Proposal of Avatar Generating Method by Composition of the Portraits Made by Friends

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Abstract. Recently, the Remote communication through the Internet has been performed actively. And as a remote communication tool, the uses of graphic avatars are especially popular in Japan. However, in many cases, the avatar used on the communication is not mirrored to a user who creates the avatar himself using the application software provided for the remote communication support system. Therefore, the remote friends cannot imagine the appearance of the user from his/her avatar at all. In this research, we will propose a method of creating an avatar. The method shows that the avatar is constructed by merging some portraits, which are created by user's friends. We have developed the prototype systems for creating a portrait and an avatar composed of some portraits. This paper describes methods and systems of creating a portrait and an avatar. We performed some experiments to evaluate the usability of the proposed system and the quality of an avatar created on the proposed system. As an experimental result, it is revealed that the avatar, which is created on the proposed system, tends to be preferred by the user and friends.

Keywords: Avatar, Portrait, Avatar communication.

1 Introduction

Recently, the Remote communication through the Internet has been performed instead of Face-to-face communication. We can use various kinds of communication support applications, and choose one of them depending on the situation and the relationship between us and our remote speakers. From this viewpoint, the avatar chat is one of the superior applications as an anonymous communication tool [1], [2].

Generally, it is said that there are two types of user's recognition of an avatar. The first is that the user uses an avatar for expressing himself. In this type, the user creates the avatar based on his physical appearance. The other type is that the user uses an avatar for his ideal image.

There are various kinds of methods of creating an avatar. Generally, the user uses his/her preferred picture in the communication system, such as chat, SNS, and video

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game, where the avatar creating system is pre-installed. However, in this case, while the avatar is preferred by the user, it may be difficult for his/her friends to imagine the user's appearance.

There are some researches and applications for creating an avatar. One is that the system provides various kinds of facial parts, and the user chooses one of them to put it on the face as a base [3]. The other one is that the system creates an avatar from the user's portrait [4]. The avatar created by the first method may be preferred by the user; however friends may not be able to imagine the user. In the case of second method, there are some possibilities that the user does not prefer the automatically-created avatar; however this avatar makes it easier for the friends to imagine the user. One of the important things is that the user can prefer the graphic avatar as his/her own avatar, and that avatar also can make it easier for the friends to imagine the physical appearance of the user.

Therefore, we propose a new method and system for creating an avatar, which are that some friends create some portraits of a target person, and the system creates an avatar by calculating the average of the portraits. The graphic avatar created by our proposed method has high possibility to be preferred by the user, and makes it easier for the friends to imagine the target person.

In this research, we propose the avatar creating system which consists of two sub-systems, the portrait making support system and the avatar constructing system. This paper describes the idea and outline of the proposed system and the sensory evaluation for the system efficiency. In this paper, the image created by friends is called 'portrait' and the image constructed by the proposed method is called 'avatar".

2 Proposed System

The proposed system has been developed on the Android Tablet PC. It is because the tablet PC allows users to intuitively create a portrait by the touch panel operation. The proposed system consists of two sub-systems, the portrait making support system and the avatar constructing system. Some friends of a target person create his/her portrait on the portrait making support system, and the avatar constructing system creates an avatar of the target person based on the average of all his portraits.

2.1 Portrait Making Support System

A Nigaoe Channel, the pre-installed application on the Nintendo Wii, allows users to create different types of avatars by combining a variety of facial parts [3]. The portrait making support system uses the same method as Nigaoe Channel. Figure 1 shows the screen shot example on the portrait making system.

The portrait consists of nine facial parts; contour, hair, eyes, eyebrows, nose, mouth, ears, facial hair and glasses. By combining these features, the user can create a portrait. The portrait can be adjusted by enlarging, reducing, tilting, and moving each facial part to be similar to the target person.

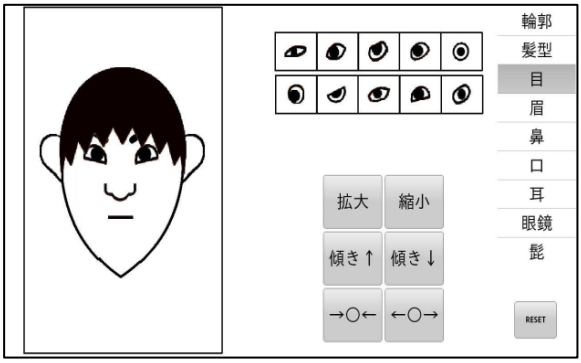

Fig. 1. Screen shot example on the portrait making system

2.2 Avatar Constructing System

The avatar constructing system uses the portraits, which are created on the portrait making support system, and the property data of each facial part used for the avatar.

Each facial part is defined by multiple feature points and their relative coordinates, which are stored in the property data. The number of points is, for example, the mouth has 24 points and the eye has 29 points. The avatar construction on the proposed system is based on the average of positions, sizes, and shapes for each facial part, which is obtained from the portrait. To decide the position and size of each facial part, the system makes an average of the positions in the upper-left corner, and the width and height of the whole facial part. The system decides the shape of each facial part by obtaining the average of each coordinate on the corresponding feature points of the selected part in the property data. For example, in the case of mouth part, loading the coordinates on each feature point of the mouth from all portraits, the system obtains the average coordinate on each feature point, and connects it to the neighbor points. The system connects every point in the same way to configure the facial part, and combines the facial parts by deciding the position and size as described above to create the avatar.

However, only when a large number of portraits with facial hair or glasses exist, the system configures the facial hair or the glasses. The facial hair is configured in the same way as the mouth. For the glasses, most commonly-used one is selected in an avatar.

Figure 2 shows the screen shot example on the avatar constructing system.

3 System Evaluation

3.1 Satisfaction and Similarities of Constructed Avatar

3.1.1 Experimental Object

The sensory evaluation of the satisfaction and similarities of the constructed avatar by the subjects as the portrait creators was investigated to evaluate the portrait making support system and the avatar constructing system.

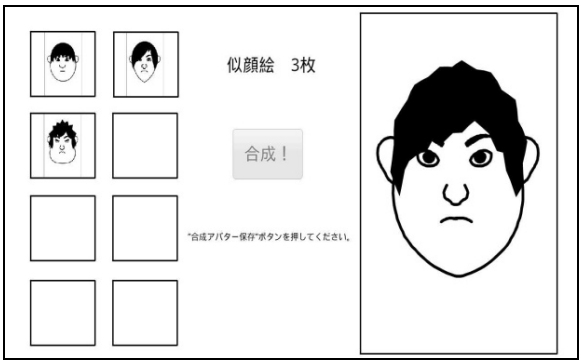

Fig. 2. Screen shot example on the avatar constructing system

3.1.2 Procedures

In this experiment, the subjects were to form a group of four or five people. All subjects create a portrait through looking at a photograph using the portrait making support system. This experiment used the photograph of a famous actor. The avatar constructing system created an avatar by merging all portraits they created. After that, each subject ranked all the portraits and the avatar in order of similarity without knowing which one was the avatar constructed on the avatar constructing system. Next, the experimenter let the subjects know which one was the avatar, and then the subjects declared the degrees of satisfaction and similarities between the target model and the constructed avatar. The subjects are 22 students in their 20s.

Figure 3 shows the experimental scene. And Figure 4 shows the example of portraits created by some subjects (left), and the avatar (right).

Fig. 3. Experimental scenes

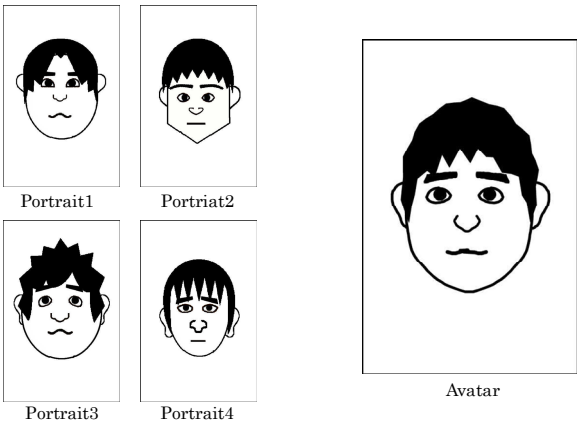

Fig. 4. Example of the portraits created by the subjects (left) and the avatar (right)

3.1.3 Experimental Results and Discussion

Figure 5 shows the graph indicating the ranking place of the avatar when the subjects ranked all portraits and avatar in order of similarity. The figure shows that five of subjects picked the avatar as 1st place, and eleven of them picked it as a 2nd. In this graph, there is a tendency for many of subjects to think that the avatar is more similar to the target person than the portraits they created.

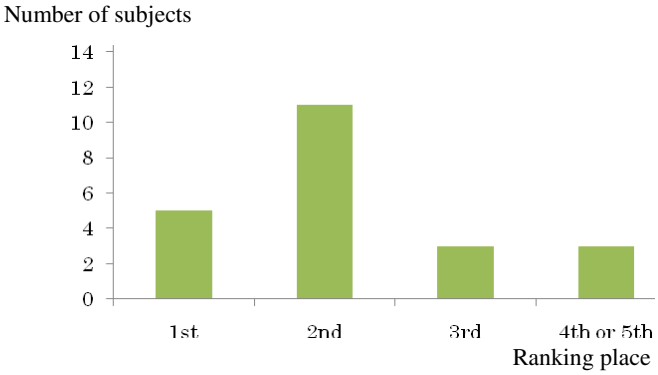

Fig. 5. Ranking histogram place of the avatar among all portraits and avatar

Figure 6 shows the graph indicating the average degrees of satisfaction and similarities between the portrait or the avatar and the target person. In this figure, there is no significant difference between the satisfaction and similarities of the portrait and those of the avatar.

As a result of this experiment, it is found, whereas the constructed avatar tends to be more similar to the target person than each portrait, the satisfaction and similarities are not significantly different between the portrait and the avatar.

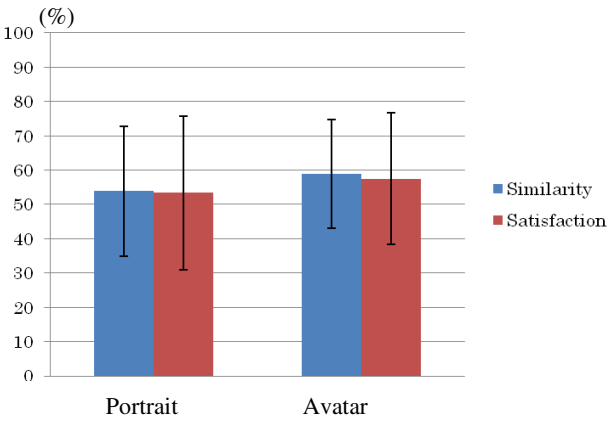

Fig. 6. Average degrees of satisfaction and similarities

3.2 Satisfaction and Similarities for Constructed Avatar from Portraits Created by Friends

3.2.1 Experimental Object

The sensory evaluation of the satisfaction and similarities of the constructed avatar by the target person and his/her friends, who creates his/her portraits, was investigated in this experiment.

3.2.2 Procedures

In this experiment, the subjects were to form five groups of 4 or 5 students in their 20s, for a total of 22 subjects. One person from each group became a target model, and other subjects created the portrait of the target model as a portrait creator.

After creating the portraits of the target model, each subject declared the degrees of satisfaction and similarities between the portrait created himself and the target model. And then, the avatar constructing system created the avatar by merging all portraits.

Viewing all portraits and the avatar displayed randomly, each subject ranked them in order of similarity. And the target model also ranked them in order of ones he wants to use. After that, the experimenter let the subjects know which one was the avatar. And then the subjects declared the degrees of satisfaction and similarities between the avatar and the target model, and the target model also declared the degree of fondness for his avatar.

Figure 7 shows the example of a target model (left), his portraits created by the portrait creators (center), and the avatar constructed by merging the portraits on the avatar constructing system (right).

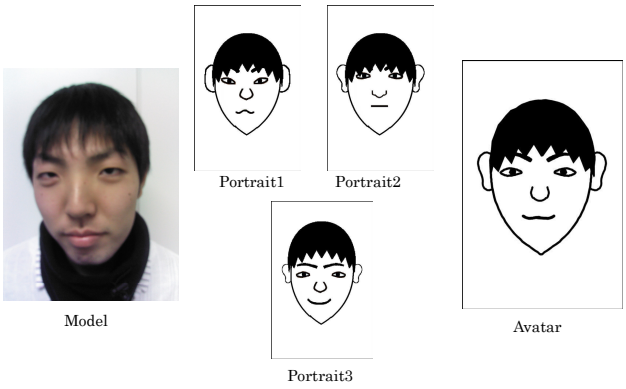

Fig. 7. Example of target model (left), portraits (center) and avatar (right)

3.2.3 Experimental Results and Considerations

Figure 8 shows the graph indicating the ranking place of the avatar when the target model and portrait creators ranked all portraits and avatar in order of similarity.

From this figure, it is obvious that both of them think the avatar constructed on the proposed system is more similar to the target model than the portraits. This shows the effectiveness of the proposed method

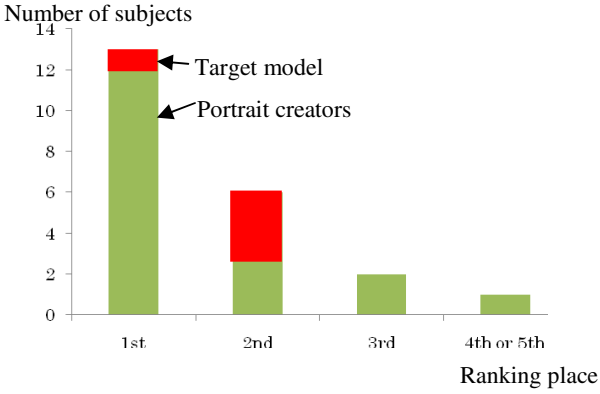

Fig. 8. Ranking place of the avatar among all portraits and avatar

Figure 9 shows the graph indicating the average degrees of satisfaction and similarities between the portrait or the avatar and the target model, which are declared by the target model and portrait creators. There is a significant difference of 10% between the satisfaction and similarities of the portrait and those of the avatar, which are declared by the portrait creators. From these results, the satisfaction and similarities of the avatar constructed on the proposed system tend to be higher than those of the portraits created by the creators.

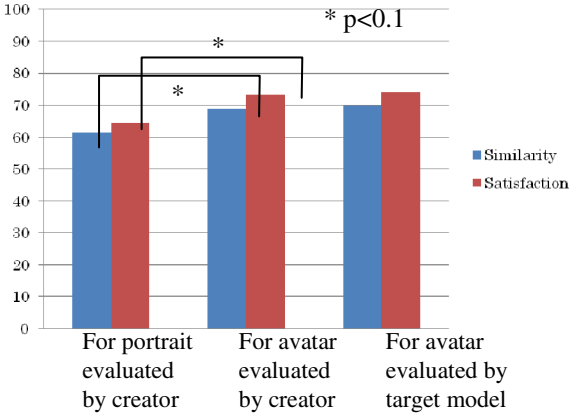

Fig. 9. Average degree of similarity and satisfaction

Figure 10 shows the graph indicating the ranking place of the avatar when the target model ranked all portraits and avatar in order of ones he wants to use.

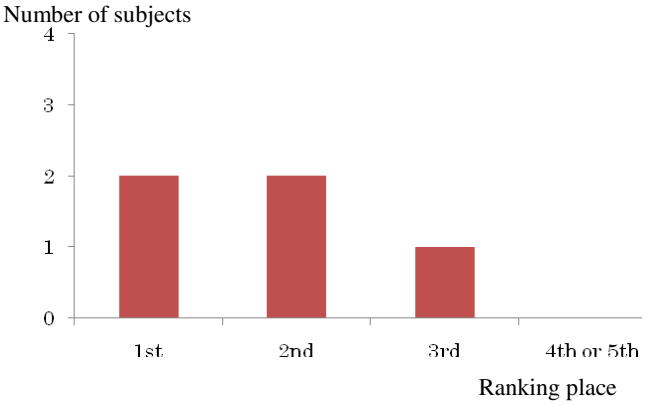

Fig. 10. Ranking place of the avatar among all portraits and avatar in order of ones the target model wants to use

Furthermore, Table 1 shows the degree of fondness for the avatar by the target model of each group.

Table 1. Degree of fondness for the avatar by the target model

Group #	1	2	3	4	5	average
Fondness (%)	50	80	80	90	70	74

From Figure 9, the degrees of satisfaction and similarities between the avatar and the target model declared by the target model (right bars) are the same as those by the portrait creator (center bars). In Figure 10, there is a tendency that the target model wants to use the avatar better than any other portraits. And from Table 1, the fondness for the avatar is different depending on each target model, however, the average degree of fondness means the avatar is highly evaluated by the target model. From these results, there is a high possibility that the avatar can make it easier for the friends of a target model to imagine him, and also tends to be preferred by the target model.

4 Conclusions

In this paper, we propose the method of constructing an avatar by merging the user portraits which are created by friends. The proposed system consists of two sub-systems, the portrait making support system and the avatar constructing system. The portrait making support system helps friends of a target model to easily create the portrait, and the avatar constructing system creates an avatar of the target person using the average of all portraits which are created on the portrait making support system. We demonstrated the effectiveness of these proposed systems by performing two experiments. In these experiments, some friends created the portraits of a target model on the portrait making support system, and the avatar was constructed on the avatar constructing system. The results of these experiments show that the avatar tends to be preferred to the portraits, and to give the satisfaction to both the target persons and friends.

We are planning to introduce the face color function into the system, and also emphasize the functionality of the avatar.

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