

Offline Analysis of the Dietary Intake Based on Binocular Vision

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Abstract — Obesity has become a worldwide problem threatening the health of millions of people. Obesity is closely related to the people's daily diet. Thus, monitoring food intake, the process of determining how much a subject eats during an entire day, could help users get more information about the patient's eating habits. First, we could use the chest-worn camera device to get the diet photos. Second, after the camera's calibration, virtual reality technology is utilized to build virtual scenes according to the diet cameras' environment. User can manipulate the object by rotating, zooming or moving to fit the real food in the binocular vision. Last, in a user-friendly interface with OpenGL, the volume of the real food could be calculated according to the volume of the virtual object.

Keywords - dietary assessment, OpenGL, user-friendly interface, virtual reality, binocular vision.

I. INTRODUCTION

Obesity is defined as a therapeutic condition in which excess body fat has accumulated to the extent that it may have an undesirable effect on health, leading to reduced life anticipation that would certainly cause the health problems [1]. When the intake of the calories are more than the calories burned, the excess calories stored as fat in the body, it exceeds the normal physiological requirements, and the time

It was estimated there were about 120 million people obese and 320 million people overweight in 2010 in China [2]. Nowadays in Western countries, people are considered overweight when their body mass index (BMI) a measurement obtained by separating a person's weight from the square of the person's height [3,4]. It is the weight of the body weight is obviously overweight and subcutaneous fat layer is too thick, it is the body fat accumulation too much and lead to an unhealthy state [5,6]. It does not only refer to the simple weight gain. People always think that looks round, it means camp of health. In fact, obesity does not mean that there is a healthy body, but also there is a lack of nutrition. As many obese children, often accompanied by lack of body calcium iron, trace elements, iron deficiency anemia, rickets and other nutritional deficiency disease. It can be said that there is a close link between obesity and health, and even can be said that obesity is the source of disease [7,8].

The decrease of insulin secretion and insulin action is the cause of high blood pressure[9,10], and high concentration of insulin can promote the formation of high blood by enhancing the recovery of sodium ion and the frequency of sympathetic nerve[10,11]. Circulating plasma and cardiac output increased, heart rate increased. Because of the increase of the nerve excitability and sodium re absorption of the persistent sexual intercourse, the hypertension caused by the increase of the increase of the peripheral vascular resistance[12,13]. The prevalence of hypertension in obese patients is high, and obesity is a risk factor for

hypertension[14,15]. The main exploration and creation can be directly worn on the body, or integrated into the user's clothes or accessories of the equipment science and technology. Its core idea is to allow people to more convenient use of intelligent equipment and do not feel its special presence. Wearable health equipment is a general application of wearable technology in the field of health, to equipment for the detection of physical conditions, the statistics of exercise data and the improvement of health conditions.

Regardless of which one or more factors lead to obesity, the incidence of the material basis is due to energy intake is greater than consumption, so that the excess energy stored in fat form. The study found that increased intake of staple food for obesity risk factors, studies have found that obese people are eating more than their own needs, so that the body is in a positive energy balance. The results of this study suggest that increased intake of vegetables and obesity, central obesity, high-risk, and may be the main food intake of obese people, which accompanied by vegetable intake more than the normal weight of the crowd.

II. VIRTUAL FOOD OBJECT'S THREE-DIMENSIONAL OPERTAION

With multi-touch technology used on the iPhone, this new mode of operation all over the world began to spread on a variety of devices. Currently supports multi-point touch technology devices and operating systems: iOS carry the iPhone, iPad and iTouch, etc. Various models equipped with Android phones and tablet PCs HTC, Samsung and Motorola; Windows 7 operating system; Windows 8 operating system, Wait. Thus, from the traditional desktop computer to popular smartphones and tablets, you can use a smooth multi-touch technology. And the technology for scaling, rotation and other operations is far superior to the traditional keyboard and mouse mode of operation, to enhance the overall findings of this project is the best choice.

So offline analysis of the virtual food's object is needed in the software.

OpenGL which is also called Open Graphics Lib, is developed from SGI's GL (graphics library), based on a separate set of hardware. Window system-independent three-dimensional graphics library, currently, OpenGL in the field of graphic design has become the industry standard. it is widely used graphics and dynamic system. OpenGL is a process of graphics API (Application Programming Interface , Application Programming Interface), it is not descriptive. It includes over 110 graphics functions, developers can use these functions to construct the scene model, three-dimensional interactive graphics software development. At the same time, OpenGL is network-transparent, graphical information can be sent over the network. Videos draw, virtual reality technology and computer visualization, three-dimensional graphics design. And VC ++ also provides an interface to OpenGL, thereby knot. Both features can fit together and develop interactive 3D applications well.

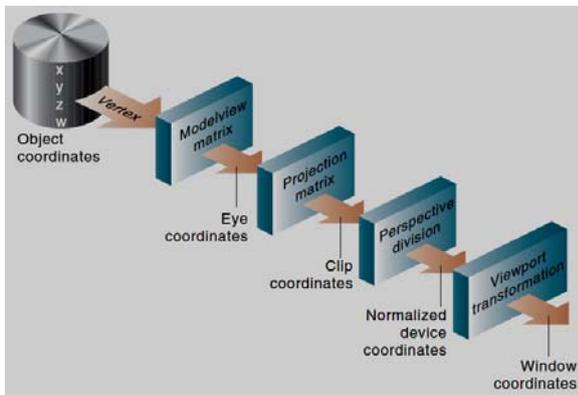


Figure 1. Virtual Object's 3D OpenGL coordinate.

Figure 1 shows the virtual object's 3D OpenGL coordinate. First, we get the food localization plane by the sensors of the chest-worn device. Second, we get the

III. THE PROGRAM INTERFACE FOR FOOD VOLUME ESTIMATION

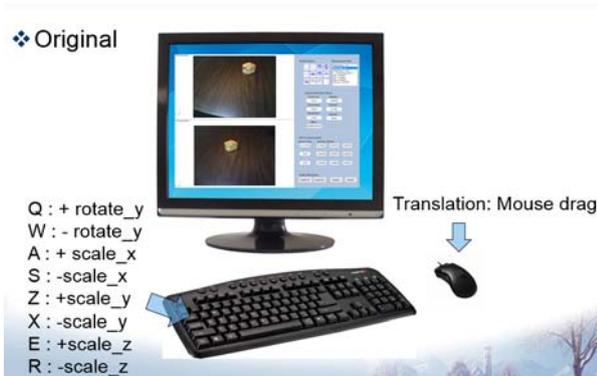


Figure 2. Virtual Object's 3D OpenGL coordinate.

Figure 2. shows the program interface for the food volume estimation. Most of the current multi-touch technology-based three-dimensional operation algorithms are based on the way the gesture, but because freedom is not enough, you must use at least three touch points to be able to reach, according to our Research, there are some platforms do not support three or more touch points, such as Microsoft's Windows 7 operating System. There are also some low-end smart devices do not support more than two fingers of the operation, and this platform could allow the users to calculate the food volume easily

Development kits and did not define the three-dimensional operation gesture, which we need to support up to two fingers fit under the circumstances to achieve a three-dimensional object. Time used to indicate the time touch placement executed in some special scene, the need for time to enter the row to calculate the operation speed. This information is stored in the form of a structure, and then sent to sign the decision module to determine the current gesture. This different components will be shielded multi-touch device when fitted to the other devices, only you need to configure this component. Then, the underlying process does not require any changes to enhance the adaptation of the algorithm.

- (1) The establishment of the project file;
- (2) OPENGL foundation library settings;
- (3) Set global variables;

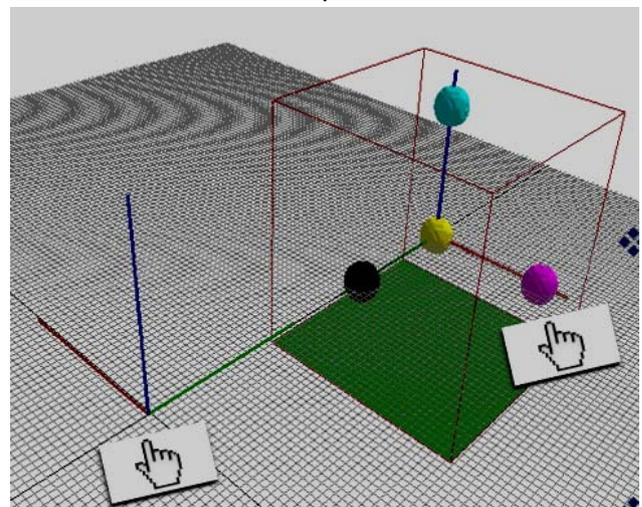


Figure 3. Mouse control of the virtual object which is projected on the left image

Figure 3 shows the mouse control of the virtual object which is projected on the left image. The object could be enlarged when the mouse is dragged.

IV. EXPERIMENTS

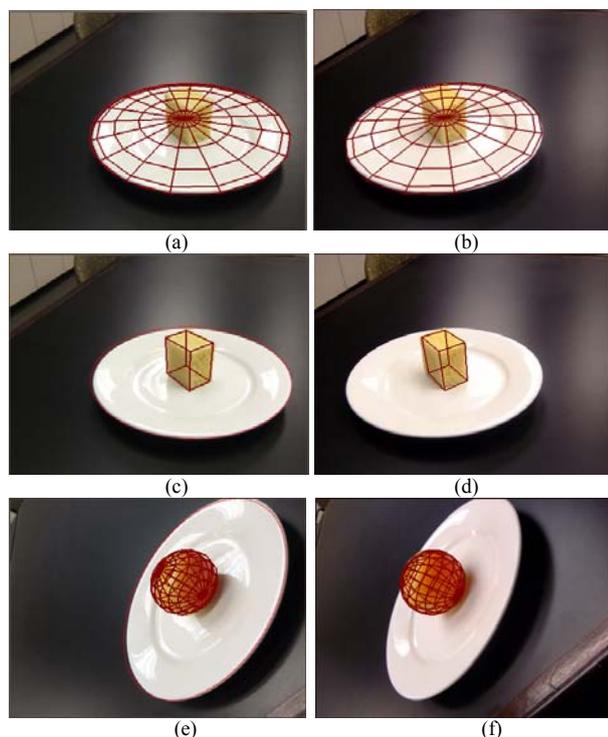


Figure 4. (a,b,c,d,e,f) matching results

Figure 4 shows the matching results of the proposed methods. As we could see, the virtual object's contour could perfectly match the real object's contour.

V. CONCLUSIONS

Obesity has become a worldwide problem threatening the health of millions of people. Thus, dietary assessment, the process of determining how much a subject eats during an entire day, could help users get more information about the patient's eating habit. First, we could use the chest-worn camera device get the diet photos. Second, after the camera's calibration, the virtual reality technology is utilized to build virtual scenes according to the diet cameras' environment. User can manipulate the object by rotating, zooming or moving to fit the real food in the binocular vision. Last, in the user-friendly interface with OpenGL, the volume of the real food could be calculated according to the volume of the virtual object.

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