Age Estimation from Frontal Images of Faces

CV Final Project - srriyer-ronair-ssdevadi

Aim : To estimate the age and gender of a person using frontal images

Current progress:

I. Implementing the paper- Automatic Age Estimation Based on Facial Aging Patterns
   A. OpenCV Haar Cascade Classifier
   B. Dlib C++ library (with a Python wrapper
II. HOG to detect presence of beard
III. HOG to estimate age based on the amount of wrinkles on the cheeks and nose

I. Implementing the paper- Automatic Age Estimation Based on Facial Aging Patterns

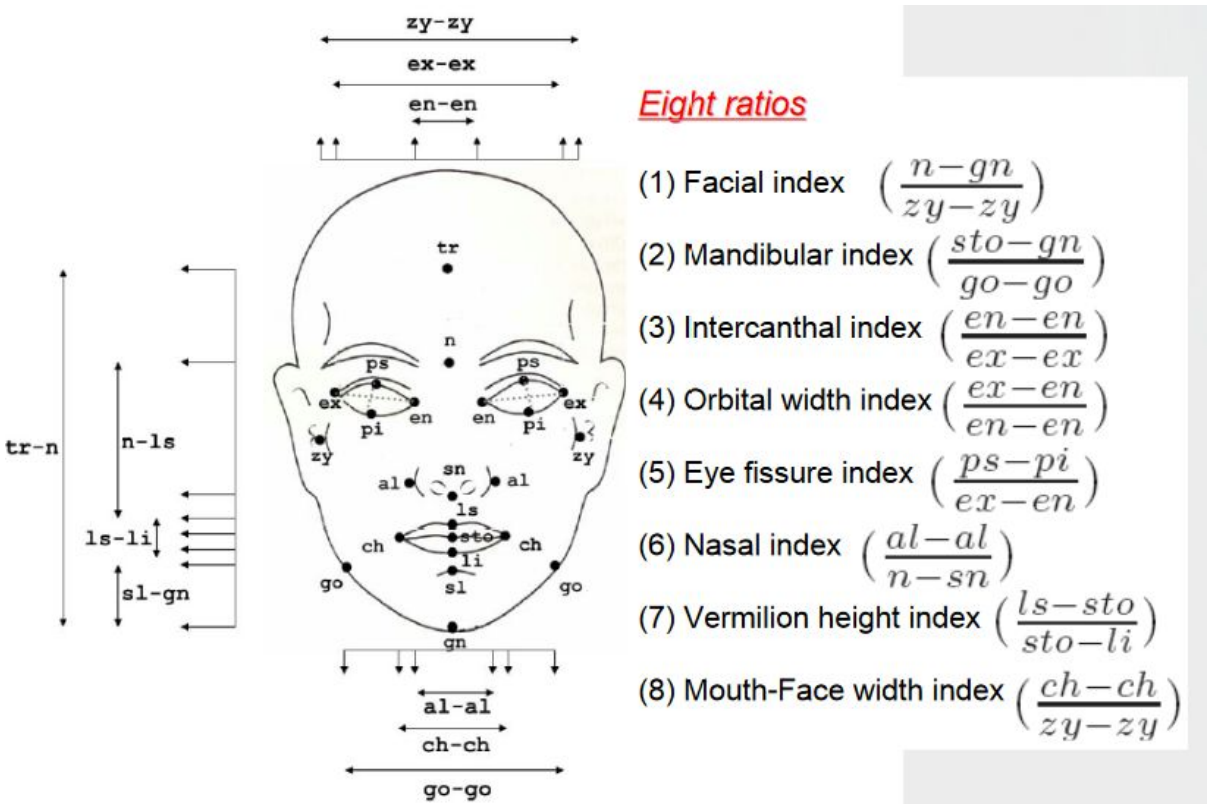
Among the different approaches suggested in this paper , we are implementing the anthropometric model

<u>Anthropometric Model:</u>

1. Only useful to distinguish between minors and adults.
2. Sensitive to head pose

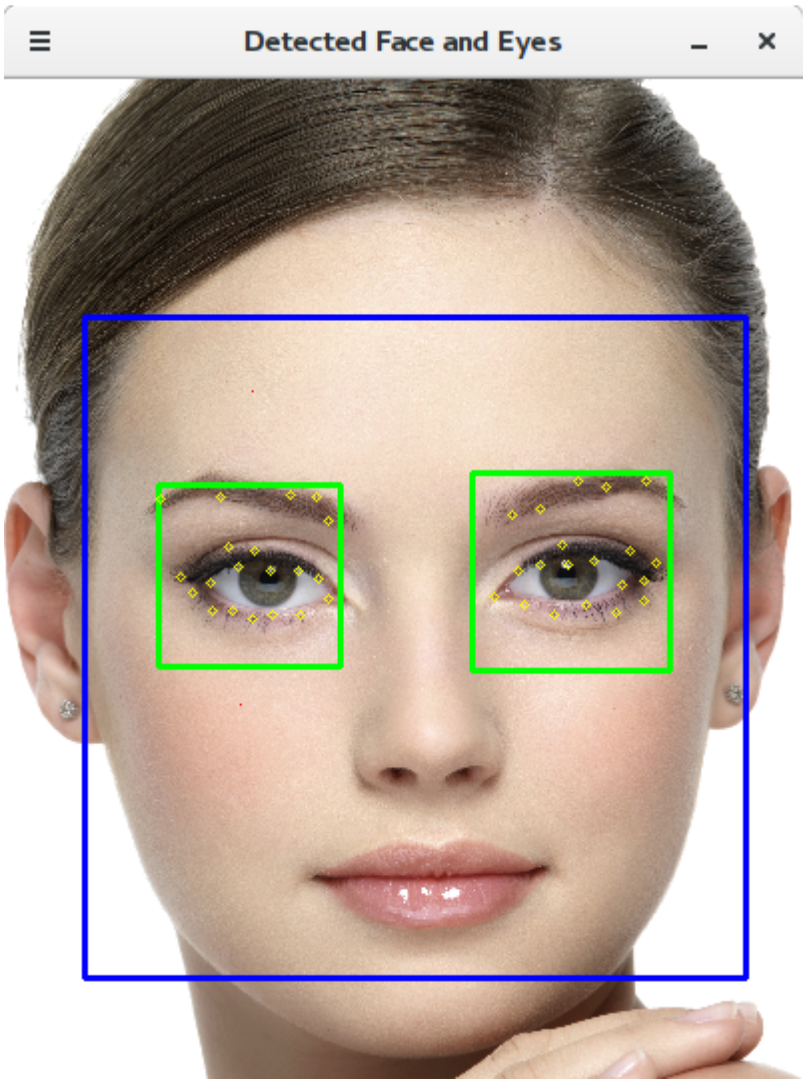
Assumptions:

1. Only frontal face images
2. Left and right mentioned throughout are from the perspective of the viewer

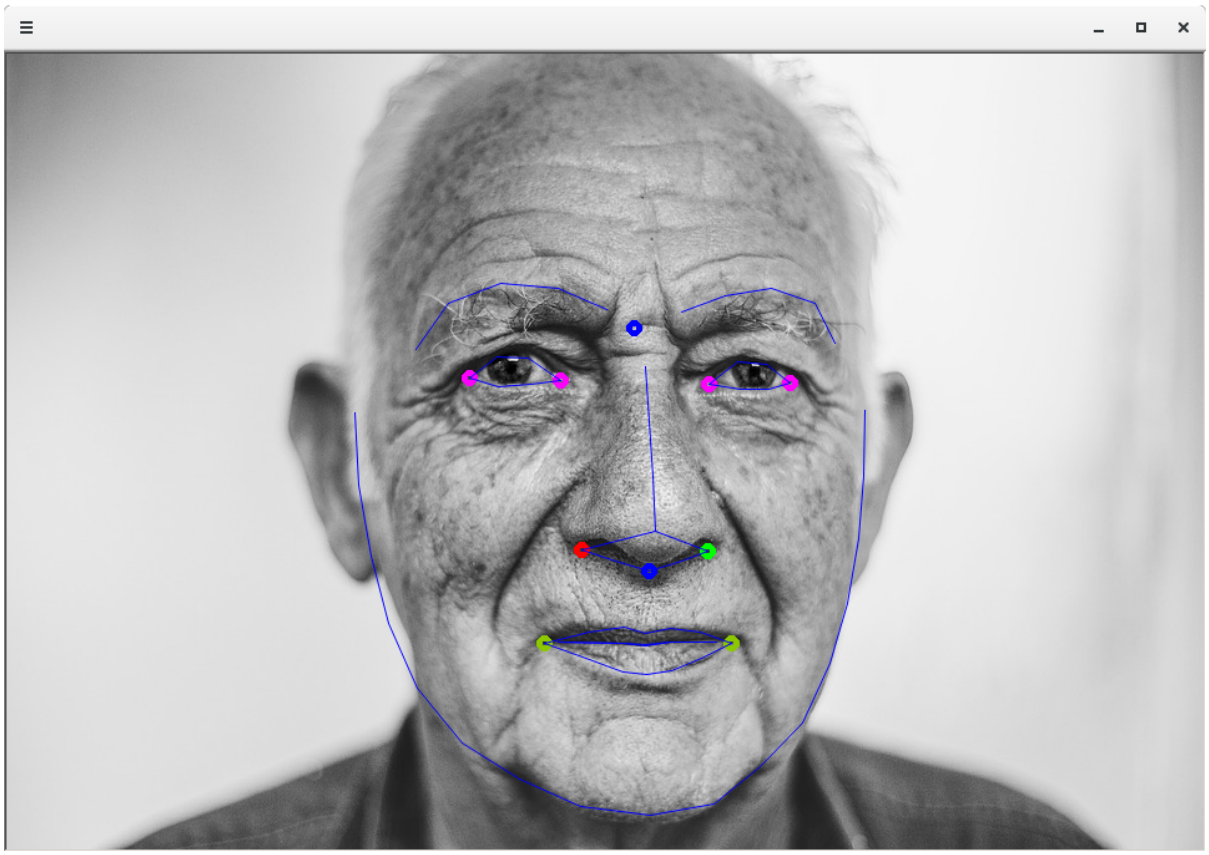


Our primary task is to detect the points in the above screenshot. Once we do that, we need to find the 8 ratios and pass them to an SVM and classify into 2 broad age groups.

1. **OpenCv Haar Cascade Classifier:**
    a. We start off by resizing the images to make it uniform
    b. We detect faces using the classifier *haarcascade_frontalface_default.xml* and for each face
    c. Detect eyes, nose and mouth using pre-trained classifiers.
    d. We applied Canny and GFTT to each eye's bounding box to detect left, right, top and bottom of each eye
    e. However we couldn't continue with this approach because this gave extremely noisy results. For example, it gave somewhat good results with a clean image, like below, but fails to detect one of the eyes of the old man in the section below:



2. DLib Library:
    a. We get the face landmark for each face in the image (represented by the edges in the below image) which returns a set of 68 points to represent the jaw, left-eye, right-eye and other features
    b. We find which point represents our desired corners which are needed to calculating the ratios. A sample of a couple of points detected are in the below image.
    c. We are able to find all the points of interest and calculate the ratios (which seem approximately correct for a normal face)
    d. Future step is to pass these ratios to the SVM to classify as an adult or minor



II. The next approach we're implementing uses Dlib HOG transform. We determine the color of the person's hair from his/her eyebrows and skin color from the nose and search the outer cheek and chin for presence of beard. A positive result from this classifier tells us that the person is a male adult

III. The next classifier helps us estimate the age of a person from the amount of wrinkles they have. We consider 3 patches of skin to do this, the area near the 2 cheekbones and on the nose. We apply HOG to these patches and pass it to the SVM classifier

References:
http://dlib.net/
http://www1.coe.neu.edu/~yunfu/papers/pricai10_t4.pdf
http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=4359348
http://alereimondo.no-ip.org/OpenCV/34