Design and Implementation of 3D Medical Education Contents Viewer based on WebGL

Min-Ho Song¹, In-Kwon Kim¹, Ji-Seong Jeong², Chan Park³, Rae-Hyun Jang¹, Kyung-Ah Kim⁴ and Kwan-Hee Yoo⁵

¹ Chungbuk National University, Digital Informatics and Convergence, 52 Naesudong-ro, Seowon-Gu, Cheongju Chungbuk 362-763, Korea
Min-Ho Song, songminho@chungbuk.ac.kr
In-Kwon Kim, leibniz55@chungbuk.ac.kr

² Chungbuk National University, Information Industrial Engineering, 52 Naesudong-ro, Seowon-Gu, Cheongju Chungbuk 362-763, Korea
Ji-Seong Jeong, farland83@chungbuk.ac.kr

³ Korea Internet Software, 314 Sangdang-ro, Cheongwon-Gu, Cheongju Chungbuk, Korea
Chan Park, szell@chungbuk.ac.kr
Rae-Hyun Jang, jrh@kis21.com

⁴ Chungbuk National University, College of Medicine, 52 Naesudong-ro, Seowon-Gu, Cheongju Chungbuk 362-763, Korea
Kyung-Ah Kim, kimka@chungbuk.ac.kr

⁵ Chungbuk National University, Software Engineering, 52 Naesudong-ro, Seowon-Gu, Cheongju Chungbuk 362-763, Korea
Kwan-Hee Yoo, khyoo@chungbuk.ac.kr

Abstract. In this paper, we propose a 3D viewer of 3D medical education content which is combined with medical data and 3D model. On the web browser, users can take interactive 3D medical education contents viewer without additional program installation. Especially, in this paper, we applied the 3D medical education content viewer to dental models.

Keywords: WebGL, Medical Education, Contents Viewer, 3D Model

1 Introduction

Existing medical education contents viewers have been developed as specific applications operated on local PC, so users have a disadvantage to install additional program. For this reason, there are problems that it is hard to distribute and manage the applications. WebGL[1] is a 3D graphic library implemented by using Javascript programming language[2], it provides interactive 3D graphics on the web browser. It has a powerful advantage to provide a high quality for 3D computer graphics without additional program installation. Specially, it is recommended to be used to visualize 3D graphics data in HTML5 [3], which is a core technology markup language of the Internet used for structuring and presenting content for the World Wide Web. WebGL based 3D rendering is required in various applications such as medicine and physical
education [4,5,6]. In this paper, we propose 3D medical education contents viewer which provides an integrating rendering of 3D medical data and 3D model.

2 System Design

2.1 System Configuration

Fig.1 shows the system configuration of proposed 3D medical education contents viewer based on WebGL. First, a storage which can store medical data (part, disease, CT/MRI etc.) is built, and 3D model is transmitted to the Web browser through JavaBeans, and is rendered on the Web browser. Finally, with stored medical data and 3D model, it provides a two-way type of medical contents viewer. Under the proposed system, users can access 3D models which they want to see and to retrieve through Web browsers.

Fig. 1. System configuration of 3D medical education content viewer based on WebGL

2.2 3D model visualization based on WebGL

As shown in the above system configuration (see Fig.1), we visualized 3D model by using Three.JS[4]. Three.JS is a representative 3D graphics Javascript library in WebGL which supports various 3D objects and provides a wide use. In the proposed system, we rendered 3D models which are converted to OBJ file [5] by using 3D graphics edit tool. With a proposed 3D medical education contents viewer, Fig.2 shows a visualization example of 3D dental OBJ models stored into a server for a specific patient which they want to see. To do it, users using a proposed viewer inputs a patient name on input forms described in HTML5, and the viewer accesses the corresponding 3D models stored into a server through Internet. The viewer can move, rotate, and magnify the visual 3D dental model according to purposes of users. The 3D dental model can be extended into a 3D medical data.
Fig. 2. A visualization example of 3D dental models by using the proposed Web based browser

4 Conclusion

In this paper, we proposed a method for visualizing 3D medial data by using WebGL. In the future, we will provide expanded medical education contents viewer with additional 3D model and another part of medical data.

Acknowledgments. This research was financially supported by the Ministry of Education (MOE) and National Research Foundation of Korea(NRF) through the Human Resource Training Project for Regional Innovation and by the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIP)(No. 2008-0062611).

References