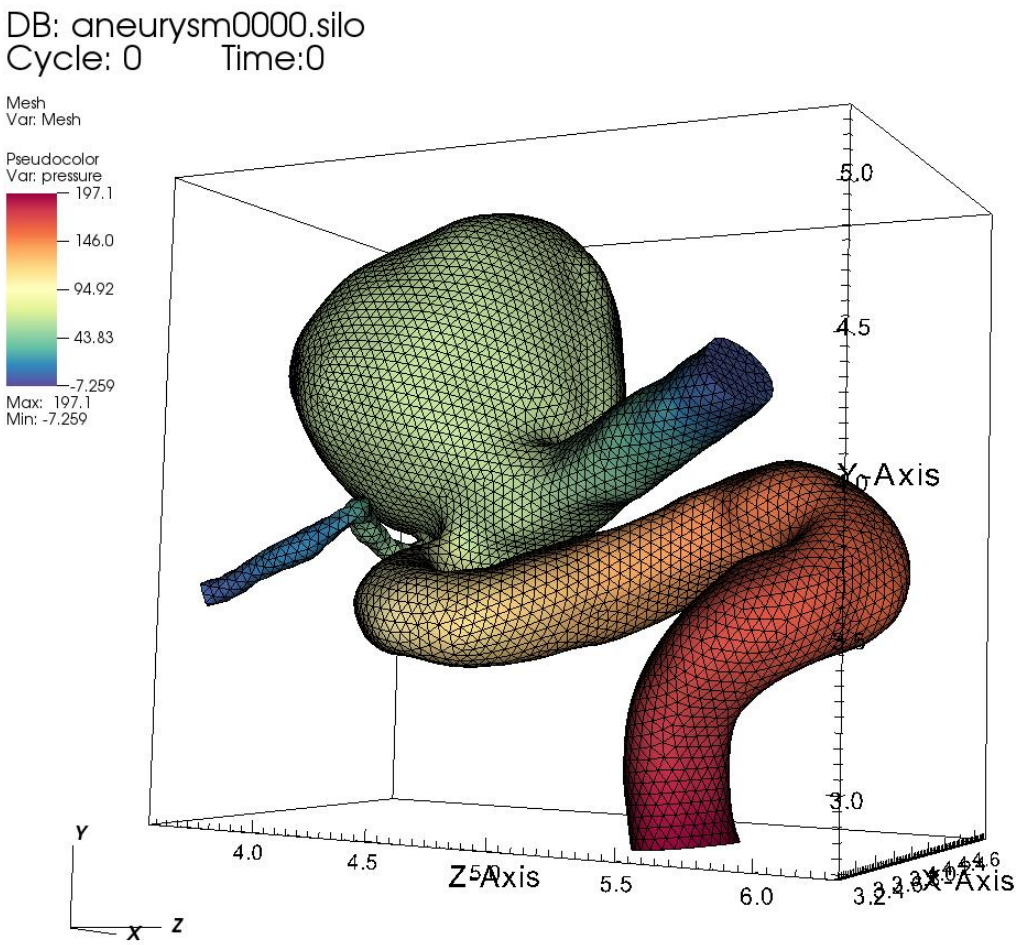
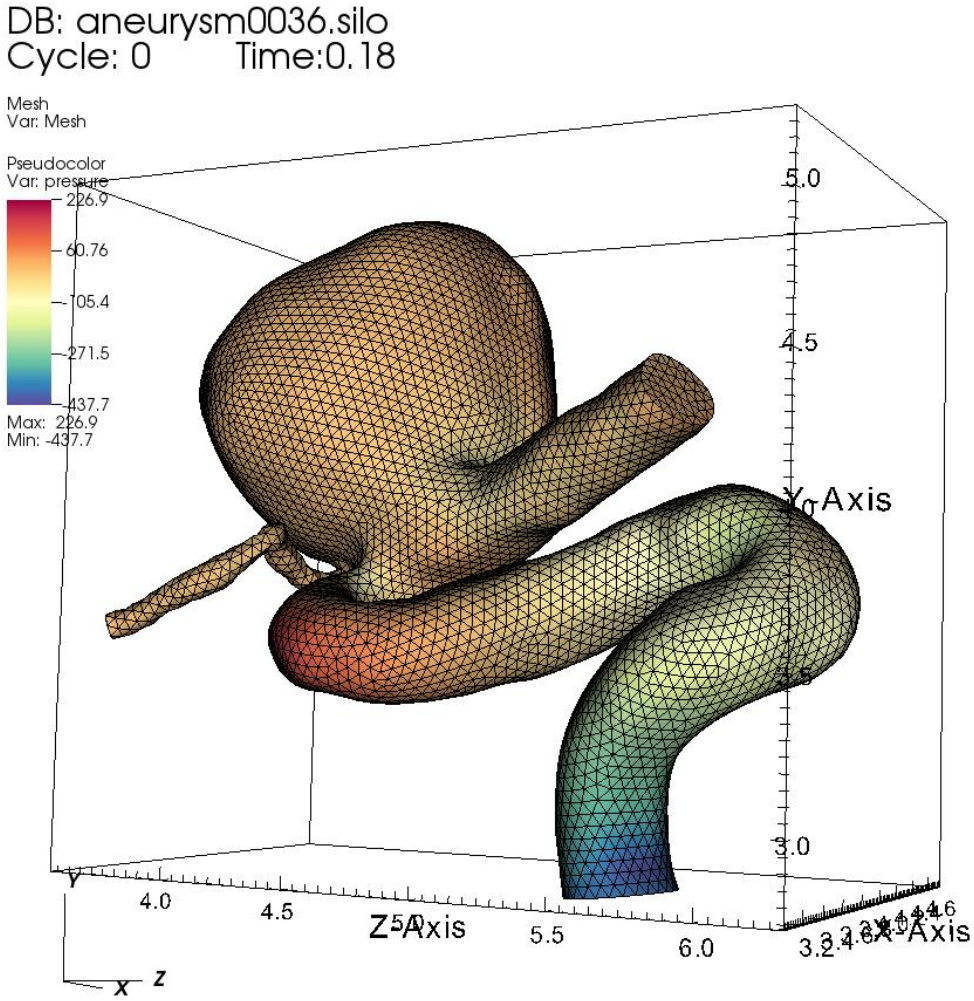
Name: Abubakar Suudy Student Number: 837867

Sample data set provided by volume rendering software

Visualisation One





Visualisation Type: Flow volume visualisation
Tool: VisIt
Visualisation Mapping: Colour is mapped to the blood pressure to the scale next to the image. The lower the pressure the closer to a blue colour the higher the pressure closer to a red colour.
Observations: You're able to see where pressure is at its highest at a given time. You're able to play the visualisation and see the movement of flow and pressure differences within the software. That's why two print screen are going.
Video: https://www.youtube.com/watch?v=aga_MY2an9Y

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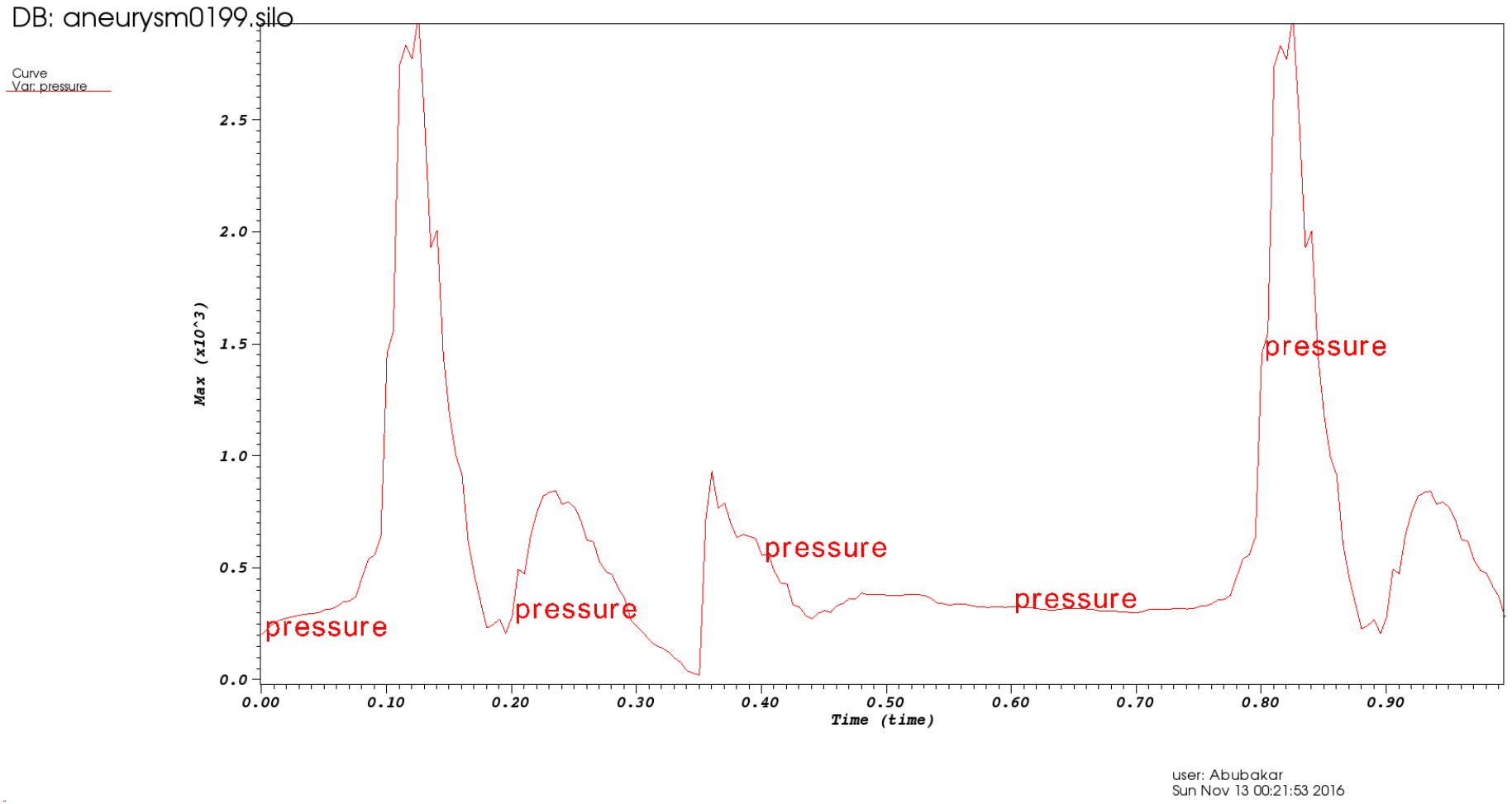

I was interested in the result and the units of time wasn't clear so I created this graph using queries of the max value of each time interval. In this diagram, it shows around 1.5 heartbeat. The first large peak is the pumping of blood out the right ventricles and it generates large pressure because muscles in the right ventricles are thick compared to the other part of the heart so when muscle contracts it generates a high pressure. The second peak is when the atrium is filling up with blood and peaks and valves open and blood travels into the atrium ventricular valve. Pressure decreases rapidly due to blood leaving, but this decrease isn't seen in the second heart beat which shows all the data of the second heart beat wasn't collected.

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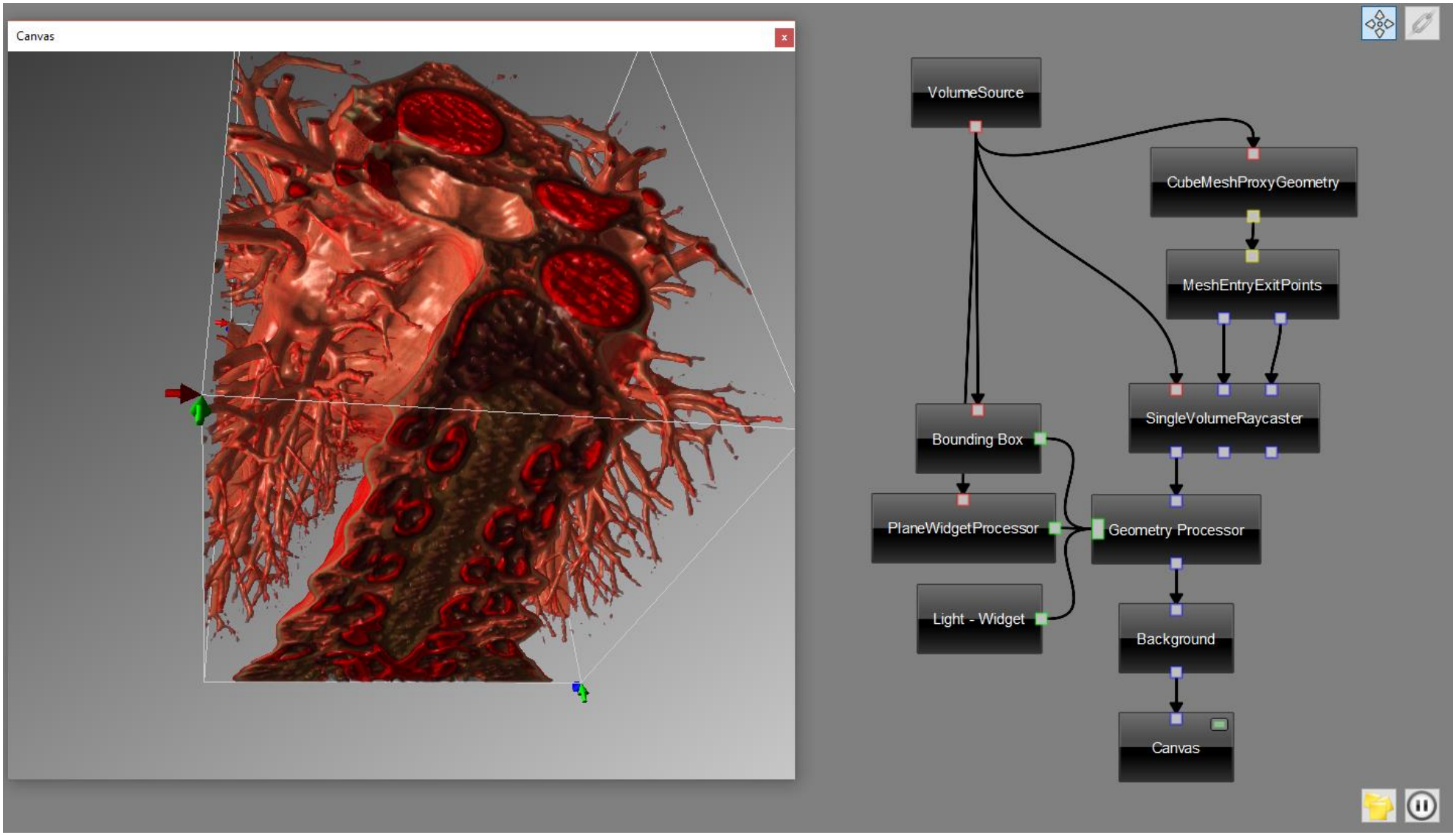
Visualisations Two



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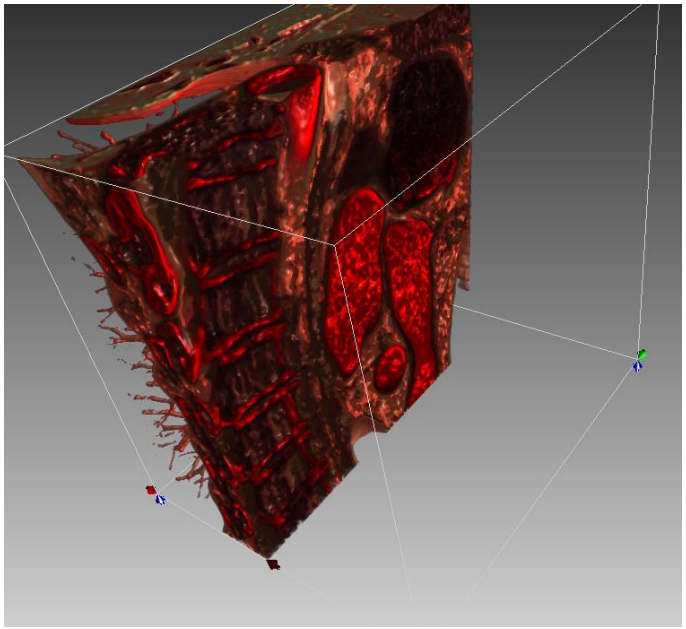

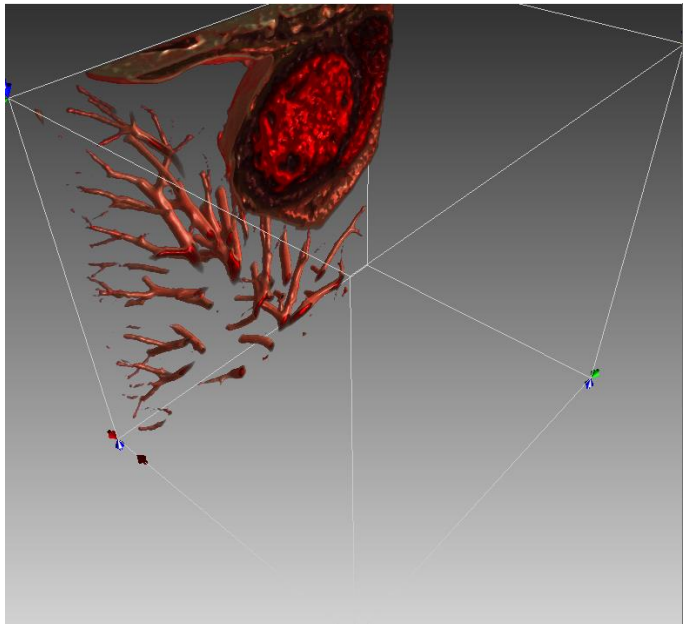

Visualisation Type: Ray Casting

Tool: Voreen

Visualisation Mapping: Red is mapped to a region of the heart that data has been collected on. Also, software allows interpolation of coarsely sampled data. Which I enabled. Shading is also added to help determine depth.

Observations: I could tell this was the upper region of the heart since there are two large vessels (image above) on top which look like the vessels that branch from the Aorta. This allows you to see the networks of vessels. You have free range of able to go through slices in the x, y and z axis. Which shows you the inner strucure of the heart.

Video: https://ww.youtube.com/watch?v=n9DFvtBBogs

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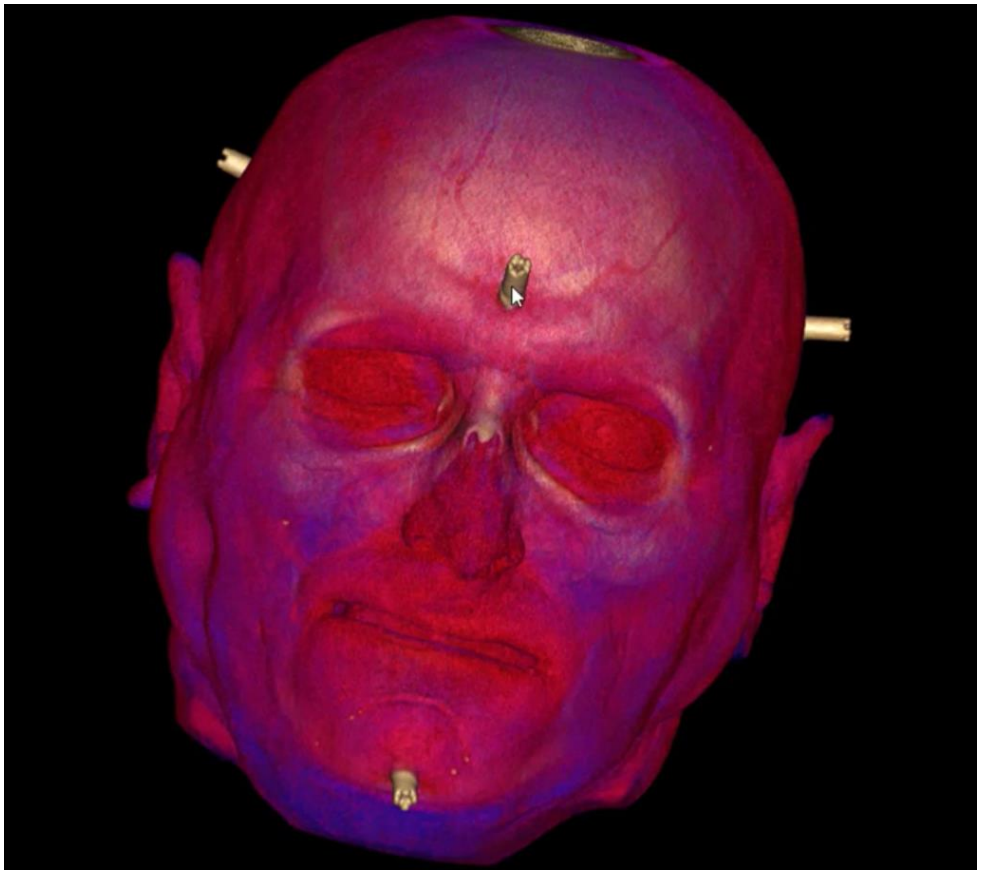
Visible Human
Visualisation One



Visualisation Type: Volume visualisation of CT data
Tool: Vol View
Visualisation Mapping: Red is mapped arteries and blue is mapped to veins.
Observations: Veins tend to gather around the top of the head, checks and neck (Jugular vein).

Video:
https://www.youtube.com/watch?v=629MgpVNMrg
(0:32)

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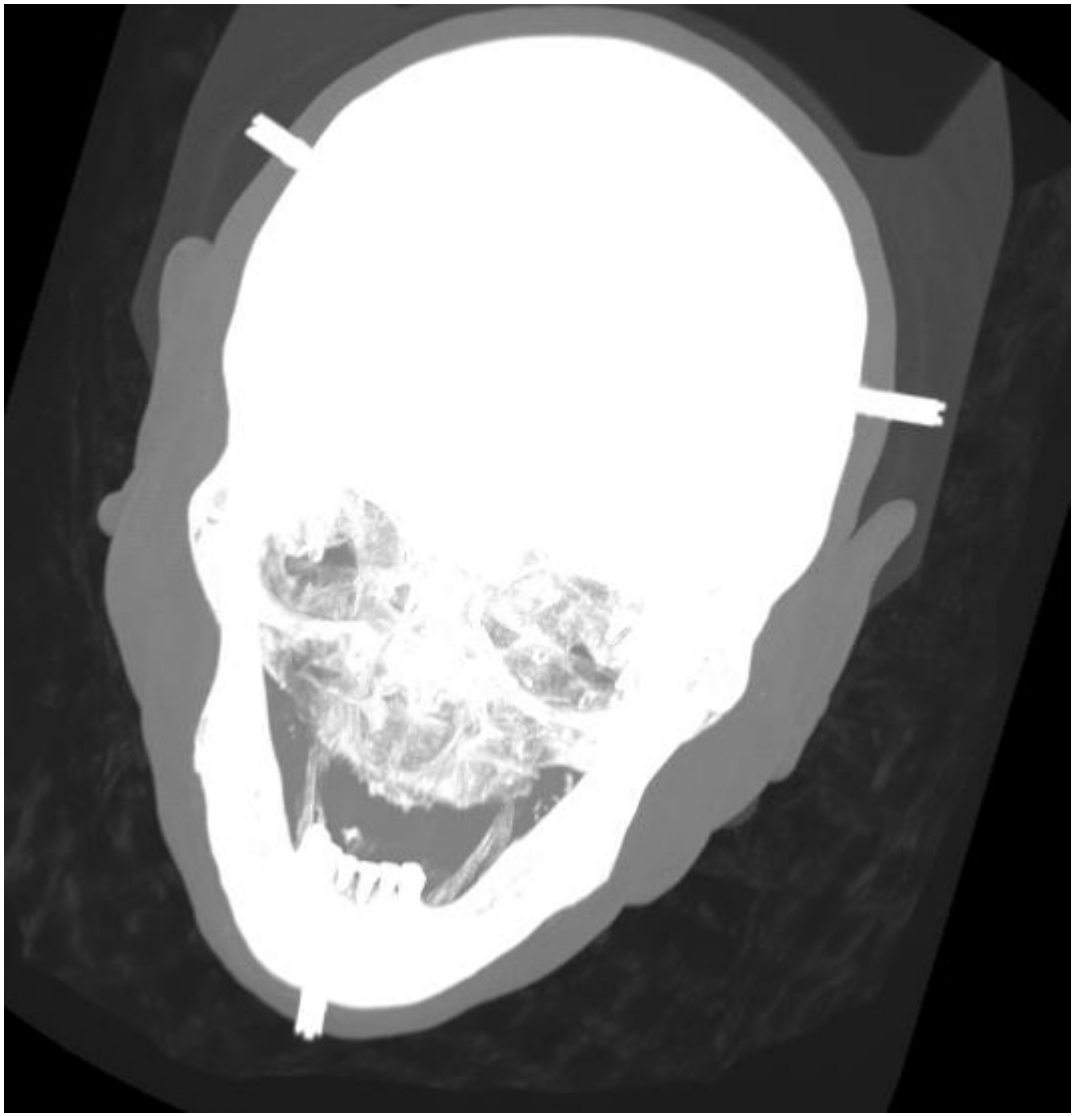

Visible Human
Visualisation Two

Visualisation Type: Maximum Intensity projection
Tool: Vol View
Visualisation Mapping: Maps the voxel to the highest value in the same plane.

Observations: Show the overall shape of bone in the head region.

Video:
https://www.youtube.com/watch?v=QEqvTCQxMRg

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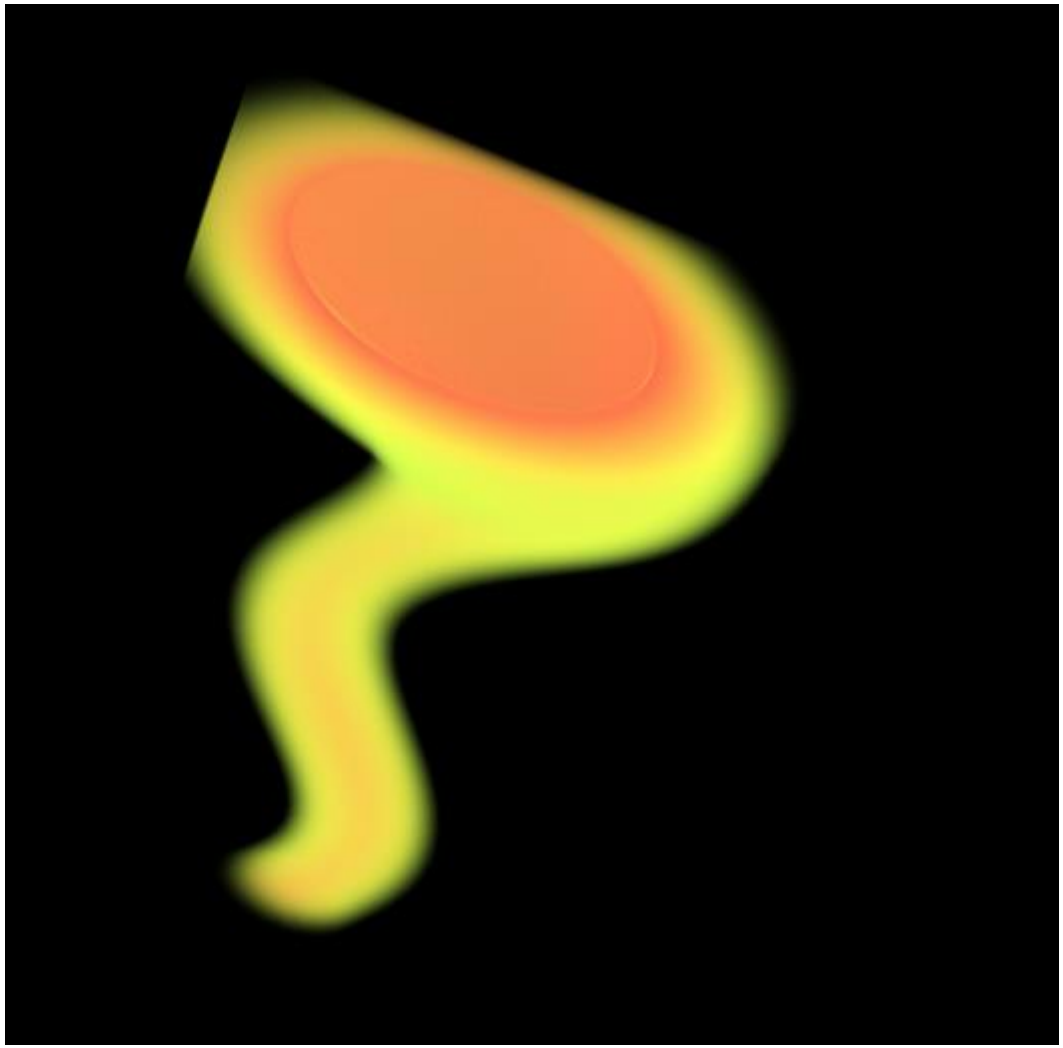
Sally

Visualisation One



Visualisation Type: Direct volume rendering
Tool: Vol View
Visualisation Mapping: orange is mapped to higher scalar value and yellows maps to lower scalar values.
Observations: The magnitude is higher towards the centre of the hurricane and lower to the outskirts and shows the overall shape of the hurricane and how it's quite small from the bottom and larger on top.

Video:
https://www.youtube.com/watch?v=5LXFuBgsdqA

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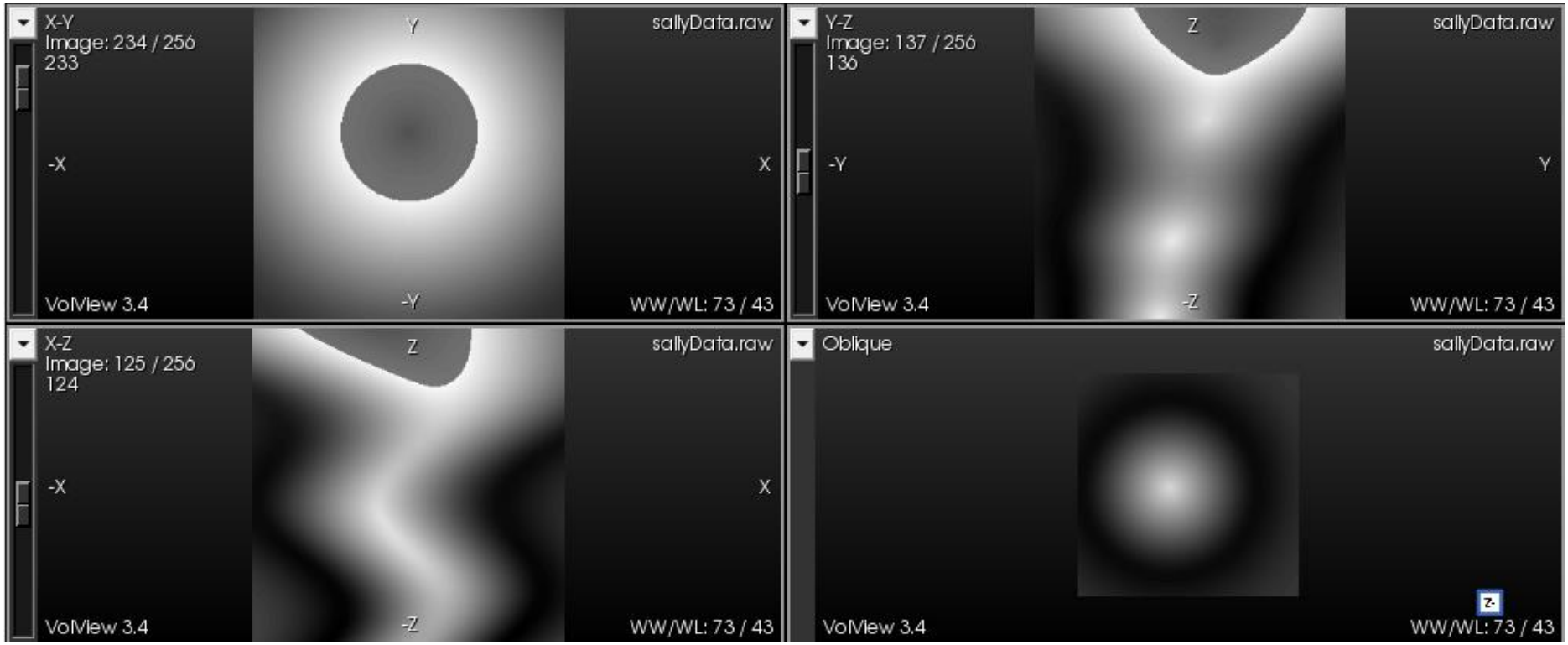
Sally

Visualisation Two



Visualisation Type: Slices
Tool: Vol View
Visualisation Mapping: The darker the grey scale value the higher the scalar value of that region.
Visualisation observation: As you go through the slices you can see more of the inner flow of the hurricane and how magnitude changes as you go through the hurricane. This wasn't able to be depicted well with direct volume rendering because it just shows the overall shape.

Video: https://www.youtube.com/watch?v=rsNPlfPDuyU

Programming Reference

Bjarne Stroustrup (2013). *The C++ Programming Language*. Addison–Wesley.