

デジタル 3D 浮世絵

Digital 3D Ukiyo-e

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Abstract: Ukiyo-e is a Japanese traditional art based on the two-dimensional image of the woodblock print. However, in the middle of Edo period, several kinds of Ukiyo-e that present three-dimensional sensation using parallel perspective and geometric perspective were created. In this study, three-dimensional representation of Ukiyo-e was reproduced using current digital technology.

Keywords: Ukiyo-e, Kinect, parallel perspective, geometric perspective

1. Introduction

These days, several researches concerning the exhibition method using digital technology have been conducted to enhance the representation ability in the museum. In this research, we focused on the exhibits of Ukiyo-e. Ukiyo-e is a Japanese traditional woodblock print that has ability to express spatial spread or depth by using a two-dimensional woodblock print. In particular, when the geometric perspective was brought from Western countries in the middle of Edo period, a new type of Ukiyo-e called Uki-e (floating picture) was created. In Edo period, Uki-e was often seen as “Nozoki-e” through the mirror or lens to emphasize the depth sensation, or the three-dimensional paper model of Uki-e called “Tatebanko” was created to represent the three-dimensional scene as a paper toy. In this research, Japanese traditional art of Ukiyo-e was reproduced as three-dimensional image using the current digital technology

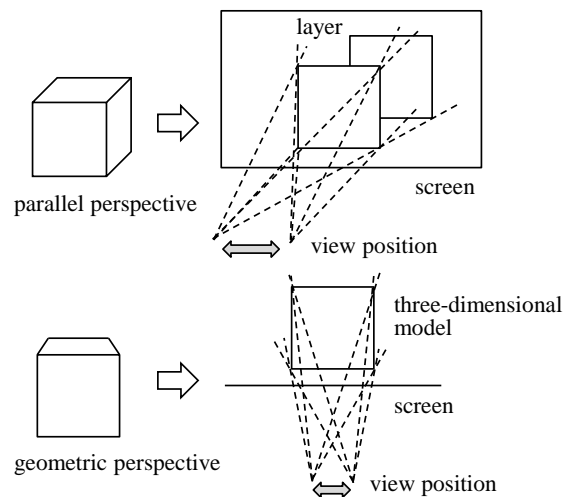
2. Principle of 3D Ukiyo-e

In Ukiyo-e, two kinds of perspective drawing methods, such as parallel perspective and geometric perspective have been used [Kishi94]. In this study, three-dimensional representation methods of Ukiyo-e were developed for both the parallel perspective and the geometric perspective. In this method, Ukiyo-e is displayed using the computer graphics image, and the three-dimensional effect is represented using the method of image warping. Figure 1 shows the basic principle of generating three-dimensional Ukiyo-e.

The parallel perspective is a traditional representation method used in Ukiyo-e in which the distant object is drawn in the upper area. This type of Ukiyo-e can be represented as three-dimensional image by dividing a picture into each object and arranging them at different distances as layers.

On the other hand, the geometric perspective is a three-dimensional representation that was brought from Western art. When the image was drawn correctly using the geometric perspective, the three-dimensional model of the objects can be constructed. Once the three-dimensional model of the scene was constructed, the image seen from

arbitrary view position can be represented based on the model.



Figur 1: Principle of 3D Ukiyo-e

3. Digital 3D Ukiyo-e system

In this study, digital 3D Ukiyo-e system that presents the three-dimensional image of Ukiyo-e using the effect of motion parallax was constructed based on the above-mentioned principle. Figure 2 shows the appearance of this system. In this system, the user’s view position is measured using Microsoft Kinect sensor, and the image seen from the user’s view position is generated in real time. Therefore, the user can see the interactive three-dimensional image using the effect of motion parallax.

In addition, in this system, in order to emphasize the depth sensation, the monitor was placed horizontally on the desk and it was seen reflected by the mirror so that the user can see the virtual image of Ukiyo-e.

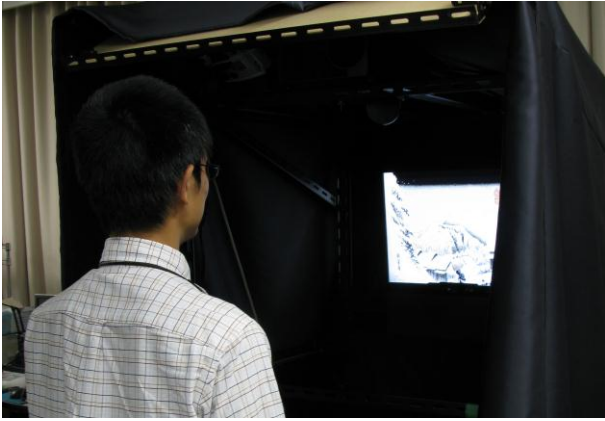


Figure 2: Digital 3D Ukiyo-e system

4. Example of content

In order to evaluate the digital 3D Ukiyo-e, several contents that were represented using the parallel perspective and the geometric perspective were created.

Figure 3 and figure 4 shows the examples of the digital 3D Ukiyo-e contents. “Kambara yoru no yuki” by Hiroshige Utagawa is an example that was drawn using the parallel perspective, and “Shibai Uki-e” by Masanobu Okumura is an example drawn using the geometric perspective. In these figures, the image seen from different view positions are shown.



Figure4: 3D representation of “Yshibai Ukie” by Masanobu Okamura



Figure 4: 3D representation of “Kambara Yoru no Yuki” by Hiroshige Utagawa

5. Conclusions

In this study, Japanese traditional art of Ukiyo-e was represented as an interactive three-dimensional image using the digital technology. Currently, a lot of Ukiyo-e prints are exhibited in several museums in the world. The actual use of this system would be expected to bring a new exhibition method of Ukiyo-e in the museum and to cause the visitor’s interest in Japanese culture.

Future work will include developing the effective exhibition method of Digital 3D Ukiyo-e and verifying the effectiveness of the exhibition using this system in the actual museum

References

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