Implementation of Face Detection using Skin Color Segmentation

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1 Abstract

Human face detection plays a very important role in various biometric applications. Varying illumination conditions, color variance, brightness, pose variations affect face detection. There are many techniques for face detection, but skin color based technique is most popular as it is simple, robust and processing color information is much faster than processing any other facial features. So we plan to implement a novel algorithm foe face detection using multi-color space based skin segmentation and region properties.

First, skin regions are segmented from an image using a combination of RGB, HSV and YCgCr color models using thresholding concept. Then facial features are used to locate the human face based on knowledge of geometrical properties of human face by testing each segmented skin region[1].

2 Implementation Steps

We will roughly follow the below steps during implementation of this project

- **Preprocessing**: Histogram equalization and noise removal edge detection using sobel edge detectors.
- Adopting a Mathematical formulation for skin segmentation using RGB HSV an YcgCr color spaces[3].
- Performing morphological operations like erosion and hole filling[4].
- After rejection of human non-face regions and morphological operations,we will draw a bounding box around human face region. We know that usually, the shape of human face is an ellipse. So, we will eliminate non oval shape skin regions with eccentricity less than a certain value.

3 Database

We plan to experiment with **The Facial Recognition Technology (FERET) Database** [2] but depending on requirement(s) during implementation, we may use other dataset as well

References

[1] Rosali Mohanty, M.V Raghunadh, "Skin Color Segmentation based Face Detection using Multi-Color Space"

[2] The Facial Recognition Technology (FERET) Database, `www.itl.nist.gov/iad/humanid/feret/feret\_master.html`

[3] Nusirwan Anwar bin Abdul Rahman, Kit Chong Wei and John See, "RGB-H-CbCr Skin Colour Model for Human Face Detection"

[4] Gleb V. Tcheslavski, "Morphological Image Processing: Basic Algorithms"