Sketch Dance Stage

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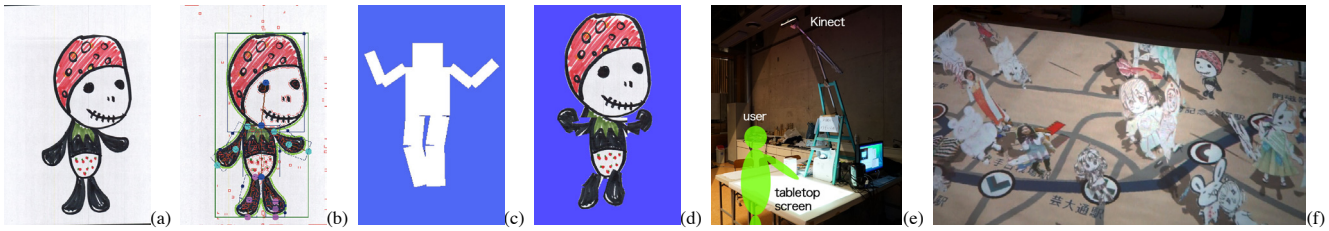

Figure 1: *(a) A hand drawn character. (b) Setting bones and separating the character into 10 parts. (c) A primitive CG character. (d) A hand-drawn CG character. (e) A stereoscopic 3DCG system with motion parallax. (f) Hand-drawn CG characters on a table.*

1. Introduction

Drawing on a sketchbook is one of the most familiar arts and people of all ages can enjoy it. Thus a lot of CG applications on which a user can create 2D and 3DCG images with drawing operations have been developed [Kondo et al. 2013]. On the other hand, dancing is also familiar to many people. Thus a digital content that is a mixture of drawing and dancing could be very attractive.

In this research, we propose a novel interactive digital system "Sketch Dance Stage". In this system, a user draws an arbitrary character on a paper and the system creates a CG character from it. Then the user dances, and the system scans the motion with a kinect. As the result, the hand-drawn CG character starts dancing on a CG dance stage with the user's motion. It is also possible to interact with hand-drawn CG characters. The user can enjoy drawing, dancing, creating 3DCG characters, and interaction with them in our system.

2. Methods

The proposed system is composed of three subsystems: a CG character creation subsystem, a motion creation subsystem, and a 3DCG subsystem.

A user draws an arbitrary character on a paper (Figure 1(a)), and it is scanned into a CG character creation subsystem. The character has to have 10 parts: a hand, a body, a pair of forearms and upper arms, a pair of thighs and legs, with the arms and the legs spread out. First, the subsystem detects the outline of the character and extracts the character region. Then the subsystem analyses the shape of the character by using some feature values such as contact points between the outline of the character and its circumscribing rectangle, curvatures of the outline of the character at each point, and so on. By comparing the feature values of a standard sprawled character, the subsystem sets bones of the character automatically. After adjusting the positions of the bones manually, the subsystem separates the body of the character into ten parts (Figure 1(b)). Images of each part are set to a primitive CG character (Figure 1(c)), and a hand-drawn CG character is generated (Figure 1(d)).

A user dances in front of a motion creation subsystem. The subsystem scans the motion with a kinect for 10 seconds based on 15 points of the user's body, and the changes of degrees of each joint of a CG character are decided. The user can choreograph a CG character with the user's dance.

A 3DCG subsystem is based on a stereoscopic 3DCG system with motion parallax [Uehara et al. 2014]. The subsystem is composed of a tabletop screen and a kinect above the table (Figure 1(e)). The kinect tracks a user's viewpoint and 3DCG for the viewpoint is synthesized to reproduce motion parallax. When the subsystem receives a hand-drawn CG character and its motion data, it adds an animated 3DCG character on the table. The users can feel as if their hand-drawn CG characters are dancing on the table with their choreographies, and can observe them from any point around the table with stereoscopy by motion parallax (Figure 1(f)). The subsystem also tracks the user's hand. When the user touches a hand-drawn CG character on the table, it starts jumping (Figure 2).

We exhibited our "Sketch Dance Stage" to a local anime festival (Figure 3). About 200 people came to our booth to see our system, and 47 people from 5 years old to over 60's drew characters, choreographed with dance, and saw hand-drawn CG characters and interacted with them. Most of visitors were anime fans who often love both drawing and dancing, and they enjoyed our system very much.

Reference

KONDO, N., MIZUNO, S., 2013, Amazing Sketchbook: extended drawing on a sketchbook using 3DCG, *SIGGRAPH 2013 Posters*.

UEHARA, Y., MIZUNO, S., 2014, A Virtual 3D Photocopy System, *SIGGRAPH 2014 Posters*.

Figure 2: *Touching CG characters.*

Figure 3: *Exhibiting "Sketch Dance Stage" at an anime event.*

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