MEDX3DOM: MEDX3D for X3DOM

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Abstract

We present an implementation of MEDX3DOM a MEDX3D standard implemented into the X3DOM framework. We present the report of a work in progress of the implementation identifying the critical sections to be migrated into the new architecture, and possible extensions of the standard on the Web environment. Results for the early implementation are shown, where the visualization of medical datasets with advanced direct volume rendering algorithms are obtained under the X3DOM architecture with interactive frame rates and good image quality. An example of the HTML5/X3DOM document is presented with future.

CR Categories: I.3.3 [Display Algorithms]: ;— [I.3.6]; Standards—–;

Keywords: MEDX3DOM, MEDX3D, X3DOM, X3D, WebGL, DVR, Raycasting

Links:

1 Introduction

Medical visualization is a challenging scientific field since the interpretation of images leads into clinical intervention. Therefore, quality and fast interactive response are important features in this domain. Remarkable advances have occurred in medical imaging technology and recent applications supports the possibility of sharing imaging data online across clinical and research centers and among clinicians and patients. Image formats such as DICOM or NRRD allow to store medical volume data acquired by diverse techniques such as computer tomography (CT), magnetic resonance imaging (MRI), diffusion magnetic resonance imaging (dMRI), positron emission tomography (PET), ultrasound and others. A formalized and standardized model of visualization for medical imaging allows a correct interpretation of the images on heterogeneous architectures like Web.

MEDX3DOM is a work in progress to support advanced medical visualization functionality on the Web without plugins. It is based on the ISO standard MEDX3D (Ref. [John et al. 2008]) and implemented into X3DOM (Refs. [Behr et al. 2009]). MEDX3DOM is based on the previous work for volume visualization in WebGL (Refs. [Congote et al. 2011]). MEDX3DOM reads medical data in diverse formats such as DICOM, NRRD and Raw formats. The output is defined by a collection of volume visualization styles for Direct Volume Rendering (DVR) algorithms.

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2 MEDX3D

MEDX3D is an extension of the X3D ISO standard to support advanced medical visualization functionality. The standard presents a set of tags which allow the user to read different volume formats such as DICOM, NRRD or Raw data. Additionally, the standard defines volume style visualizations allowing to render volumes with different non-photorealistic models thus enhancing specific regions of the volume which normally represent interesting regions to be visualized, such as edges, blobs and occlusions. Several applications on the Web are used in medical fields. One of which is medical training simulations.

Acknowledgements

This work was partially supported by the Basque Government’s EMAITEK research programme and CAD/CAM/CAE Laboratory at EAFIT University and the Colombian Council for Science and Technology –COLCIENCIAS–. We would also like to thanks Yvonne Jung for her support and help with the integration of the code into X3DOM project.

References

