OpenAnatomy Volume Rendering

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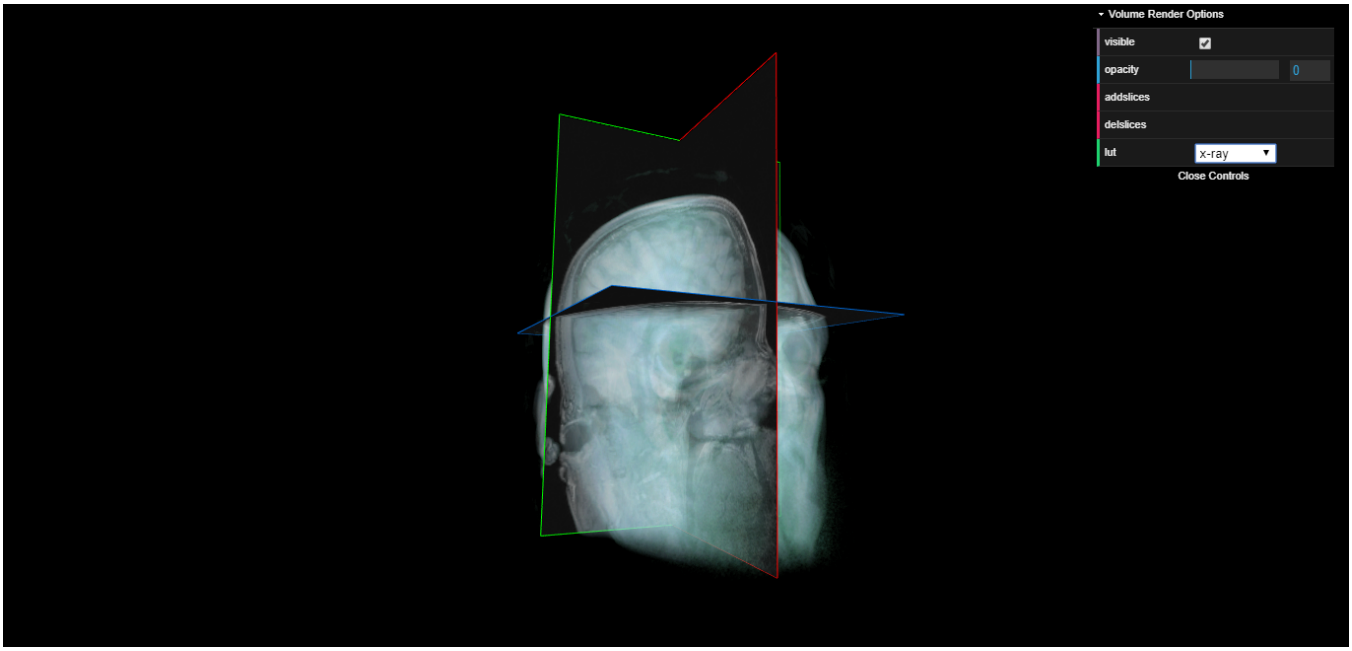

Figure 1: A volume rendering of a human head with slices

ABSTRACT

Using anatomy model data from the OpenAnatomy project, I have improved the project's atlases by volume rendering their models instead of surface rendering them. By doing so, atlases should be easier to visually comprehend.

KEYWORDS

XTK, Volume Rendering, dat.GUI

ACM Reference Format:
Richard Pan. 2019. OpenAnatomy Volume Rendering. In *CS460: Computer Graphics at UMass Boston, Fall 2019*. Boston, MA, USA, 2 pages. https://CS460.org

1 INTRODUCTION

This project is important as it improves the visibility of anatomy models for doctors and patients and helps them visually understand anatomy better. My contribution towards OpenAnatomy's project is that I took their brain atlas model and volume rendered it.

2 RELATED WORK

Similar work of mine includes class assignment 05 [3] from my CS460 class. Major credit given to XTK [1] and OpenAnatomy [2] for introducing me to their project and providing the data for this model.

3 METHOD

Using volume rendering functions from XTK and dat.GUI, I transformed the surface-rendered models from OpenAnatomy to be volume-rendered instead. dat.GUI allowed me to create controlls for the lut of the model and to render slices on-top of the brain.

3.1 Implementation

Using XTK and some Three.js, I simply loaded in the .nrrd file into an XTK volume and enabled volume rendering. I then used dat.GUI to control the volume.

```
r = new X.renderer3D();
r.init();
v = new X.volume();
v.file = 'A1_grayT1.nrrd';
r.add(v);
```


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```
r.render();
// ... //
v.volumeRendering = true;
```

3.2 Milestones

How did you structure the development?

3.2.1 Milestone 1. Downloaded the data from OpenAnatomy and attempted to understand it, along with the AMI framework.

3.2.2 Milestone 2. Received assistance from professor and re-adjusted my project to work around the XTK framework instead.

3.2.3 Milestone 3. Added dat.GUI to add more customization features to the program

3.3 Challenges

Describe the challenges you faced.

- Challenge 1: Attempting to learn a completely new framework (AMI)
- Challenge 2: Understanding how to parse through a label-map (as seen in Figure 3) and using it to render specific parts of a model

4 RESULTS

By the end of it all, I managed to successfully create a volume-rendering of OpenAnatomy's brain atlas, along with some controls to view the model in different ways. Despite this, I could not get to figure out how to use label-maps to individually render certain parts of the brain.

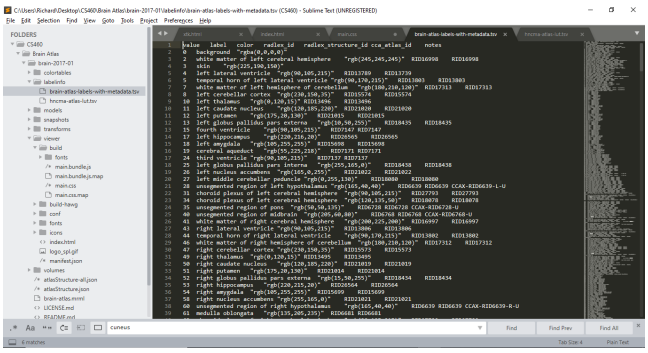

Figure 2: The label-map for the brain atlas.

5 CONCLUSIONS

In conclusion, this project was more of a success than a failure as I completed the goal to "volume render data from OpenAnatomy". In addition, I added controls for the lut of the model, which I assume is the "transfer function" part of the assignment.

While I was unable to fully accomplish all of my goals for this project, such as implementing the volume rendering into OpenAnatomy's atlas viewer and, of course, using label maps to individually render parts of the brain, I will still continue to work on this project for my own personal satisfaction and to hopefully have my code be added to OpenAnatomy itself.

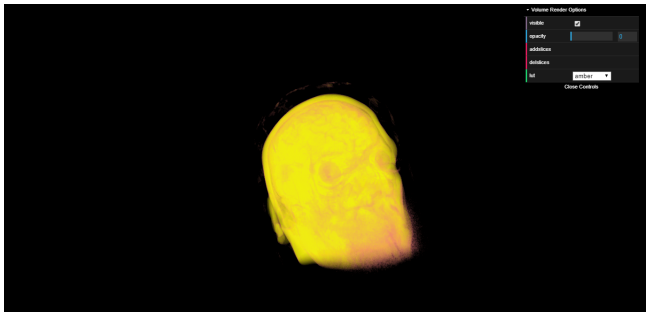

Figure 3: One of the various lut options I added.

REFERENCES

[1] Daniel Haehn et al. 2012. XTK. *URL: https://github.com/xtk/X* (2012).

[2] Mike Halle et al. 207. SPL/NAC Brain Atlas. *URL: https://www.openanatomy.org/atlas-pages/atlas-spl-nac-brain.html* (207).

[3] Richard Pan. 2019. Assignment 05. *URL: https://rpan001.github.io/cs460student/05/* (2019).