

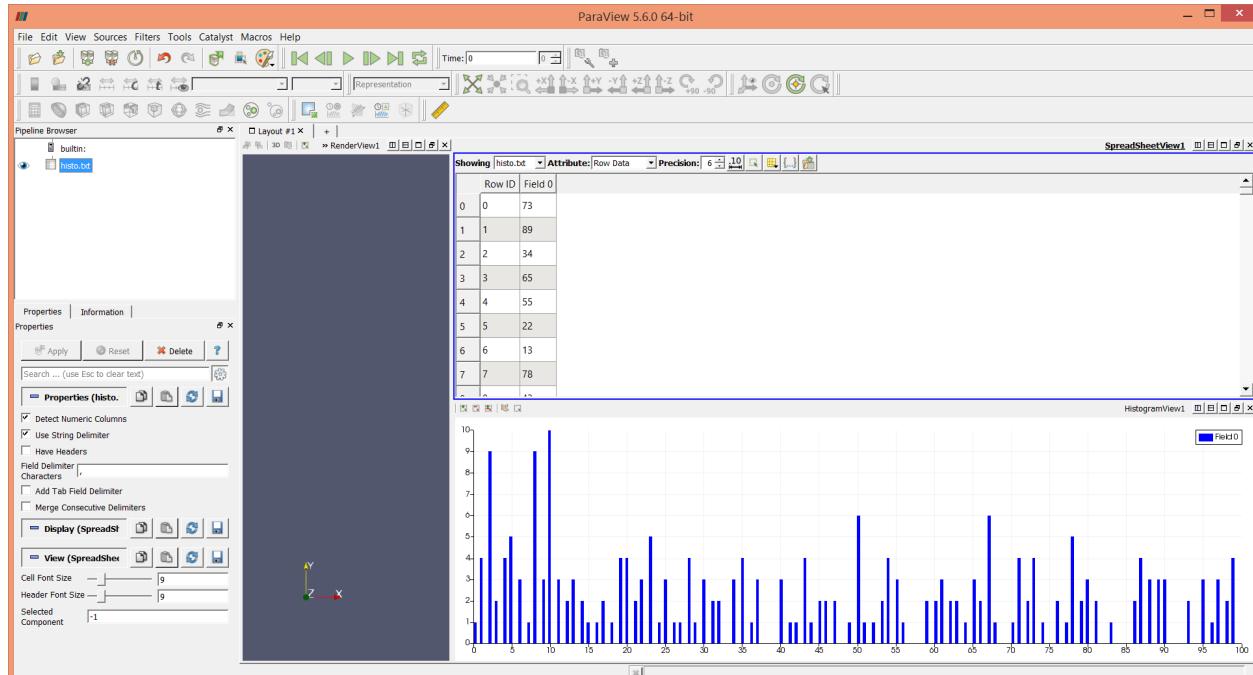
CPSC 8040 Data Visualization Assignment 3 – Paraview

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Note: please use my submitted *paraview state* files to load the corresponding data files in your computer directories.

Part 1: Loading Simple Data

Load histo.txt and activate the visualization of the histo dataset into this view.



What is the problem of this histogram?

The default bin count is 256 which is more than the count of possible numbers to be drawn. Also, the precision of tooltip is 6 which is not necessary, since the number and its count are always integers.

Try to improve it by using the Properties tab and answer to the two following questions.

Two changes have been made to the Properties tab:

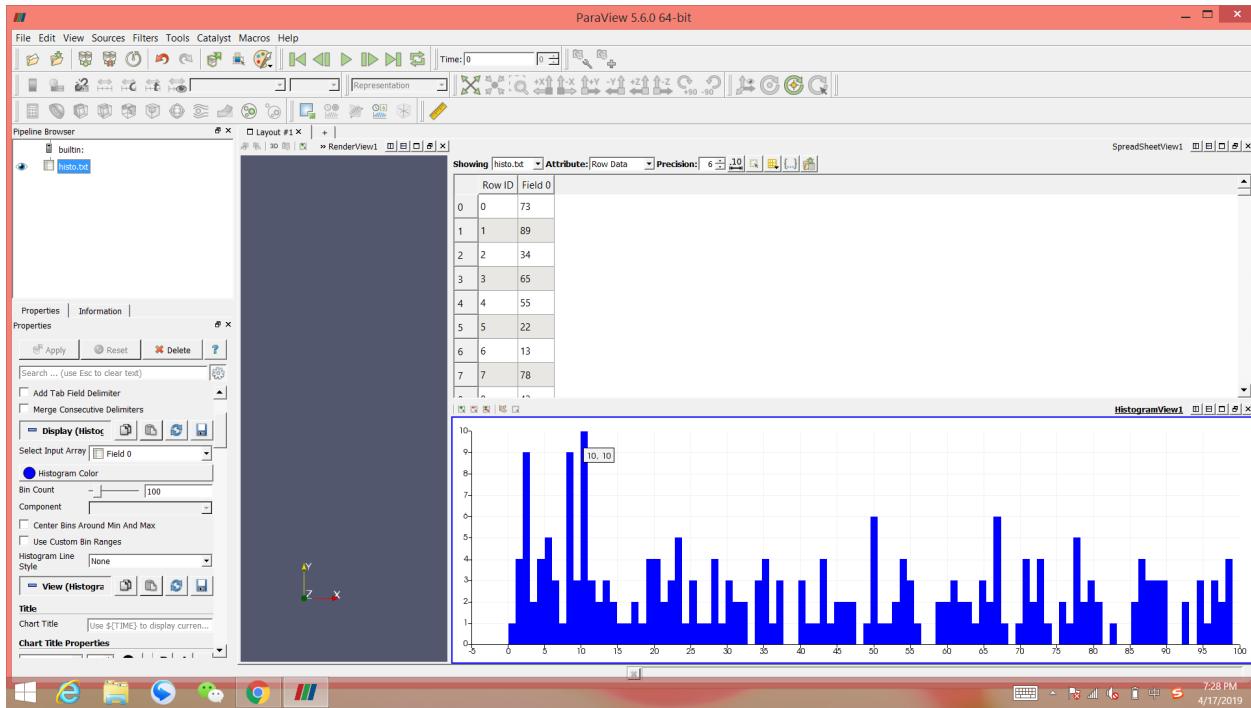
1. Change the bin count to 100 that matches the count of possible numbers to be drawn. Now, there are no gaps between bars in the histogram.
2. Change the Tooltip Notation to fixed and Tooltip Precision to 0, so that the tooltip can be displayed correctly, e.g. 10, 10.

Which number occurred the most frequently and how many times did it occur?

Number 10 occurs the most frequently for 10 times.

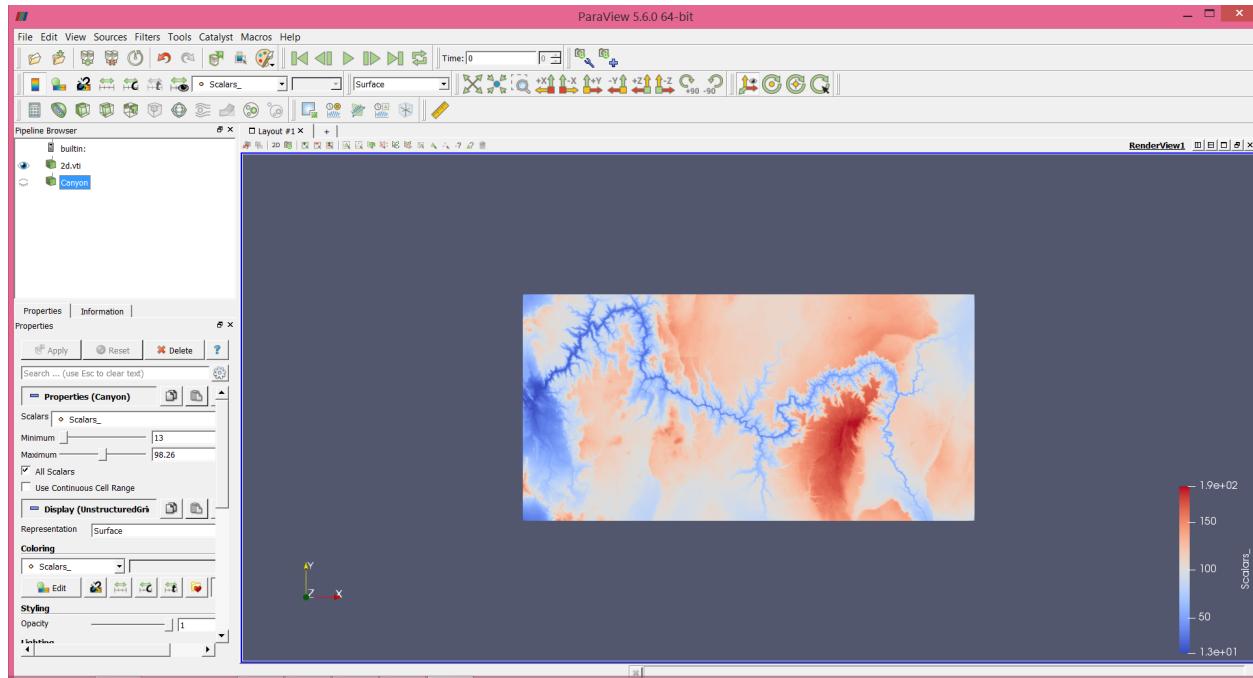
How many numbers were never used by the class?

There are 14 numbers never used, including 33, 38, 39, 48, 57, 58, 69, 75, 82, 84, 85, 91, 92, and 94.



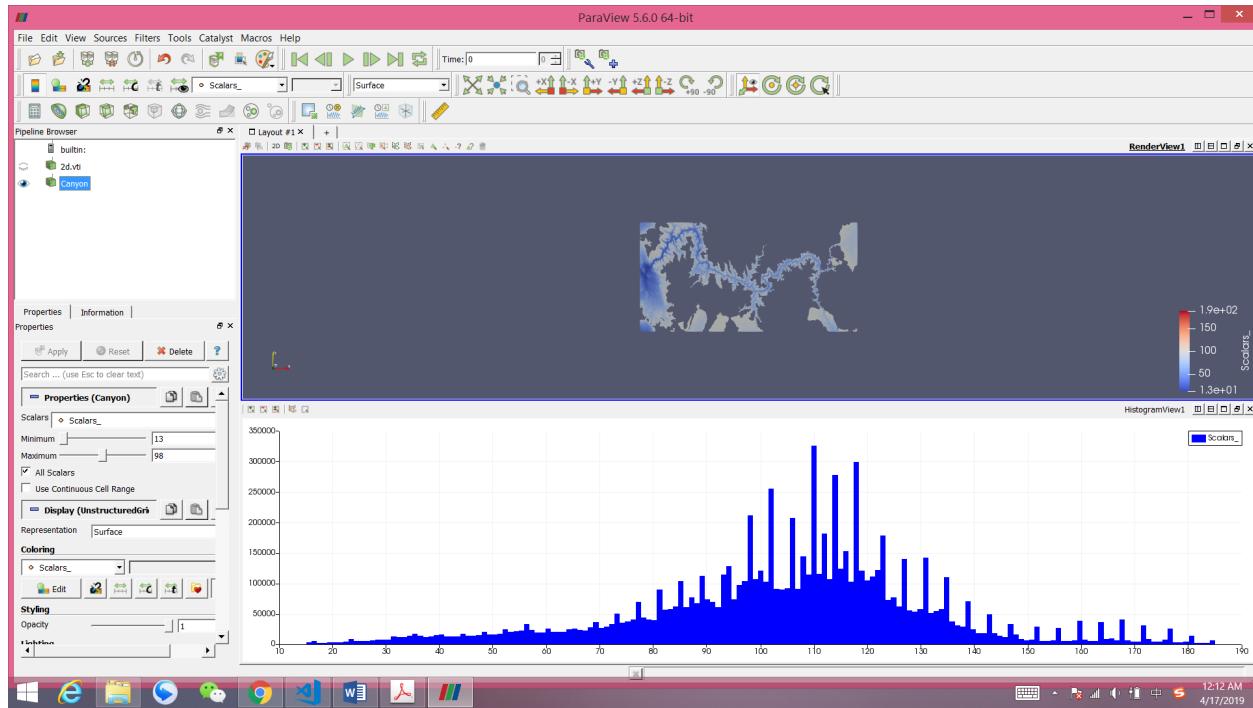
Part 2: Visualizing a 2D image

The colored 2D image of the grand canyon is rendered in Paraview as shown below.

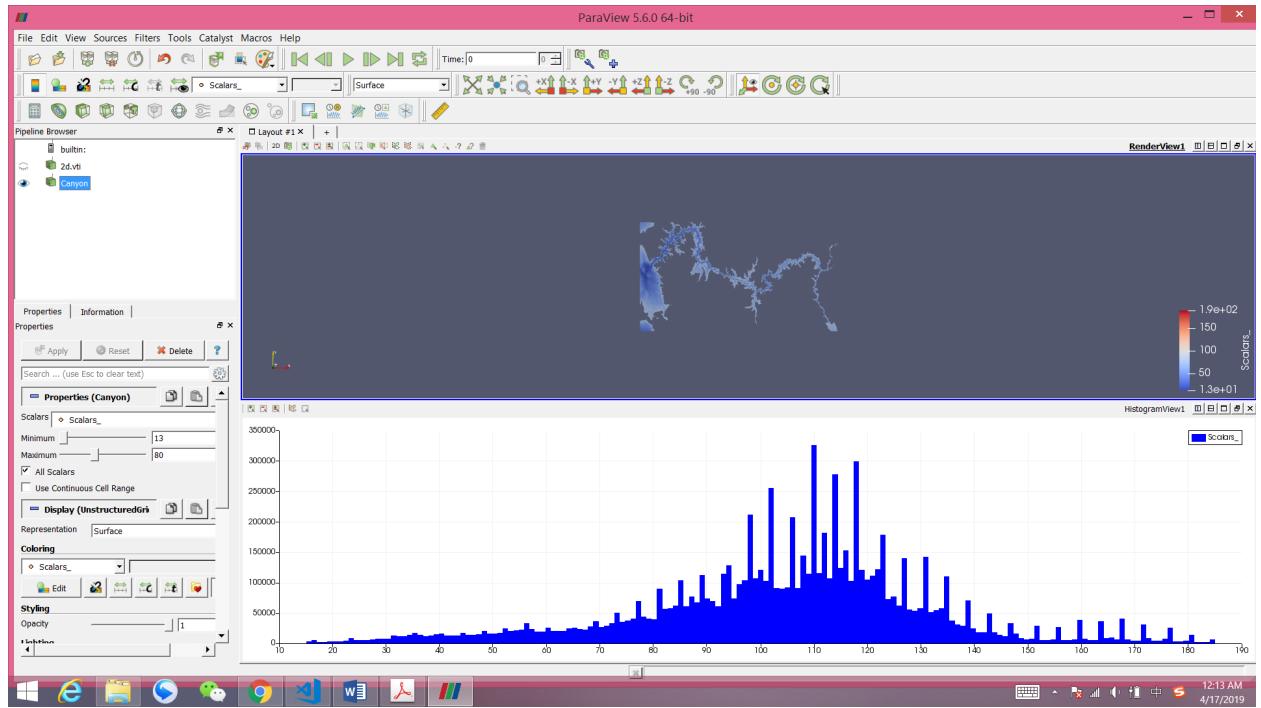


What threshold did you use for capturing the riverbed? Experiment with other thresholds and explain what features you may or may not have missed with this approach.

From the histogram, the first bin that had more than 200000 in it relates a maximum threshold at 98. The image also shows some blueish yellow areas other than the riverbed. I fine-tuned the threshold to 80 and got a better view of riverbed.



To show the blue riverbed only, the maximum threshold is reduced to 80 for an optimum result.

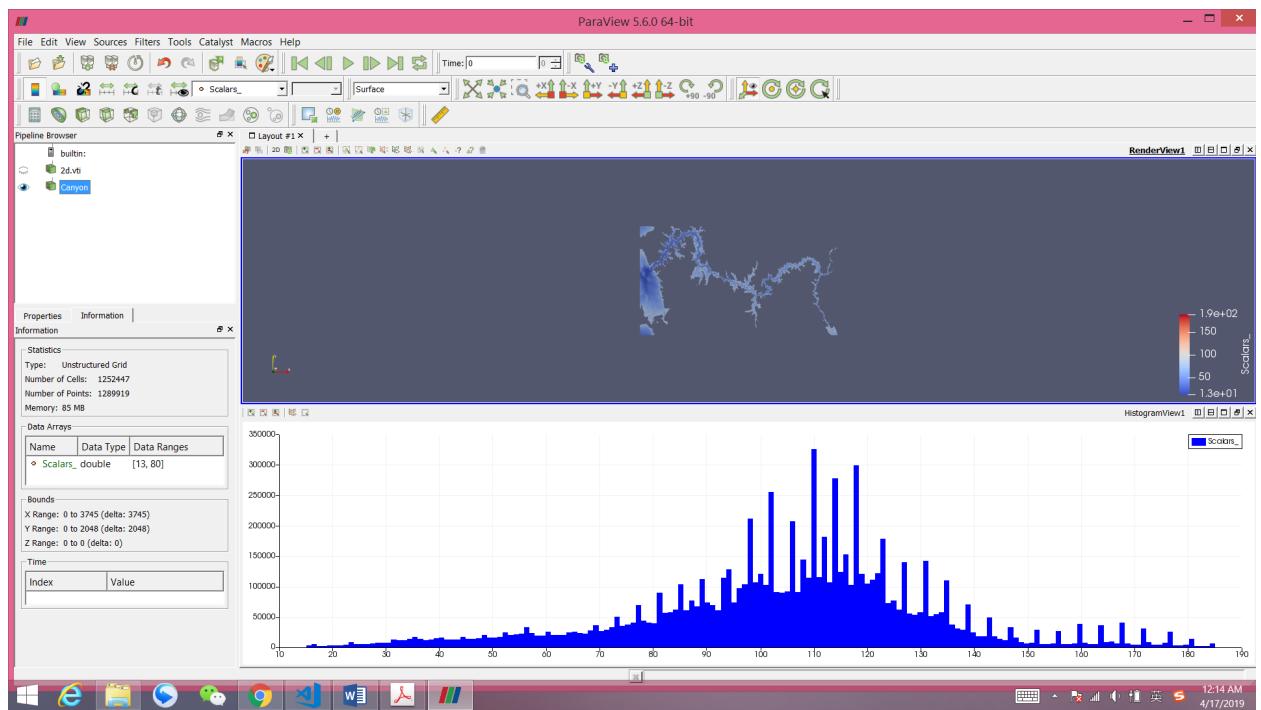


Using the Information panel, report the number of pixels in this image. Note that ParaView automatically creates cells from an input image, implicitly forming a structured quad mesh.

The number of cells is 1252447 and the number of points is 1289919 if the threshold is 80.

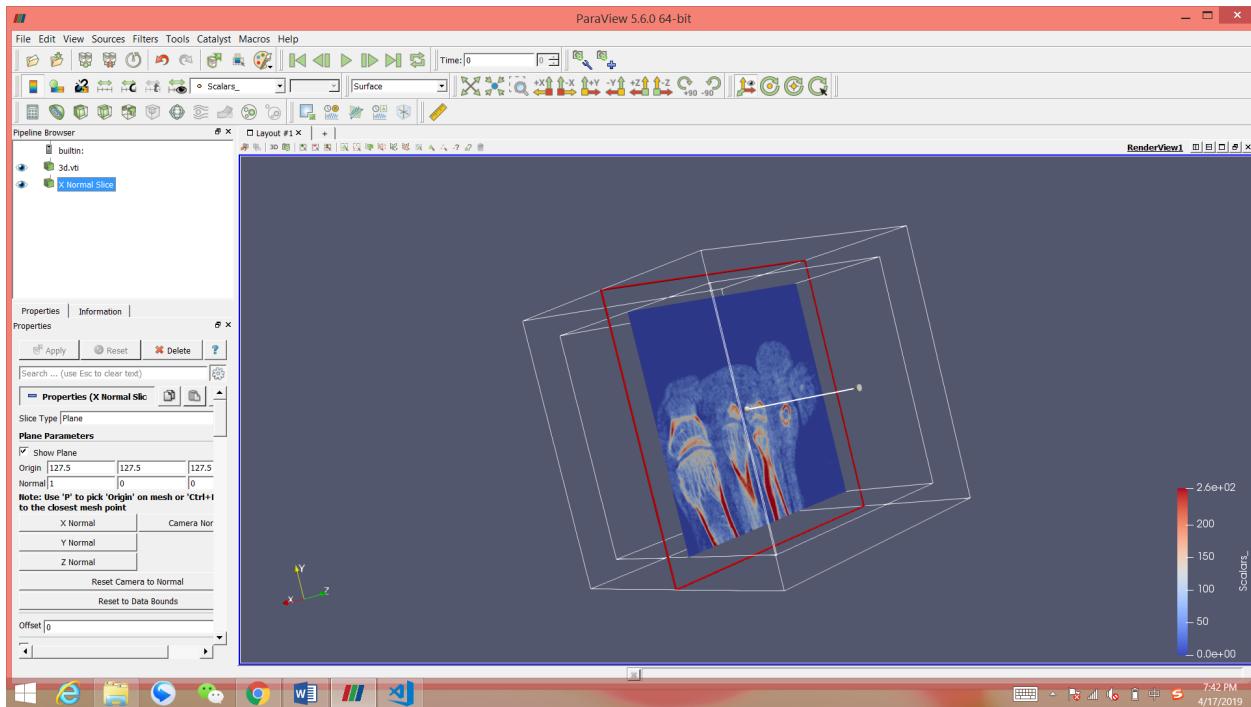
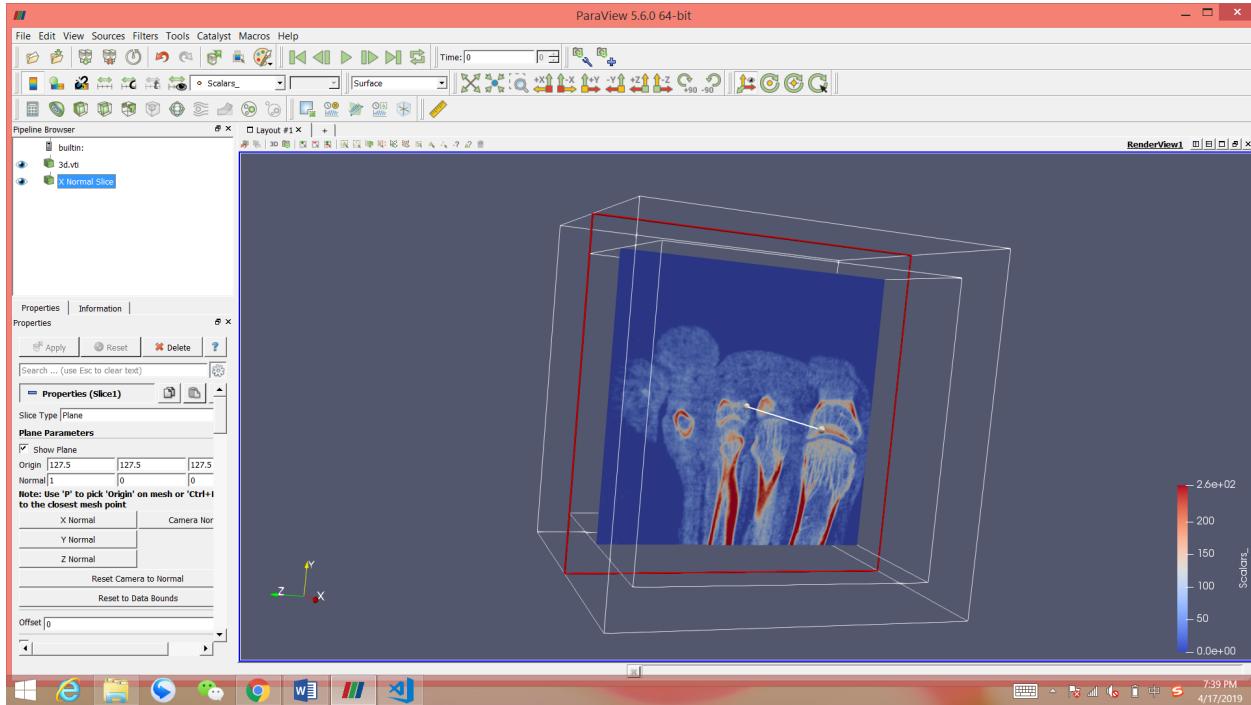
The number of cells is 2871477 and the number of points is 2915826 if the threshold is 98.

I prefer to use threshold of 80 since it yields clearer view of riverbed only and filters out unnecessary pixel information.

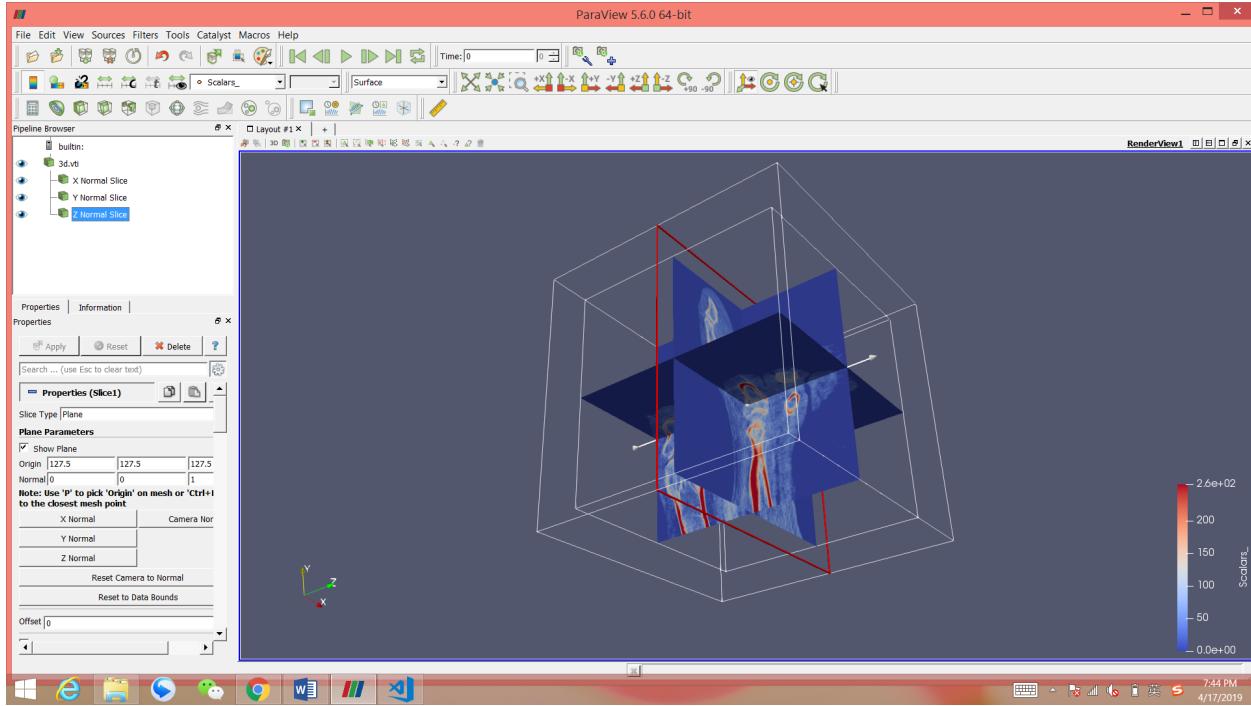


Part 3: Visualizing 3D Image

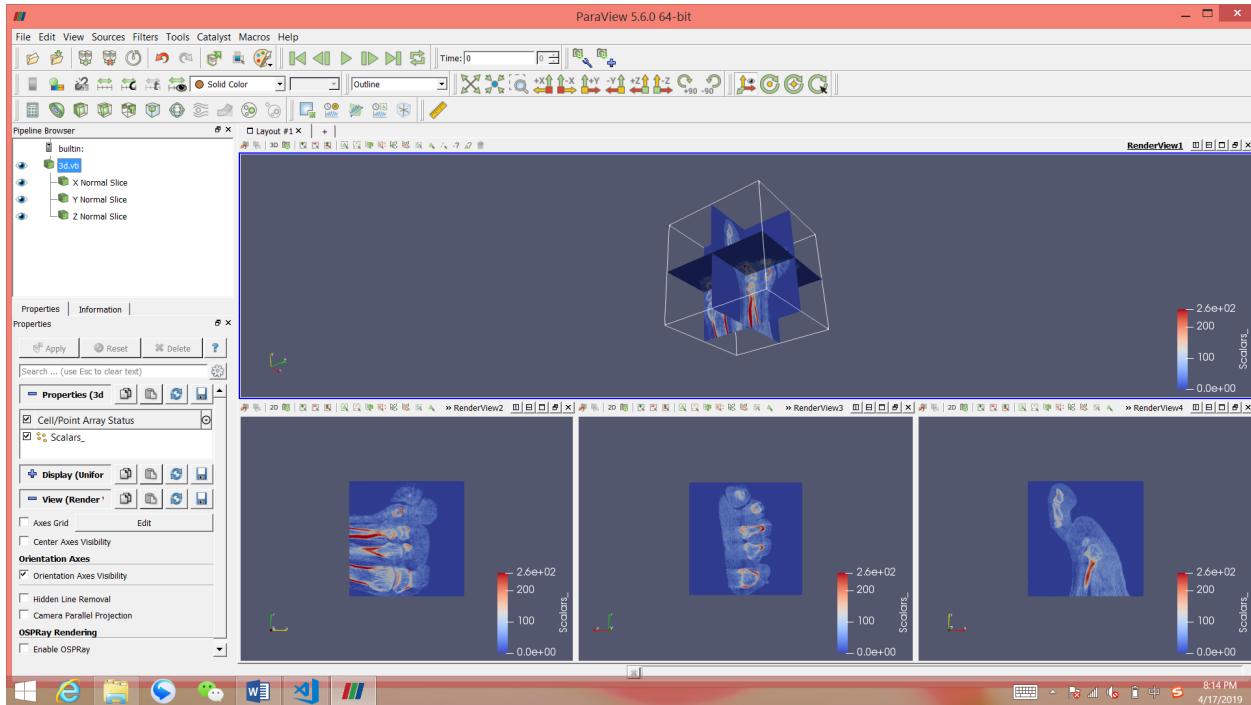
Create a slice that is aligned with the X normal of the image. Rotate the dataset and look at the slice from both sides.



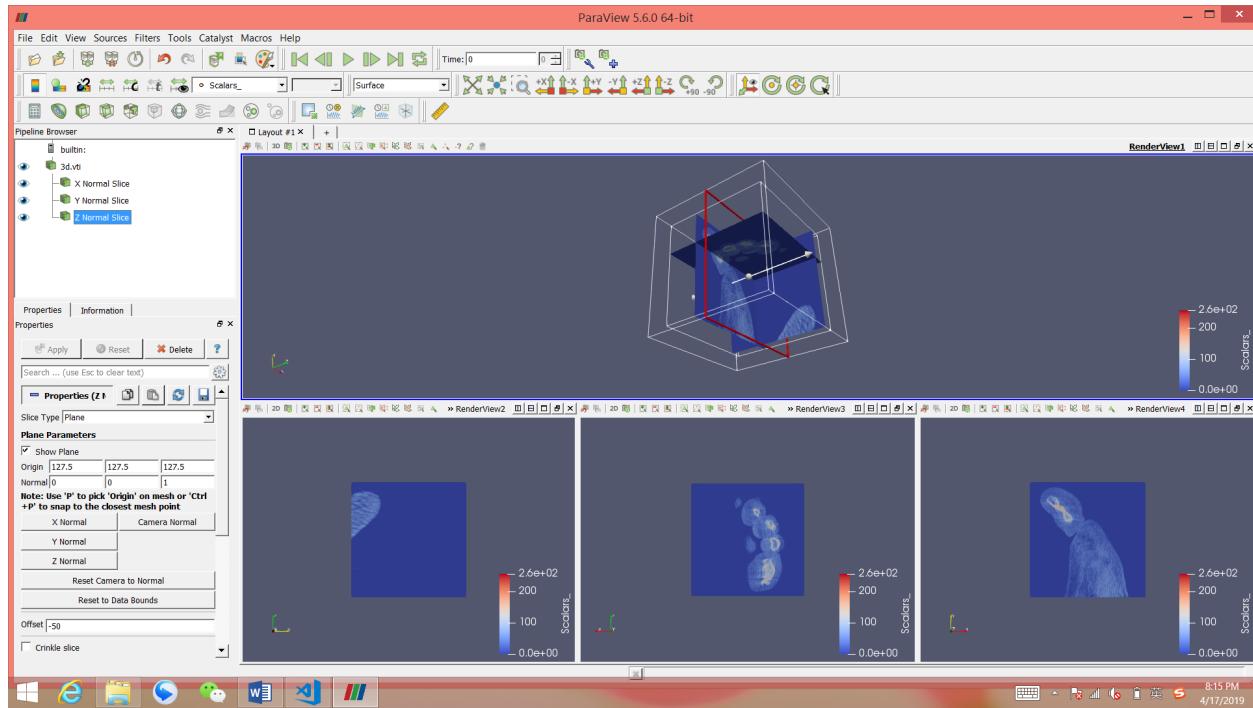
Create two additional slice filters, one aligned on the Y normal and Z normal of dataset and view all three simultaneously. Rotate the volume around and investigate it.



Create a linked view in ParaView. To do so, we'll view the same element of the Pipeline Browser in multiple renders. One at a time, click on each of the smaller views and make only one of the slices visible. Change this to a 2D view and use the camera controls so that you'll see the slice head on. You've now created a multiple linked view.

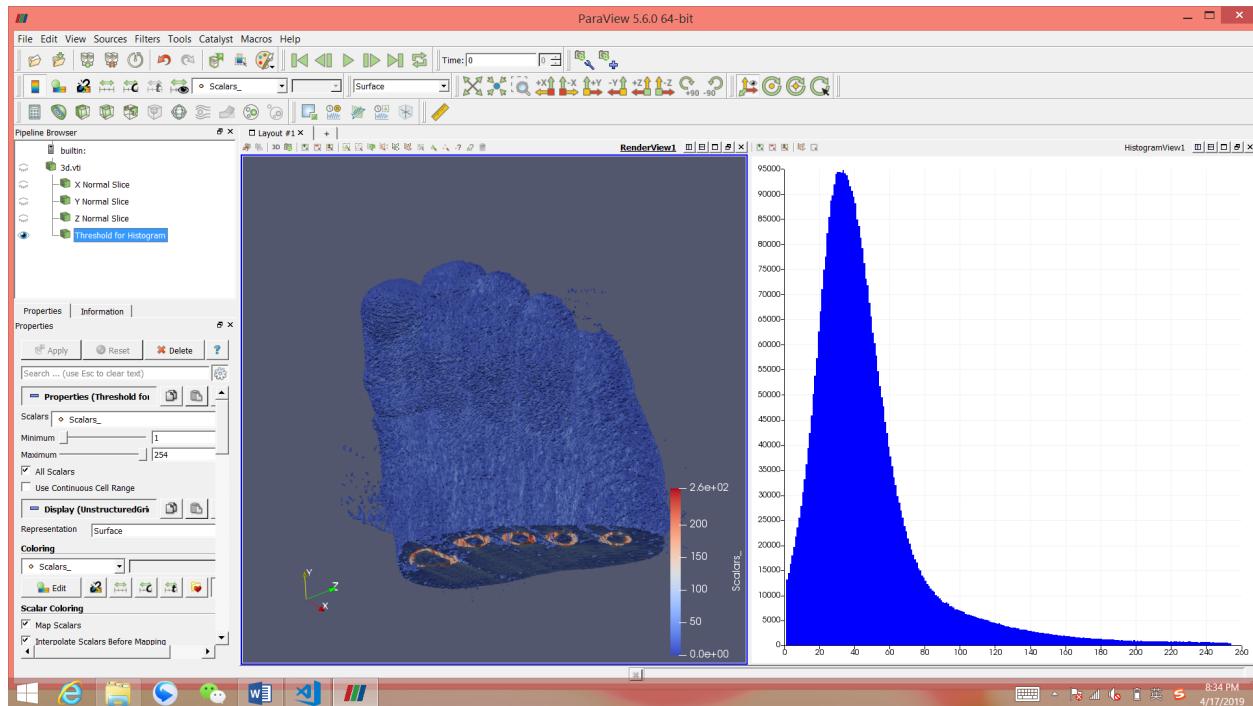


Adjust the properties of the slice in one panel, the other views should adjust accordingly.



Apply the threshold filter to the dataset.

Create a histogram to deduce the best values to use as threshold. Define a second threshold filter on the histogram to remove the pixels with 0 value. **Also adjust the number of bins to 253.** Based on the newly created histogram set suitable threshold values for the main view.

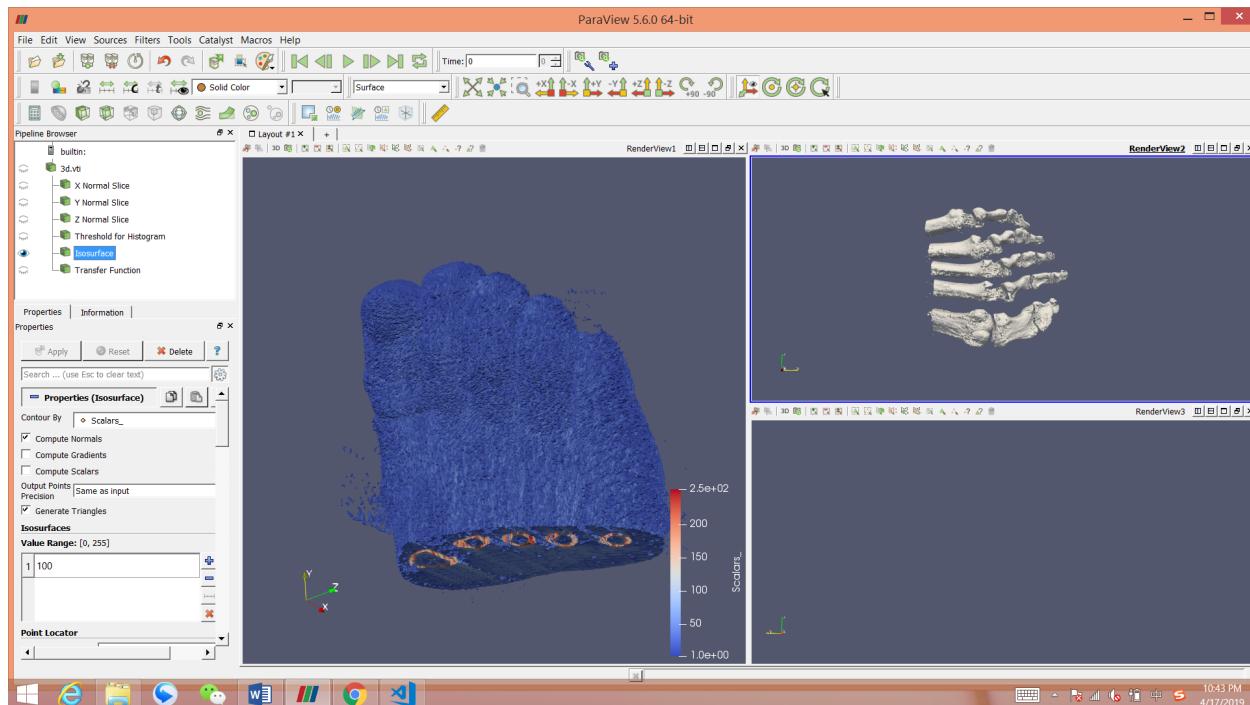


What is the dataset representing?

The dataset represents a 3D representation of a right foot. It also includes section information of the foot.

Two alternative methods for visualizing a 3d dataset are isocontours or transfer functions.

In the upper right view create an isosurface with the contour filter. Explore different values for creating the isosurface. **The best value for the contour filter is found to be 100. The isosurface with contour filter shows the bones of the foot.**



In the lower right view let's create a transfer function. This is done easily by loading the whole image and by visualizing it as a Volume. The Color Map Editor is used to modify the transfer function. Try to use the editor to add transparency for the blue pixels.

The transparency for the blue pixels is set as zero in default. Check “Enable opacity mapping for surface” to turn on the transparency effect.

