A Training System on TANZAKU Calligraphy Skills by Augmented Reality

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1 Introduction

Learning Japanese calligraphy with ink-brush is so difficult for beginners. For solving such a difficulty, several researchers have developed some training system for calligraphy (e.g. Shichinohe's work in [1]). But, there is no training system for more challenging "TANZAKU calligraphy" which the paper is movable.

In this paper, we develop a novel training system for getting skills of TANZAKU calligraphy by utilizing AR technology. The basic idea is similar to Shichinohe's work in [1]. But, the big differences between the work in [1] and ours are that (i) our system may enable trainees to acquire skills of TANZAKU calligraphy, (ii) our system can give trainees even the dynamic writing process of sample characters. Here, the dynamic font method [2] is employed in (ii), in which the characters are formed as the result of 3-dimensional motion of a virtual writing devices on a virtual writing plane. Then, by using AR, it can be shown that not only static writing path but also dynamic writing process of model character can be given to trainee as visual information through a head mounted display (HMD). The performance is demonstrated by experimental studies.

2 Training System for TANZAKU Calligraphy

We present our developed system for training a skill of TANZAKU calligraphy. For such a development, we here use the dynamic font method in [2] and AR technology.

In Figure 1, we illustrate an overview of our developed training system for TANZAKU calligraphy. This training system consists of a laptop PC and HMD (Vuzix Inc., Wrap 1200DXR). Also, the size of TANZAKU is 7.6[cm]×36.4[cm] (width × height). On the both sides of TANZAKU, four markers are attached for AR, where each marker is a square with the size of 4[cm]×4[cm].

Using this system, we can show trainee both static sample writing (blue lines) and dynamic sample writing (red lines) of model character on TANZAKU through HMD, where such sample writings are designed by the dynamic font method [2], in which the characters are formed as the result of 3-dimensional motion of a virtual writing devices on a virtual writing plane. That is, trainee can take visual information on not only static writing path but also dynamic writing process corresponding to model characters. The software for visualizing such information in AR has been developed by employing VC++ 2013 with ARToolKit and OpenGL. In the calligraphy training, the trainee have only to write some characters on TANZAKU by a brush pen so as to imitate the model characters based on visual information taken in AR.

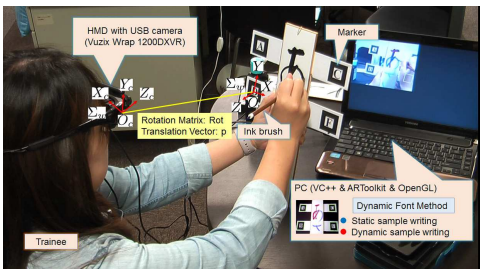
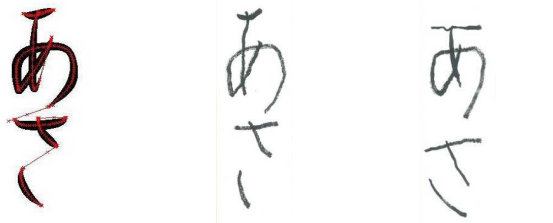


Figure 1: Calligraphic Skill Training System using AR

3 Experimental Studies

We demonstrate the performance of our training system in the previous section. Here, regarding characters as 2-dimensional patterns, we simply evaluate the training effects from the viewpoint of character typefaces.

As an example, we here used characters "a-sa" in Figure 2 (a) as model character. Figure 2 (b) shows a result with our training system by a trainee, where the trainee is right-handed and has no experience of TANZAKU calligraphy. For comparison, the characters written by same trainee without using the our training system is illustrated in Figure 2 (c). From these results, we may observe that trainee can imitate model character in Figure 2 well and that our training system works quite well. We also confirmed that the results for other trainees are almost same. It however reminds to examine the effectiveness and usefulness of our training system in more details – such as writing rhythm during the writing, etc.



(a) Model characters (b) with system (c) without system

Figure 2: An experimental result.

References

[1] T. Shichinohe et al., Augmented Calligraphy: Experimental Feedback Design for Writing Skill Development, *Proc. of the Fifth Int. Conf. Tangible, Embedded, and Embodied Interaction*, pp. 301-302, Funchal, Portugal, Jan. 22-26, 2011.

[2] K. Takayama and H. Kano et al, Dynamic Font: A New Representation Technology, *FUJITSU Sci. and Tech. J.*, Vol.32, No.2, pp.192-202, 1996.