

Subjective Age Obtained from Facial Images - How Old We Feel Compared to Others-

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Abstract. We propose a relative estimation method for subjective age, imaged by ourselves, using peoples' facial images and their chronological (real) age. We experimented with a rating scale for facial images which stimulated subjects. The subject evaluated an image as looking older than themselves with uncertainties. Finding the average values of the rating, the zero crossing point in the approximate line is defined as the subjective age. The experimental result shows that the subjective age tends to be found in negative direction (tendency to estimate oneself as younger than actual).

1 Introduction

Humans can estimate their age and gender by their experience of facial color and part of the facial features of their companions. The automated estimation of age and gender is an important factor in the study of the recognition of faces and facial expressions, however, it is difficult for this to reach the level of human estimation [1].

On the other hand, we often find ourselves being much more humble than needed, after finding a companion's actual age. Then, we often say; "I thought he was much older than me!" It can be said that we didn't estimate his age wrongly, but that we saw ourselves as younger, or older, than we really are.

Seeing our age like this is called our subjective age. In this paper, we propose a relative estimation method for subjective age, using people's facial images and their chronological age. This can be developed to further studies, such as the range of the subjective age, or, finding the cause of misunderstanding our subjective age and the chronological age, according to the generation and gender. There has been research of finding one's imaged subjective age on the basis of a questionnaire [2], but no research using facial images so far.



Fig. 1. Examples of the facial images in this database. (a) ordinary (left), (b) smile (right)

In this paper, we present three points; the construction of a database of facial images which is the foundation of this research, a proposal for the definition of subjective age and the estimation method, and the result of research.

2 Facial Image Database

There are total 20 classes from 20 years old to 70 years old for each gender in this database. At this moment, each class has 10 people, and a total of 400 facial images have been recorded, which include two different expressions (ordinary and smile) for each person. Figure 1 shows examples of the facial images. Facial images are saved as high-precision digital images by film scanning.

3 Experiment of Subjective Age Estimation

3.1 Rating Experiment

For subjects who were of different age and gender groups, we choose 15 facial images each for both males and females from a total of three category groups. These facial images were from the same age group as the subject, and the next younger and older groups from the subject's group.

Next, we experimented with a rating scale for these facial images which stimulate the subjects. The subjects were shown facial images at random, and they evaluated if it looked older or younger than themselves. The evaluation had 5 ranks; “Definitely older than myself (2)”, “Probably older than myself (1)”, “Not able to estimate (0)”, “Probably younger than myself (-1)” and “Definitely younger than myself”. The reason for adopting a range of responses was not to estimate the chronological ages of the facial images, but to seek their relative position to others.

3.2 Definition of Subjective Age and Method of Estimation

To quantify the result of the estimation, we plotted the results in a two-dimensional plane with the x-axis being the relative age (the chronological age of the facial image

minus the chronological age of the subject) and the y-axis was the estimation result, as shown in Fig. 2. Thus, the data with the range of upper-right direction was obtained. This range shows the subjective age of the group of subjects. Finding the average values of estimation this time, the zero crossing point in the approximate line is defined as the subjective age. That is to say, the subjective age is considered to give us a kind of standard of a relative position (age) for a companion or in a group.

3.3 Results of Research

According to the above mentioned method, we have treated the result obtained from research by showing ordinary and smile facial expression data to a total of 8 male and female subjects who were between 31 and 62 years old. The result of the rating and average value are shown in Table 1. The horizontal axis is from -9 to 9, because the subjects evaluated the facial data with a 9 year difference as a maximum. For example, in Case A the subject was 34 years old, he was shown facial data from 3 classes; 25-29 class, 30-34 class and 35-39 class. The average value of the evaluation and its approximate straight line are shown in Fig. 3. Zero crossing point of the approximate straight line and X-axis is found at -3.78 from the formula; $y = 0.1469x + 0.5552$. This is the subjective age of the subjects group from this research.

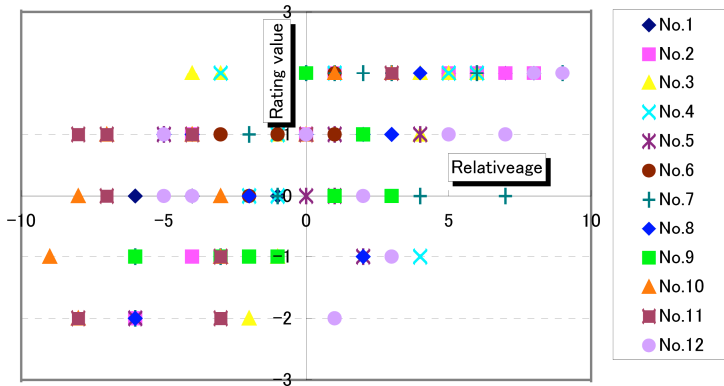


Fig. 2. A range of the relative age and the rating values

Table 1. The Result of Rating with Range of Response

	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9										
2					1	1	2			1	13	1	8	3	8	9	2	3	4										
1		1	3	2	5	8	1	1	3	10	2	8	5	3	4	1	4	1											
0		1	1	3	4	5	1	7	8	1	2	4	1	3	2		2												
-1	1	2	1	3	3	1	3	4	8	1	1	2	1	2															
-2		2		9			2																						
Av.	-	-	-	-	-	-	-	-	-	1.0	0.8	0.4	1.1	0.3	0.6	0.2	0.2	0.2	0.2	0.8	1.5	0.5	1.3	0.6	1.4	1.9	1.0	1.7	2.0

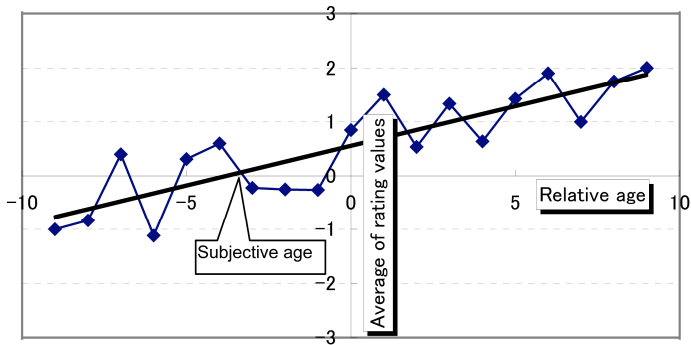


Fig. 3. The estimation result of subjective age

3.4 Evaluation

Since both the number of subjects and facial image data are too low, an unevenness was found in the results. However, as a tendency, the subjective age was generally found to be in the negative direction (tendency to estimate younger than actual). Although we see our own faces everyday, there is no opportunity to evaluate our face relative to others. So, we tend to see a past record, such as a photograph, as being the same as we look now. For instance, everybody has had the experience of being sneered at after sending in an old photograph, in which we see little change, when submitting our picture for official purposes. It is presumed that this tendency comes from a kind of conviction that we never get old.

Besides, there are other interesting trends. This tendency becomes more remarkable as the subject becomes older. Also, there are different tendencies between the same gender and the opposite gender. In the future, we will carry out further research of the different tendencies based on age and gender, and on facial expressions, and with more images and subjects.

In addition, we are now considering the possibility of collecting the examination data through a public website. We believe this will be possible if the issue of the rights to the portraits can be settled. On the other hand, by the method with 'average facial image' [1], we can stimulate subjects with "average facial images of 25 years old male or 42 years old female", so that we can prevent the unevenness of the stimulation. Furthermore, there would be no problem of the rights to the portraits.

4 Conclusion

As a foundation into the research of subjective age with facial images, we have built up a facial image database, and have introduced of a definition of subjective age and an estimation method. The results of the research are presented here.

In the future, we will further examine the estimation method of subjective age. In addition, we are planning to examine objective age (appearance age judged by others).

References

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