

GRAPHICS AND ANIMATION

ASSIGNMENT 2

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1 Volume Rendering, Interaction and Histogram Computation

The aim of this assignment is to display a Computed Tomography (CT) image using volume rendering as well as iso-surface representation. Please use the CT dataset provided with this assignment to complete the task.

1. Read CT dataset using `vtkDICOMImageReader` class.
2. Create a colour transfer function using the following values.

Pixel Value	Red	Green	Blue
-3024	0.0	0.0	0.0
-77	0.5	0.2	0.1
94	0.9	0.6	0.3
179	1.0	0.9	0.9
260	0.6	0.0	0.0
3071	0.8	0.7	1.0

3. Create a opacity transfer function using the following values.

Pixel Value	Opacity
-3024	0.0
-77	0.0
180	0.2
260	0.4
3071	0.8

4. Create viewports as shown below and render the CT dataset using direct volume rendering approach in viewport 1.

View Port 1 Volume rendering	View Port 2 Iso surface	View Port 3 Iso surface + volume rendering
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5. In viewport 2, display the iso-surface extracted at intensity value 300 using marching cubes algorithm. Check the online documentation for `vtkMarchingCubes` class for usage information.
6. For viewport 3, display both the volume rendered CT data as well as the iso-surface extracted using marching cubes algorithm. Reuse the objects created for viewports 1 and 2, and do not create separate objects to display on viewport 3,
7. Synchronize all three viewports so that they all display the same view. (Hint: Viewports 2 and 3 can be synchronized by setting the cameras to viewport 1 camera. Refer to `GetActiveCamera()` and `SetActiveCamera()` functions of the `vtkRenderer` class.

1.1 Submission

You are required to submit the following files for this assignment:

1. A commented code (85%)
2. A JPEG image showing the output (10%)
3. A README file containing details on how to run the code and other information such as VTK version used for writing the code. (5%)

Place your files in a single directory. Please do not include the CT data in the assignment submission. Zip and submit the file via eClass before Match 14, 2019. A penalty of 10% per day will be applied for late submissions.