DICOM Import And Visualization for Congenital Heart Disease using Virtual Reality

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Abstract
The purpose of this project is to import raw DICOM data into a virtual reality environment for a doctor to easily view and manipulate. Particularly, the implementation of a variable color transfer function in this environment is important for the doctor to update and see results in real time. This saves doctors countless hours in planning a surgery by presenting the information in an interactive environment, and allows them to more accurately perform the surgery. Our goal is to implement this within the current virtual reality system that was produced in Unity. Therefore, this project will be done in Unity, with support from the Volume Viewer Pro plugin.

Architecture
Platform: Unity
Assets: VolumeViewer, VRTK
Language: C#

Results
The importing of dicom data into virtual reality via unity was a success with it maintaining a frame rate of 50 fps.

The dicom data can be altered via multiple transfer functions through an interactable interface.

The dicom data can be converted to a mesh that can later be converted to an stl.

A camera tracker allows the user to understand what their position to the data looks like from the perspective of an MRI scanner.

Impact
This project serves as an important step in the process of an overarching mission by UT Southwestern to be able to make use of virtual reality for the sake of 3D segmentation of Dicom data. This would allow for much more efficient use of time when dealing with the mri scans of patients.

The immediate use of this project would be for the use of education for upcoming doctors in being able to look at and be familiar dicom data of patients in a 3d space to which they can observe and diagnose certain conditions that the patients have.

Metrics
★ Framerate stable at 50 fps minimum.
★ Takes about 15 seconds to load dicome volume data into the scene.
★ Takes about 40 seconds to convert the dicom data into a mesh.