package because it requires numerous format conversions in order to display an image.

• The Canny edge detection function is simple and easy to implement in Python.

References

[1] Ahmed Elgammal, Crystal Muang and Dunxu Hu, "Skin detection - a short tutorial", unpublished

[2] Vladimir Vezhnevets, Vassili Sazonov and Alla Andreeva, "A survey of pixel based skin color detection techniques", unpublished

[3] V.A. Oliveira and A. Conci, "Skin detection using HSV color space", unpublished.

[4] Dr. Aly A. Farag "Intruduction to Biometrics Lectures – Skin Detection", unpublished

[5] Adrian Rosebrock, Zero-paratemeter, automatic Canny edge detection with Python and OpenCV, 09.11.2017, URL: www.pyimagesearch.com/2015/04/06/zero-parameter-automatic-canny-edge-detection-with-python-and-opencv/

[6] Khamar Basha Shaika , Ganesan P, V.Kalist, B.S.Sathish, J.Merlin Mary Jenitha, "Comparative Study of Skin Color Detection and Segmentation in HSV and YCbCr Color Space", 3rd International Conference on Recent Trends in Computing 2015