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Development of Multimedia Terminal that Uses Personal Tempo

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Abstract: In this paper, we propose a novel multimedia terminal in which the presentation tempo of the contents, such as videos, slideshows, and animation, are determined by the user's personal tempo. We examined the relationship between the user's personal tempo and a presentation tempo that the user prefers. The results showed that there was a correlation between the personal tempo and the presentation tempo. We then developed a multimedia terminal by using Flash. The terminal has two new functions: a personal-tempo measuring function and a display-speed control function that changes the presentation tempo of the contents. This tempo is determined by the user's personal tempo.

Keywords: personal tempo, multimedia terminal, presentation

Introduction

Animation and slideshows that are included in multimedia contents, such as information terminals and learning materials, are generally presented at a speed that has been decided by the content producer beforehand. There can be large individual differences in the presentation tempo that users prefer [1, 2]. A multimedia terminal has been developed in which the user can freely change the display speed or tempo; however, the user must operate the keyboard or mouse to adjust the speed. The speed that the user prefers can change if the contents change. Therefore, it is necessary to adjust the speed whenever the contents change, and this adjustment can be troublesome for users.
We propose a new multimedia display terminal that can present animation and images, such as slideshows, at an appropriate speed determined by the user's personal tempo. A personal tempo is the tempo that is observed in activities such as walking, speech, and other actions in everyday life. Intra-individual variation in the personal tempo is low, while inter-individual variation is high. A high correlation of the tempo is found across similar actions [3].

1. Relationship between Personal Tempo and Presentation Tempo

1.1 Experiment

The presentation tempo that a user prefers was measured using a slideshow designed for college introduction. The personal tempo was also measured before and after this measurement, and the average of the two measurements was used as a personal tempo. The participants in this experiment were nine college students.
The number of beats during 1 min of a tapping task was measured as the personal tempo. The participants were asked to click the left mouse button at the speed at which they felt most comfortable.

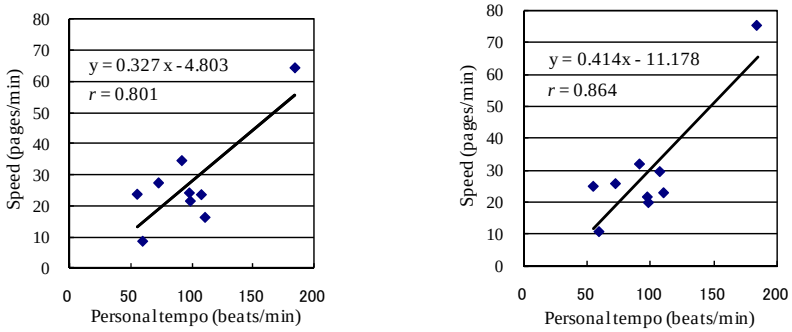
The presentation tempo that the user prefers was measured using a slideshow that displayed pictures of rooms and buildings, as an introduction to the college. The participants were asked to move the mouse to the right and to the left in order to adjust the interval time of the slideshow. A total of four titles of the slideshow were used: "Rooms, large image (1280 × 1024 pixels)," "Rooms, small image (640 × 480 pixels)," "Buildings, large image (1280 × 1024 pixels)," and "Buildings, small image (640 × 480 pixels)."

1.2 Results and Discussion

Figure 1 shows the relationship between the slideshow speed that a user prefers and his personal tempo, as well as the Pearson product-moment correlation coefficient for the association between the slideshow speed and the personal tempo for the nine participants. The correlation coefficient *r* ranged from 0.801 to 0.866. The results showed that there is a correlation between them.

The difference in the speed between the participants was very large; however, each individual participant consistently displayed the same difference. Furthermore, the difference in the speed between the titles was smaller than that among the participants.

As a result, when the multimedia contents are presented, it is desirable to consider not only the difference in the contents, but also in the user's favorite tempo.



(1) Title: Rooms, Size: large (2) Title: Rooms, Size: small

Fig. 1 Example of relationship between personal tempo and slideshow speed.

2. Development of Multimedia Terminal

2.1 General

The experimental results showed that the presentation tempo that the user prefers was different among the various users; however, there was a correlation between the personal tempo and the presentation speed. We then developed a multimedia terminal by using Flash to introduce the college. In this terminal, the presentation tempo is determined by calculating the user's personal tempo. The top page of the contents is shown in Figure 2. A user can obtain information about the college, such as videos, slideshows, pictures, and text, by touching the screen. In addition to these basic functions, the terminal has two new functions: a personal-tempo measuring function and a display-speed control function.

The personal-tempo measuring function measures the user's personal tempo. The user who uses this terminal for the first time is asked to click the left button of the mouse for 30 s at a speed at which the user feels most comfortable.

Fig. 2 Top page of the college guide.

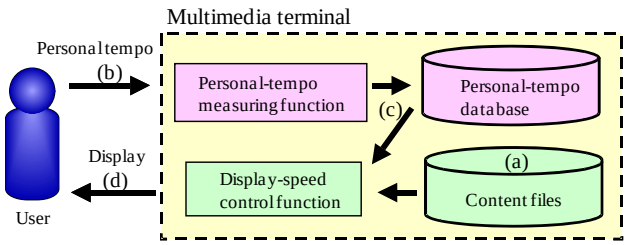


Fig. 3 System configuration.

The display-speed control function adjusts the presentation tempo automatically, such as the slideshow interval time. The speed is calculated using the user's personal tempo and the prediction formula, which is obtained by examination beforehand. The slideshow interval time is extended for a user whose personal tempo is low.

2.2 System Configuration and Process Flow

The system configuration and process flow are shown in Figure 3, as follows:

(a) The relationship between the personal tempo and the presentation tempo is examined, and the prediction formula is obtained for all contents. The formulae are stored along with the content files.

(b) The user's personal tempo is measured.

(c) The measured personal tempo is stored in a personal-tempo database with the user's name or user ID, and this value will be reused the next time.

(d) The contents in the tempo that the user prefers is displayed, which is determined using the personal tempo and the prediction formula.

3. Conclusion

We examined the relationship between the user's personal tempo and the presentation tempo that the user prefers by conducting experiments. The results of the experiments showed that the presentation tempo that the user prefers differs among users; however, there is a correlation between the personal tempo and the presentation speed.

We then developed a multimedia terminal for college introduction, in which the presentation tempo is determined by calculating the user's personal tempo. The terminal has two new functions: a personal-tempo measuring function and a display-speed control function that changes the presentation tempo of the contents. When the user's personal tempo is low, the terminal display slows down. This terminal can also be introduced into an e-learning system, in which the learning materials are presented automatically in a tempo that is appropriate for the learner.

Further study will evaluate the proposed system in terms of its educational effect for the presentation of learning materials.

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