Assignment 2

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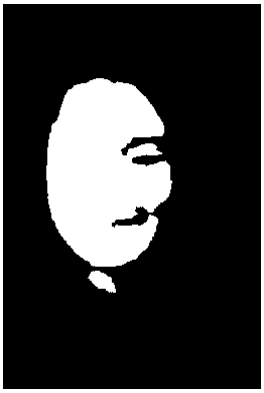
I. Introduction:

The assignment required isolating faces in the given images with a binary image with white on-target and black off-target.

A sample run of the program is given below:



II. Face Isolation:

The faces are first converted from RGB color space to YCbCr color space and the last two channels are isolated. Consider $a[\overrightarrow{x}]$ to be the Image of face in RGB space. The pixels in Cb channel below the value of 120 and those with Cr channel value greater than 130 are used to create the binary image $b[\overrightarrow{x}]$ .This transformation can be represented as:

$$b[\overrightarrow{x}] = \Gamma \left\{ \begin{array}{c} \phi \\ < 120 \\ > 130 \end{array} \right\} \times \left\{ \begin{array}{c} \phi \\ 1 \\ 1 \end{array} \right\} \mathcal{L}_{Y,Cb,Cr} a[\overrightarrow{x}]$$

III. Running the Code:

The code is included in the file 'running_code.py'. The following steps give an overview on running the program:

$ cd <path_to_dir>hw2-jkanukur

$python running_code.py

The script processes image files placed in 'faces' directory and shows the number of files processed.

>>>execfile('running_code.py')

Reading Images

Isolating Faces in Images

Total images processed: 24

Enter the image number to display: <Enter Number Here>

The code will then display image in 'YCbCr' mode, and after we close this image, it displays the binary image.

Image 22: In YCbCR

(Closing This will open -->)

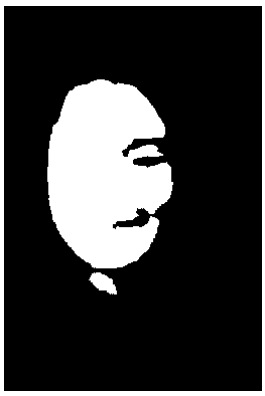


Image 22: As Binary Image

IV. Data, Steps & Results:

Data: The data is a subset of Feret3 data and tries to include 2/3 faces from each category to show its adaptivity on different ethnic groups and image types.

The script is run over all these files and the output can be viewed from within the scripts display menu.

Results: The code gave good results for most of the input files irrespective of the ethnic group. However as the main information to find faces was skin color, any similarly colored clothing gave some unwanted results. One example is given here:

Improvements: The code didn't use fiducial points, but can be used to improve its efficiency and adaptivity even more. If we use fiducial points it can be used to find the mean of pixel values within a subset of these points. This mean value will improve the accuracy with which we can isolate the faces