One-Handed Gesture Based Interaction for Image Zoom Manipulation

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Abstract—Hand gesture-based interaction has great importance role in human-computer interface. However, many applications have been proposed to incorporate with additional wearable sensors and some specific training for each user may be required. These limitations make it inconvenience for using in the real world. This paper presents one-handed gesture based interaction for image zoom manipulation, which is fast and easy to implement. The manipulation of zoom command with natural gesture is to pinch or to stretch fingers, like on touch-devices. Energy feature extracted from hand contour of grasping and spreading fingers represent zoom-in/zoom-out commands, respectively. The relative percentage of hand energy, while manipulating image zoom, and image zoom level is presented. The experimental results show that a speed of zoom manipulation and hand size is invariance to the energy percentage. Therefore any users can easy perform on their natural way to zoom an image without training.

Keywords—Human Computer Interaction, Hand Feature Extraction, Zoom command

I. INTRODUCTION

In recent year, there has been widespread amount of research on human-computer interaction or HCI. Some of the past HCI systems attempted to identify gestures using glove-based device or wireless hardware that would measure the position and joints angle of hand [1, 2]. However, these devices have limit to a convenient of users that would control to system. Vision-based interaction has been approached to resolve this problem. They capture the hand gestures without requiring any physical device. The system cloud more natural and convenient for human-computer to interaction.

Hand gesture-based interface has great importance role in HCI. They used to replace traditional interaction devices such as mouse, keyboard, touch screen, tablets etc. Many applications would apply to interaction. For example, computer gaming, automatic sign-language interpretation would also allow to helping hear and speech impaired people [3]. Nowadays, they apply in healthcare field that could more natural control for diagnostic data and surgical devices. Wachs el al. [4] present the Gestix system, a doctor-computer interact with devices in operation room. They used this system for sterile navigation and manipulated of Radiology images. According to [5-6], they presented a novel technique implementing barehanded interaction with virtual 3D content. However, they are inconvenience for any individual users by using specific posture which unconventional and inflexible gesture. Thus, in developing a hand gesture-based interface design, it is important to design gesture which low cognitive load, friendly, flexible and natural for users. These have challenging to many researchers for resolve these problems.

II. HAND DETECTION

This section shows a process of our hand detection as shown in Fig. 1. Kinect is used as input of acquisition system. Hand feature extraction and used to calculate energy percentage for implemented to zoom manipulation.

The reminder of the paper, Section II presented hand detection and then Section III presented zoom manipulation. Experimental results and discussion are described in Section IV. Finally, the conclusion is presented in Section V.

A. Image Sequence Acquisition

Original color images are captured by Kinect sensor (Xbox 360) as the input device. The depth maps are also captured with 640×480 pixels resolutions. Once a hand is detected, the corresponding depth maps are generated as in Fig. 1(b).