K-003

Research on expressing method of audience in a cyber-theater

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1. Background

Nowadays, it's very common to use 3-dimensional motion capture to catch humans' actions. Therefore, humans' motion analysis and synthesis are widely researched. However, most of these technologies are applied to the actors, there are not many research works related to the audience in a virtual space.

We try to achieve a virtual space that could let the users join as an actor, a director, or an audience from their homes or offices via Internet. We call this system Cyber Theater[1]. In this paper, we study the audience in a virtual space and proposed a method of expressing audiences in cyber-theater.

2. Real world Theater Interaction Analysis

In a real-world theater, there are certainly kinds of interactions between audience and actors, and of course, also between audience and audience. These interactions are deeply related to the success of concerts and/or plays. Therefore, we have to clarify these interactions in real world to make the cyber-theater more similar to real world.

Interaction between Actors and Audience

To obtain a specific idea about the interactions between audience and actors in real world, we visited some real actors who have experiences on the stage and conducted questionnaires.

From the result we found that the final purpose for actors to perform hard is in order to gain excellent response from audience. Besides, when the audiences give positive reactions, actors feel pleased and want to perform better; but when the audiences show negative reactions, they feel upset and lose their confidence. In summery, we are sure that the relationship between actors and audiences is very important to achieve a successful performance.

Interaction between Audience and Audience

In order to gain a specific idea about the interactions among audiences in real world, we ask some people who have been to a concert or show to fill out another questionnaire.

According to the data we got from the questionnaire, it turns out that audience also concern about the other audiences' actions even when they are watching the performance. Besides, they often do some kinds of actions just because other people do that. Moreover, most audiences enjoy watching performance with other people because it is more fun to laugh together, cheer together or discuss with each other.

3. Audience of Cyber-Theater Scenario

About cyber-theater, since it is a "theater ", obviously it consists of actors and audiences. Note that cinemas can be included in cyber-theater, but in case of cinemas there is no interaction between actors and audience. This paper is concerned with theater arts such as concerts and plays.

Figure1 illustrates a conceptual system set-up for the audience study. In the screen, each audience can see avatars for all the audiences and avatars for the actors. During the time, each audience sees the actors' performance presented by the avatars in the screen, each audience can display his/her reactions through some interface to his/her avatar, where this paper uses a "push button" interface for displaying the audiences' reactions. The actors can see the audiences' reactions by seeing the audiences' avatars displayed in the screen. Note that, about the actors' avatars, motion capture and avatar simulation are needed, but these technologies are still on-going projects; therefore, this paper does not detail these.
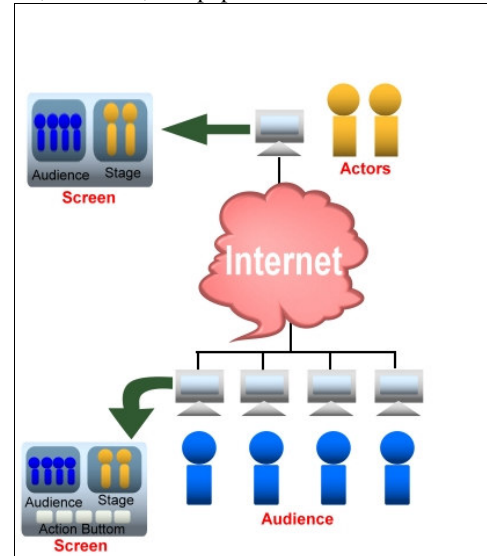

Fig.1 Illustration of the audience of cyber-theater scenario

4. Constructing and Animating Audience's Avatars

In order to let the user who participates in cyber-theater feel that they are interacting with real people, it's very important that the actions of avatars are similar to real human actions. In particular, the facial expressions of avatar and the motions of the upper part of the body are very important because the audiences are sitting on the chairs in the theater.

Figure 2 is the main scene of the model system we made. In this model system, there are 10 people sitting on the chair and they can display 10 kinds of actions, including clap, laugh, talk, sleep, leave, bore, agree, disagree, surprise, clap, and laugh.

Fig.2 Main Scene

5. Experimental Study

The purpose for this experiment is to clarify whether the audiences' avatars can give actors feelings that they are performing to real people and whether the audiences' avatars can give influences on actors' performance. In addition, we also want to obtain audience's impression on our model system.

5.1 Experimental conditions

In this experiment, the configuration is shown in Figure3. We used a camera to videotape the performance of actors and the videotaped performance was displayed on the audience's screen. In the audience's screen he/she can see the auditorium, stage (performance) and ten action buttons. The audience can use the buttons to display his/her emotions. In addition, we used a projector to project the auditorium on to the wall so that the actors can look at the avatars while they are performing. In order to prevent actors and audience from interfering with each other; we used a board to separate them.
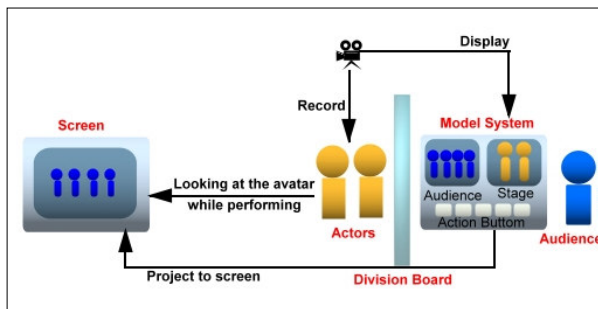

Fig.3 Illustration of the experimental Configuration

5.2 Experimental procedure

A group that includes two or three persons is formed, where one or two persons are the performer(Fig.4), and the other one is the audience. As the performers, we invited 2 people from Entertainer company and 8 people from a rakugo club of Waseda University. Also we invited some amateur people who experienced to perform on the stage.

Fig.4 Performer   *Fig.5 Audience*

Performers are asked to perform for 5~10 minutes perform. When they are performing, they face to the avatars of audiences that are projected on the wall. At the same time, the person who is the audience uses the model system and selects the action buttons based on how he/she feels about the on-going performance(Fig.5).

Before the experiment, we let the subjects fill out a questionnaire. Performers and audiences have different questionnaires. And after the experiment, we let subjects fill out another questionnaire.

5.3 Experimental results

The experiment we did gave us a positive outcome. And it corresponds with our expectation, too. From this positive result we can come up with some conclusions. These conclusions include:

(1). Most actors felt that they were indeed affected by the avatars of audiences. And most audiences feel this kind of system is easy to use but it is quite inconvenient for them to use it while they are watching a performance because they have to use the mouse to choose an action button.

(2). About the model system, it is better to make the length of time that audiences hold the button to be controlled by audiences. And each action should have more variations such as smile, laugh, laugh slightly and so on.

(3). The audiences in cyber-theater turned to show more intense reactions than in a real theater. The reason might be that the actors do not see the audiences in cyber-theater directly. Therefore, the audiences tend to feel free to show their real emotions.

6. Future Work

In this paper we do not have enough time to put forth the effort on the part of the interactions between audiences. We only did some investigations on this part, but we do not make an experiment for it. Therefore, it will become the next step for us to achieve in the future.

Moreover, the system should be online so that it can be used by multi-users at the same time. Thus, each avatar can present each individual audience's different actions. By doing this, we can make the system more similar to the real world.

Reference

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[2] M. Slater et al., IEEE Computer Graphics and Applications, 19(2), pp.6-9, March/April 1999,