Age Estimation from Frontal Images of Faces

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ABSTRACT

Humans have the ability to automatically look at the face of the person and estimate the age. For a computer to be able to do this automatically, we require algorithms that extract appropriate features from the faces and use them to learn how they map to ages. This poster summarizes the result of using anthropometric models with varying parameters.

INTRODUCTION

Humans can estimate information such as age, gender, expression etc. by simply looking at faces. Automated age estimation has several challenges such as variance among different ethnicities, facial deformities etc. Aging progress is uncontrollable depending on various factors such as lifestyle, climatic conditions, health etc. Hence, we can't have an accurate estimation process for every possible case. We try to predict age groups of people by exploiting various biologically defined ratios in facial features and relations between them.

METHODS

We use the dlib library to automatically recognize faces in the given image. Additionally, the library also provides us with accurate location of various facial features such as a set of points that represent the boundary of eyes, eyebrows, lips, nose and jaw. These points allow us to calculate the ratios of various distances and use them in a classifier to predict the age groups.

We have used two models for this purpose. In one model, we extract the ratios as shown in Fig 2. In the other model, we proposed that the curvature of face also changes with age. We tried extracting a vector of angles as shown in Fig 3 for classification purpose. These ratios and the vector of angles made by the jaw boundary are later used for classification using neural networks.

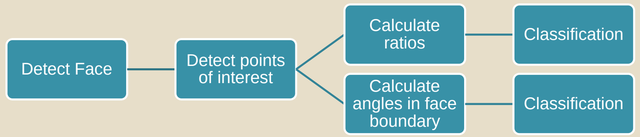

Figure 1 Overall process

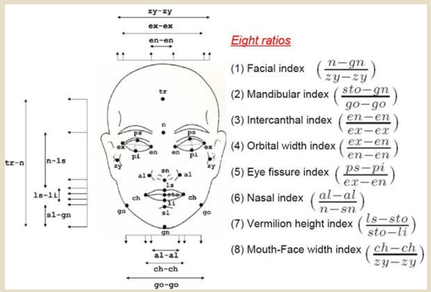

Figure 2 Anthropometric model of human face

Figure 3 Angles in jaw boundary

RESULTS

The results that various parameters would have on the overall accuracy is summarized below.

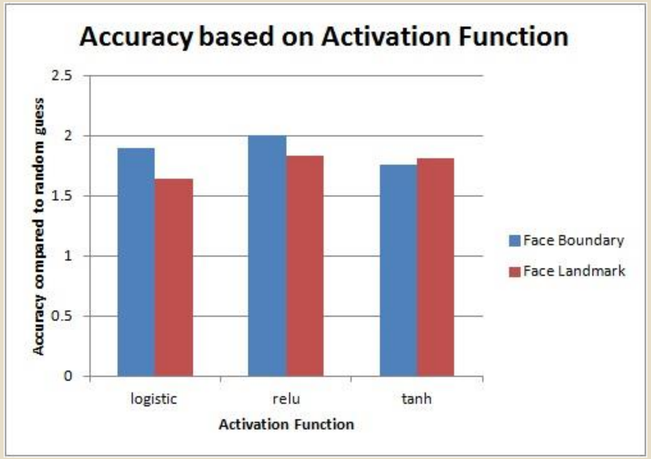

Chart 1. Comparison with different activation functions

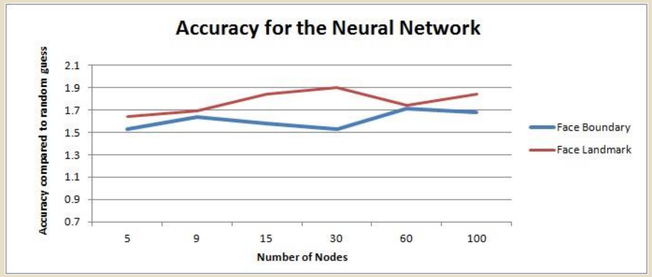

Chart 2. Comparison with different nodes in hidden layer

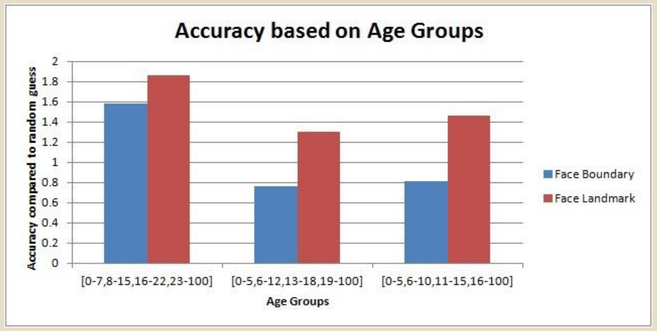

Chart 3. Comparison of accuracy for different age groups.

OBSERVATIONS

From the experiments that we performed, we can note quite a few observations

- Although the classifier gives a relatively good accuracy for more granular age groups, we found that the output is often unstable for higher ages. In other words, the classifier is able to distinguish better between kids and adults. However, it does not perform well when tasked with predicting more accurate ages.
- The curvature of the faces can also be used to predict the age group of the person. However, it gives a lower accuracy as compared to the other model.
- However, since the facial boundary can sometimes be similar for different people of different age, we feel that this could have lead to lower accuracy while running it against the test images.

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