Aim

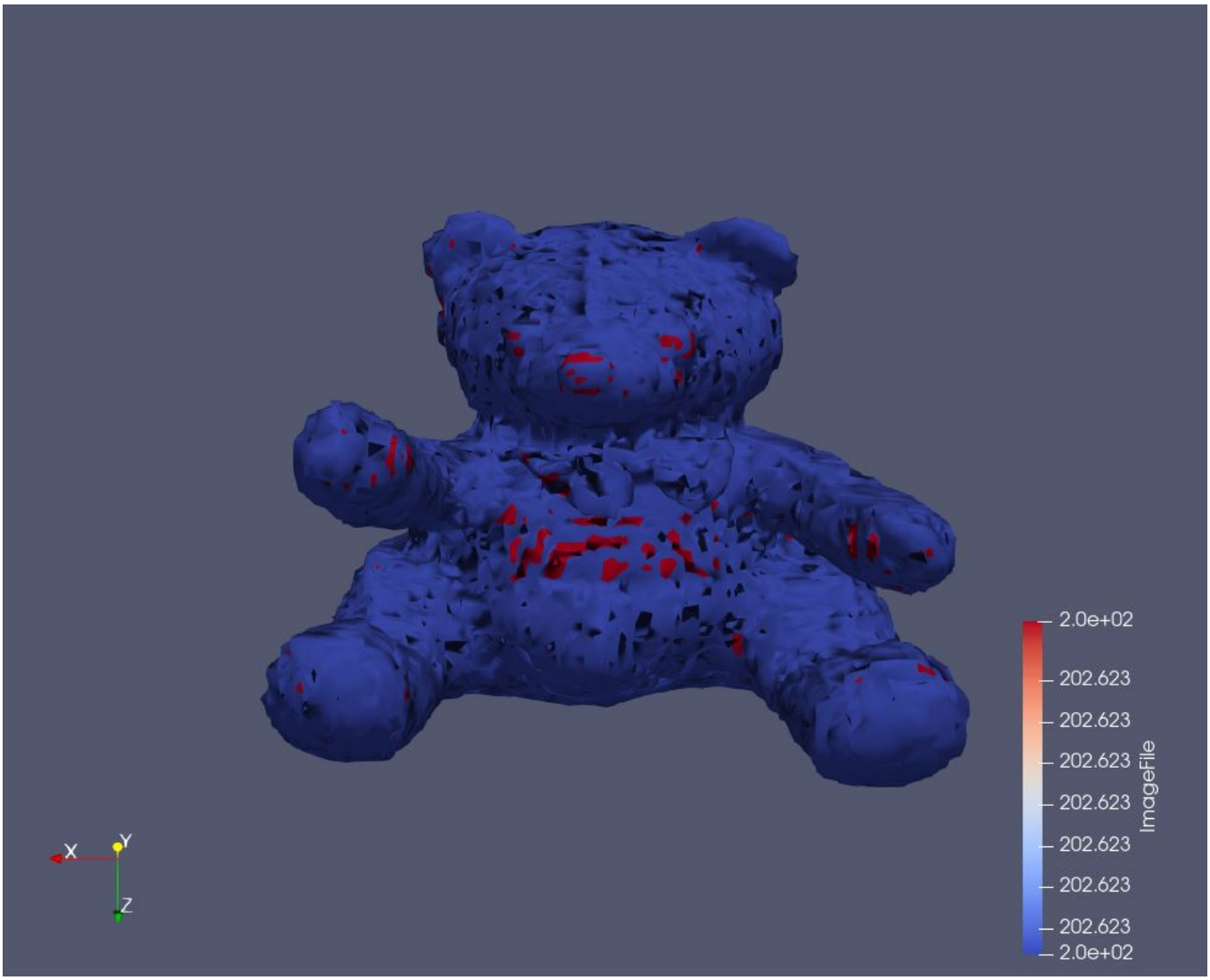
The aim of this visualization is to explore the given data using techniques of volumne visualization to find interesting and meaningful visualization.

Visual Design Type

Volume Visualization showing narrowed down or filtered view of the hidden data(teddy bear) using marching cubes.

Visualization

3D render of an object(teddy bear) with volume/density map



Visual Mappings

Legends

Mapping	Range
High	
Medium	
Low	

Data Preparation

We need to explore the dataset and find the hidden pattern in it. We take the below steps to achieve this.

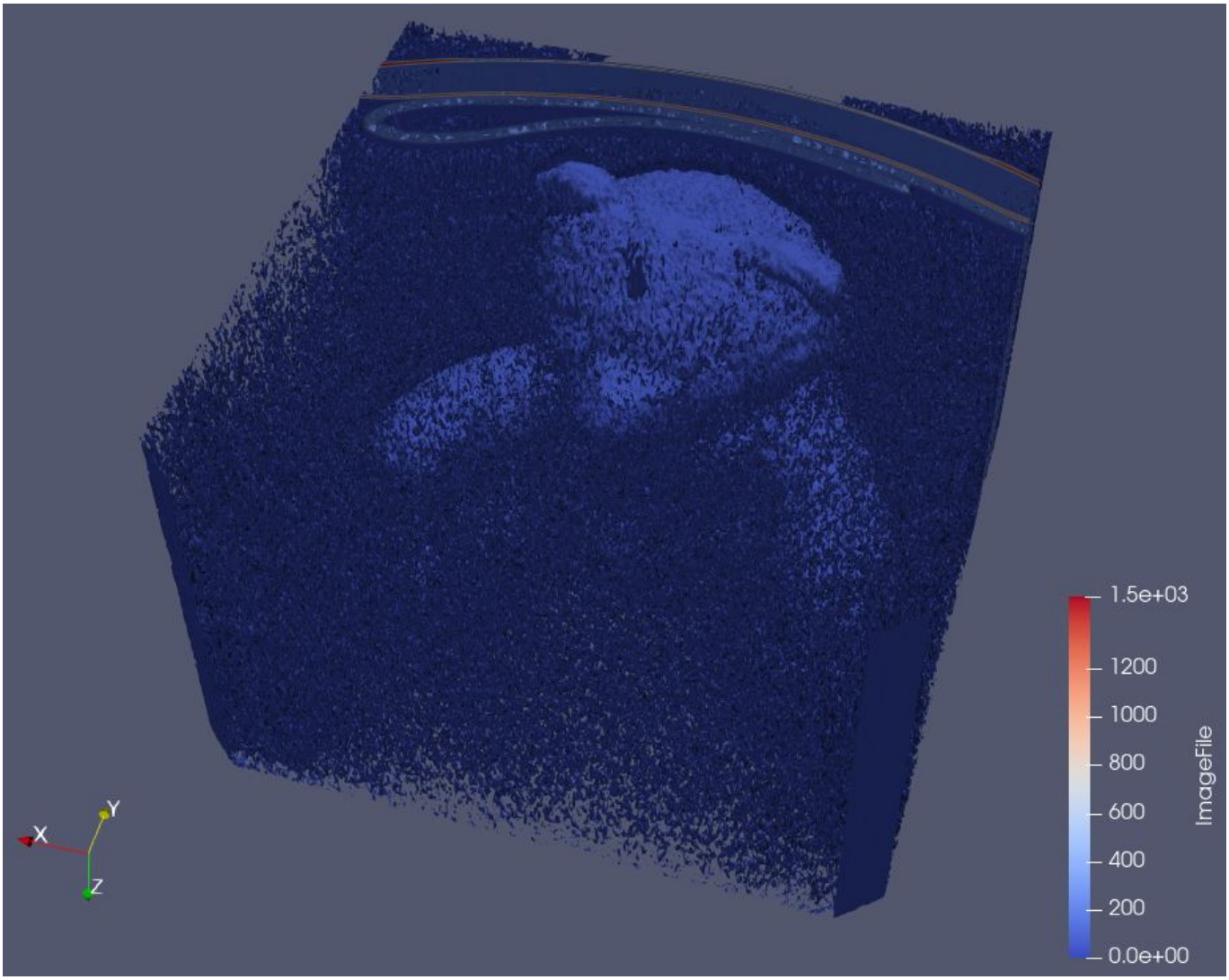
1. Load the dataset and specify the Data Extent in properties window with respresentation as "Surface". The values used for Data Etent as listed below.

Property	Value:
X	511
Y	511
Z	62

2. We apply the `Contour filter` to find the iso surfaces in the dataset with a `Linear Series` of `10 data points` with range `[0,1492]`, however this would result in a very noisy result which need to be filtered further. A short summary below of the setting is below.

Property	Value
Sample size	10
Range	0 - 1492
Type	Linear
Compute Normals	Y
Compute Gradients	N
Compute Scalars	Y
Compute Triangles	Y
Representation	Surface

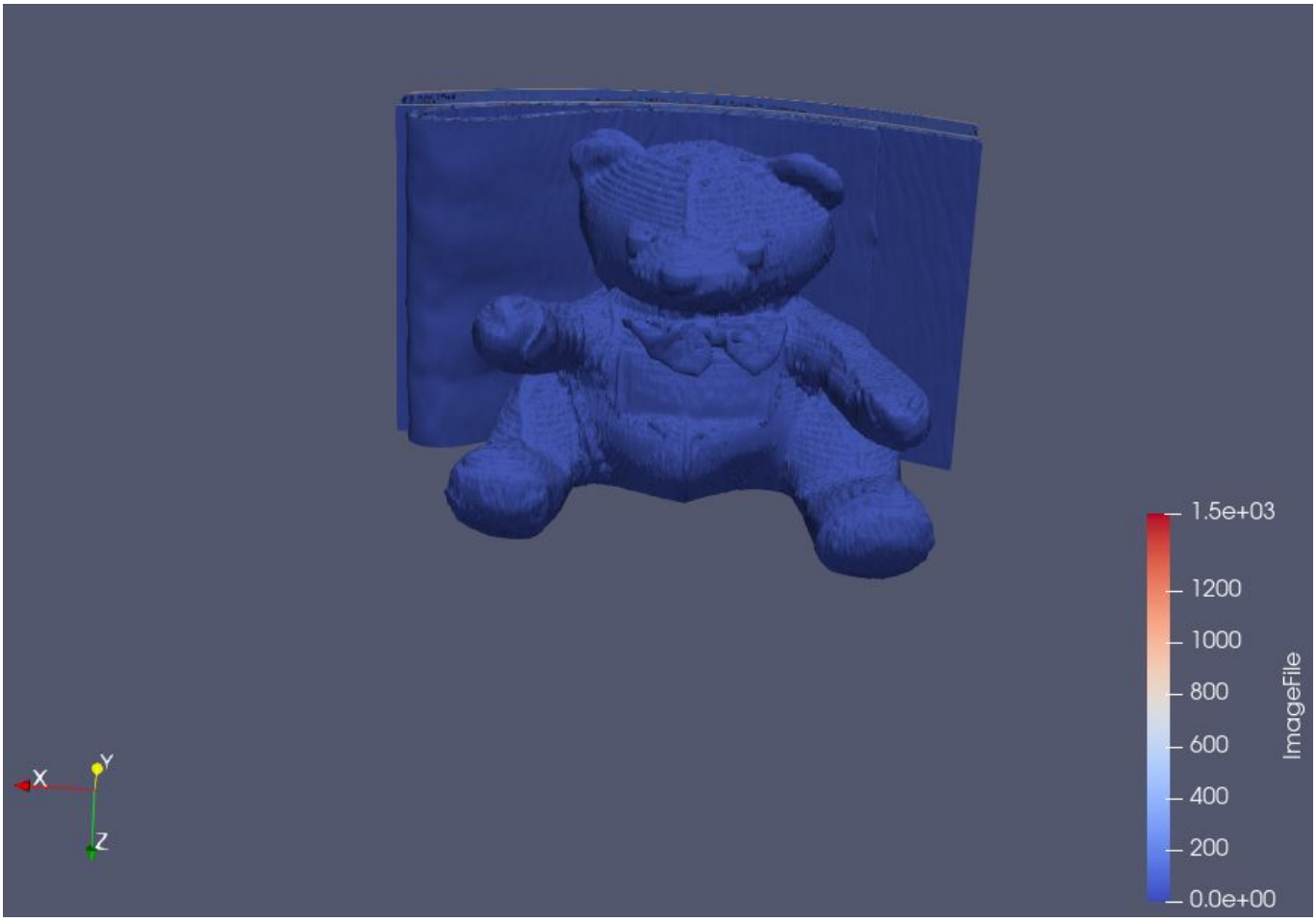
This resulted in the below image



3. Next we apply the `Threshold filter` to find out the scalar which lie in the range(50-1000), this parameter needs to be selected carefully yo obtain the desired result.

Property	Value
Scalars	ImageFile
Minimum	50
Maximum	1000
All Scalars	Y
Use Continious Cell Range	Y
Invert	N
Representation	Surface

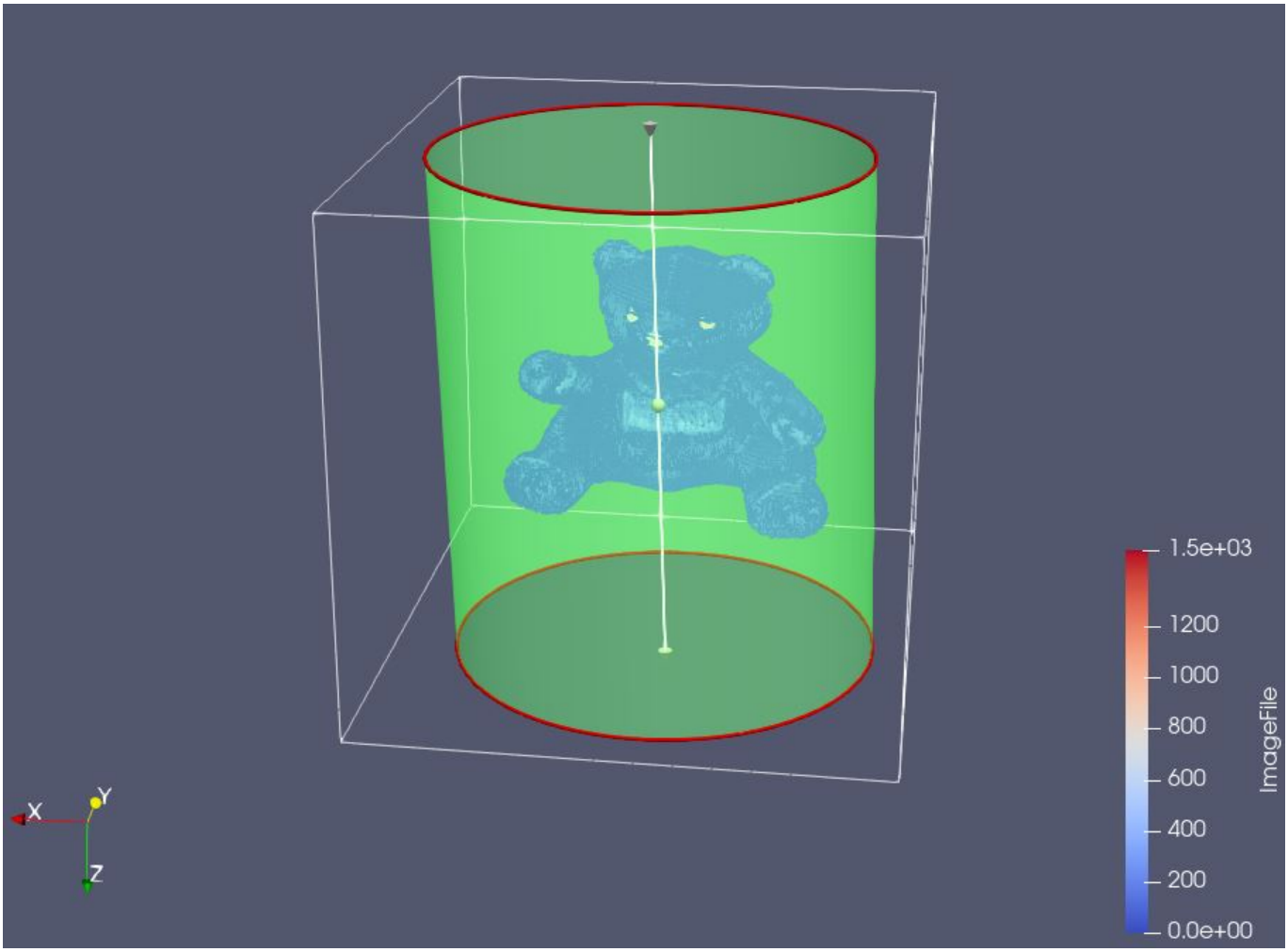
This resulted in the below image



4. Once we have the clear picture of the hidden object in the dataset, we apply a `Clipping filter` along the `z-axis` to clip out the obejct from background. Leaving the needed datat to visualize the subject. We used a `Cylinderical clip` type oriented in a manner to extract the desired data from the dataset.

Property		**Value**
Clip type		Cylinder
Parameters	Center	`(241.99, 168.68, 147.55)`
	Axis	`(-0.029,0.009,0.999)`
	Radius	258.693
Invert		Y
Crincle Clip		N

This resulted in the below image



Improvements

1. This visualization is limited to the representation of object in the dataset. It can be improved with addition of pressure and stress values at points which can be visualized along the dataset to provide a better visualization.
2. There are no distinctive results that can be inferred from dataset, perhaps having a more colourful image would have better inferences and be more applealing.
3. We have ignored the back side of the object, it appears to be some sort of plane on which the object was placed, it could be explored more to find interesting inferences.

Aim

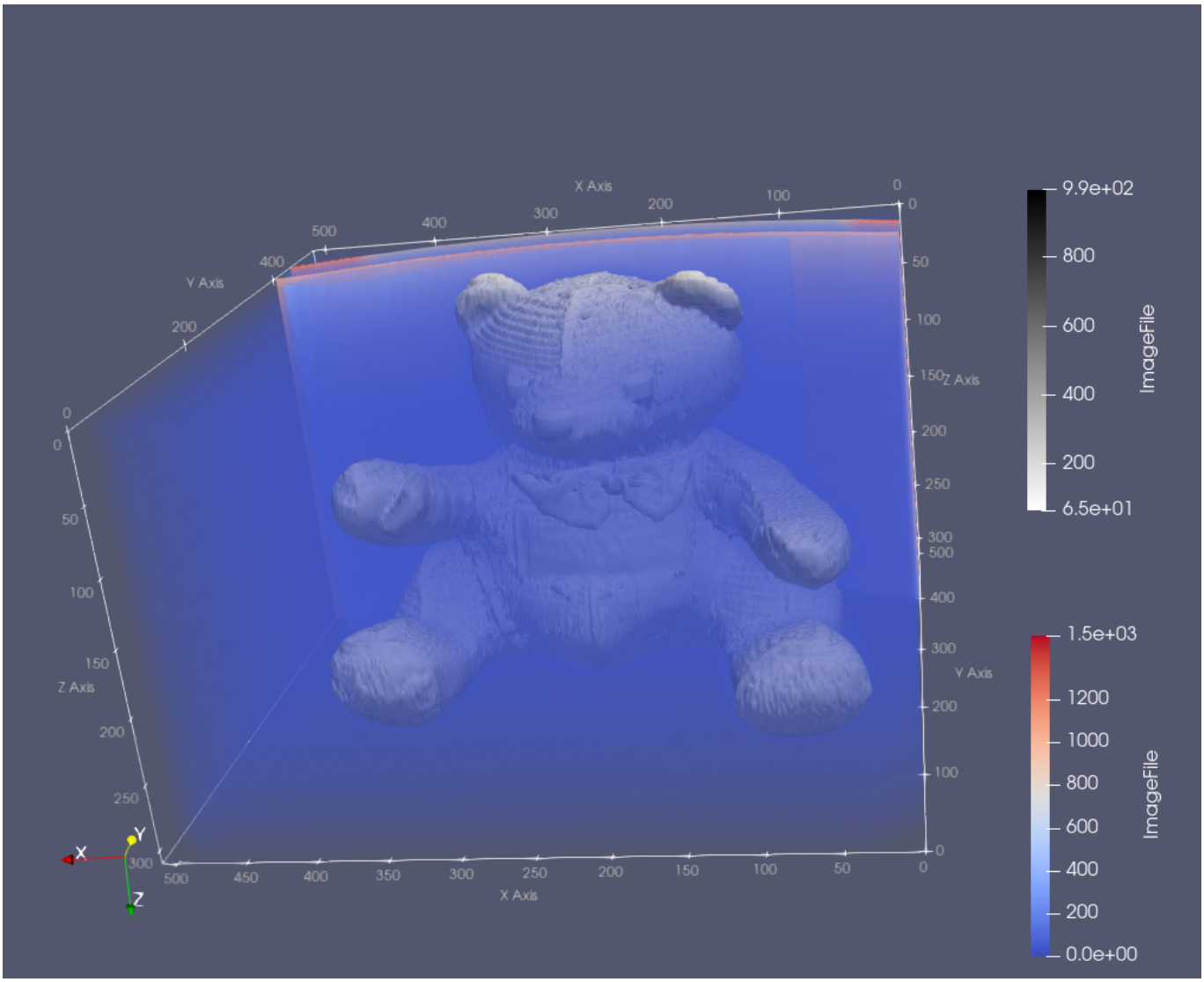
The aim of this visualization is to explore the given data using techniques of volumne visualization to find interesting and meaningful visualization.

Visual Design Type

Volume Visualization showing the position/context of the object within the raw dataset `data1`.

Visualization

Volume render of an object(teddy bear) in the given dataset which gives the relationship between the object and it surroundings.



Visual Mappings

Legends

Mapping	Range
High	
Medium	
Low	
Non Empty Space	
Empty Space	

Color Map

Two color maps presets have been used in this visualization both used in conjuction provide an accurate depiction of the object and the space around it.

1. `Cool to Warm` preset to map out the surrounding dataset
2. `X Ray` preset to map the object within the dataset.

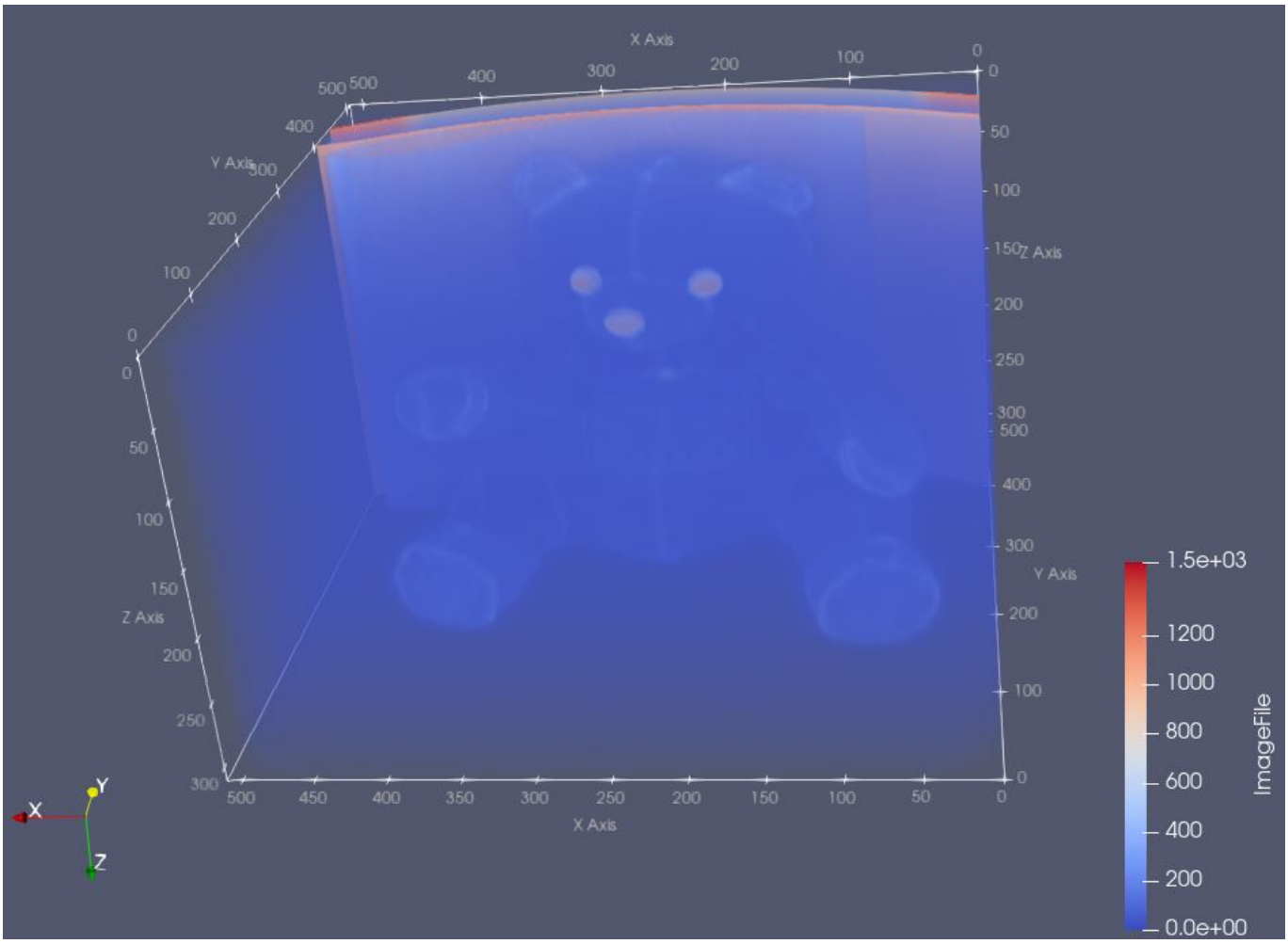
Data Preparation

We need to explore the dataset and find the hidden pattern in it. We take the below steps to achieve this.

1. Load the dataset and specify the Data Extent in properties window with respresentation as `volume`. The values used for Data Extent as listed below. To cater for the size of object, we have increased the `data spacing` to 5. `Colormap` used is `cool to warm` preset.

Property	Value:	
X	511	
Y	511	
Z	62	
Data Axes Grid	Y	
Read As Image Stack	Y	
Scalar Opacity Unit Distance	3.108	
Parameters	Data Origin	(0, 0, 0)
	Data Spacing	`(1,1,5)`

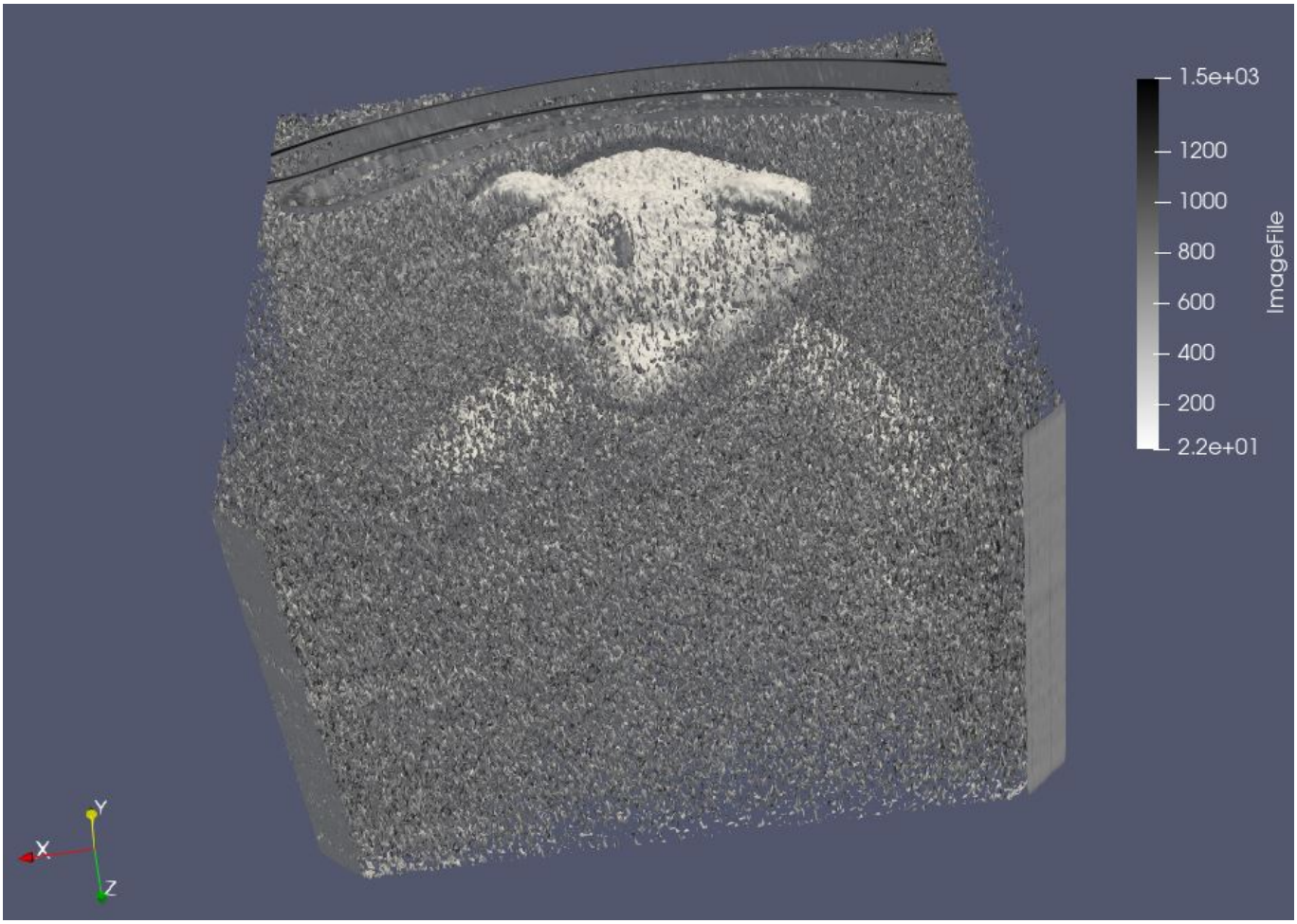
produced the below image



2. We apply the `Contour filter` to find the iso surfaces in the dataset with a `Linear Series` of `10 data points` with range `[0,1492]`, however this would result in a very noisy image, which need to be filtered further. A short summary below of the setting is below. `Colormap` used is `X Ray` preset.

Property	Value
Sample size	10
Range	0 - 1492
Type	Linear
Compute Normals	Y
Compute Gradients	N
Compute Scalars	Y
Compute Triangles	Y
Representation	Surface
Data Axes Grid	N

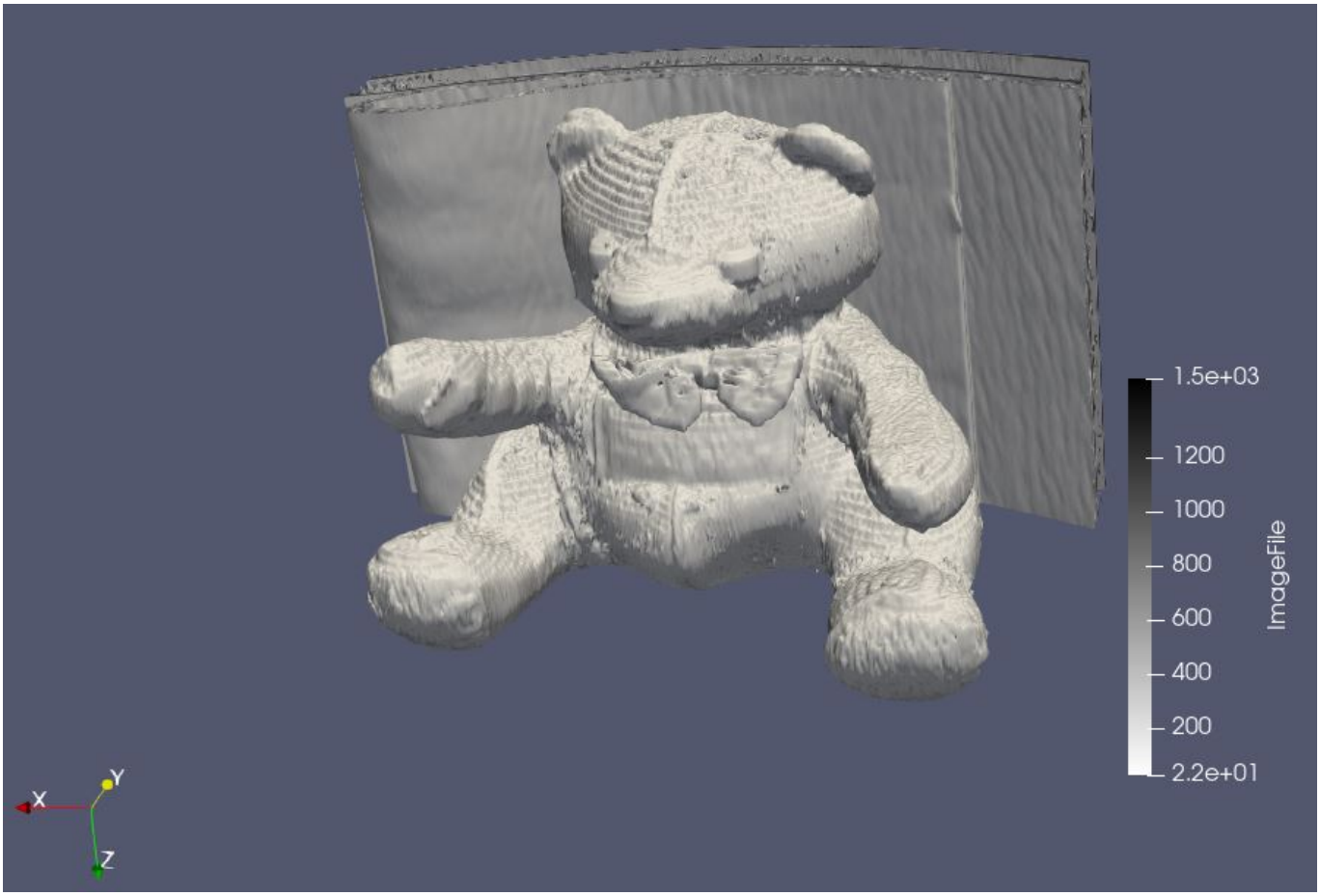
This resulted in the below image



3. Next we apply the `Threshold filter` to find out the scalar which lie in the range(50-1000), this parameter needs to be selected carefully yo obtain the desired result. `Colormap` used is `X Ray` preset.

Property	Value
Scalars	ImageFile
Minimum	50
Maximum	1000
All Scalars	Y
Use Continious Cell Range	Y
Invert	N
Representation	Surface

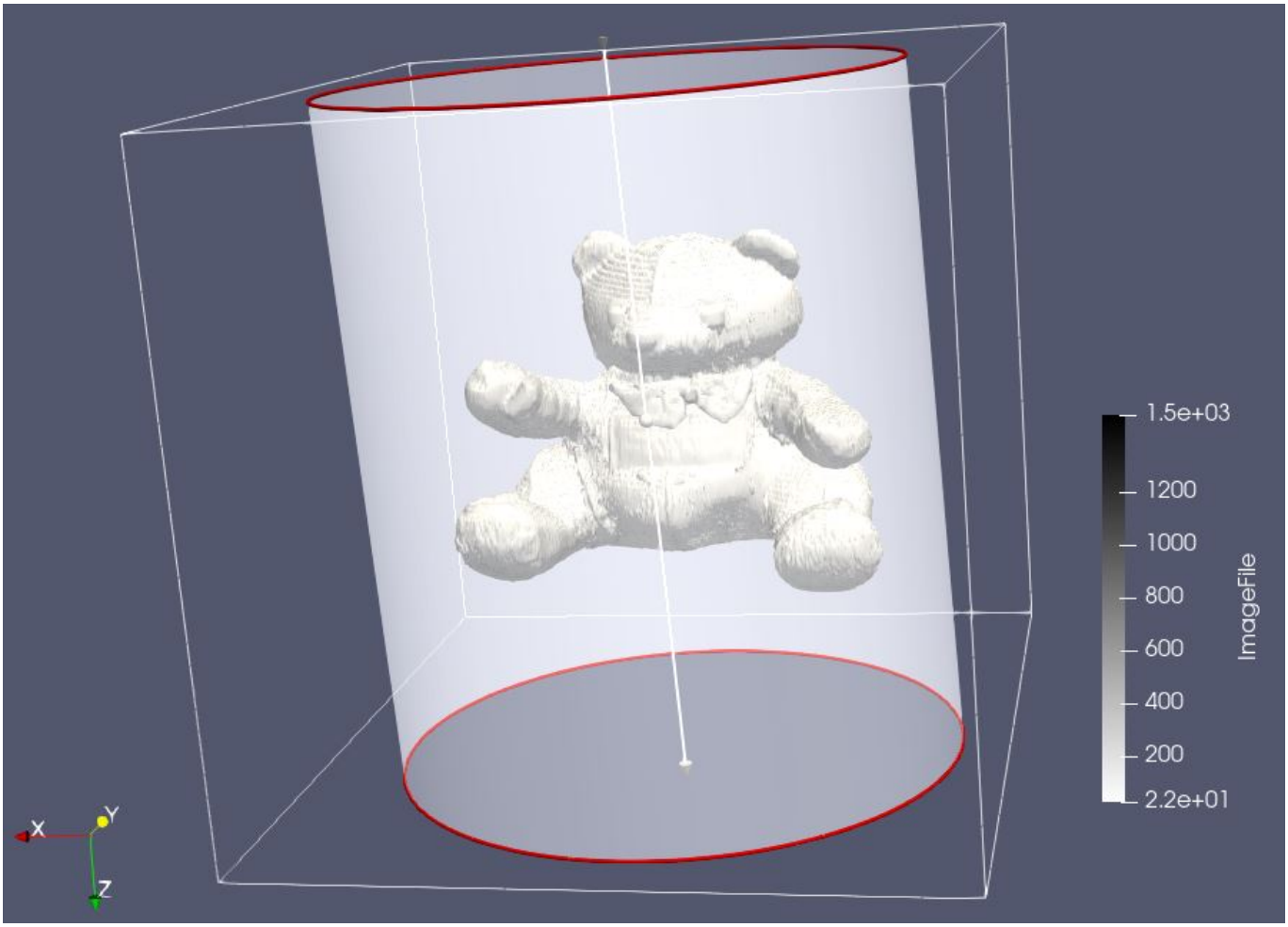
This resulted in the below image



4. Once we have the clear picture of the hidden object in the dataset, we apply a `Clipping filter` along the `z-axis` to clip out the obejct from background. Leaving the needed datat to visualize the subject. We used a `Cylinderical clip` type oriented in a manner to extract the desired data from the dataset.

Property		**Value**
Clip type		Cylinder
Parameters	Center	`(241.99, 168.68, 147.55)`
	Axis	`(-0.029,0.009,0.999)`
	Radius	258.693
Invert		Y
Crincle Clip		N

This resulted in the below image



5. We then combine the dataset from data load and from the Clipping by making both visible which would give us the final result.

Improvements

1. This visualization is limited to the representation of object in the dataset. It can be improved with addition of pressure and stress values at points which can be visualized along the dataset to provide a better visualization.
2. There are no distinctive results that can be inferred from dataset other than the object itself, perhaps having a more colourful image would have better inferences and be more applealing to eye.

Aim

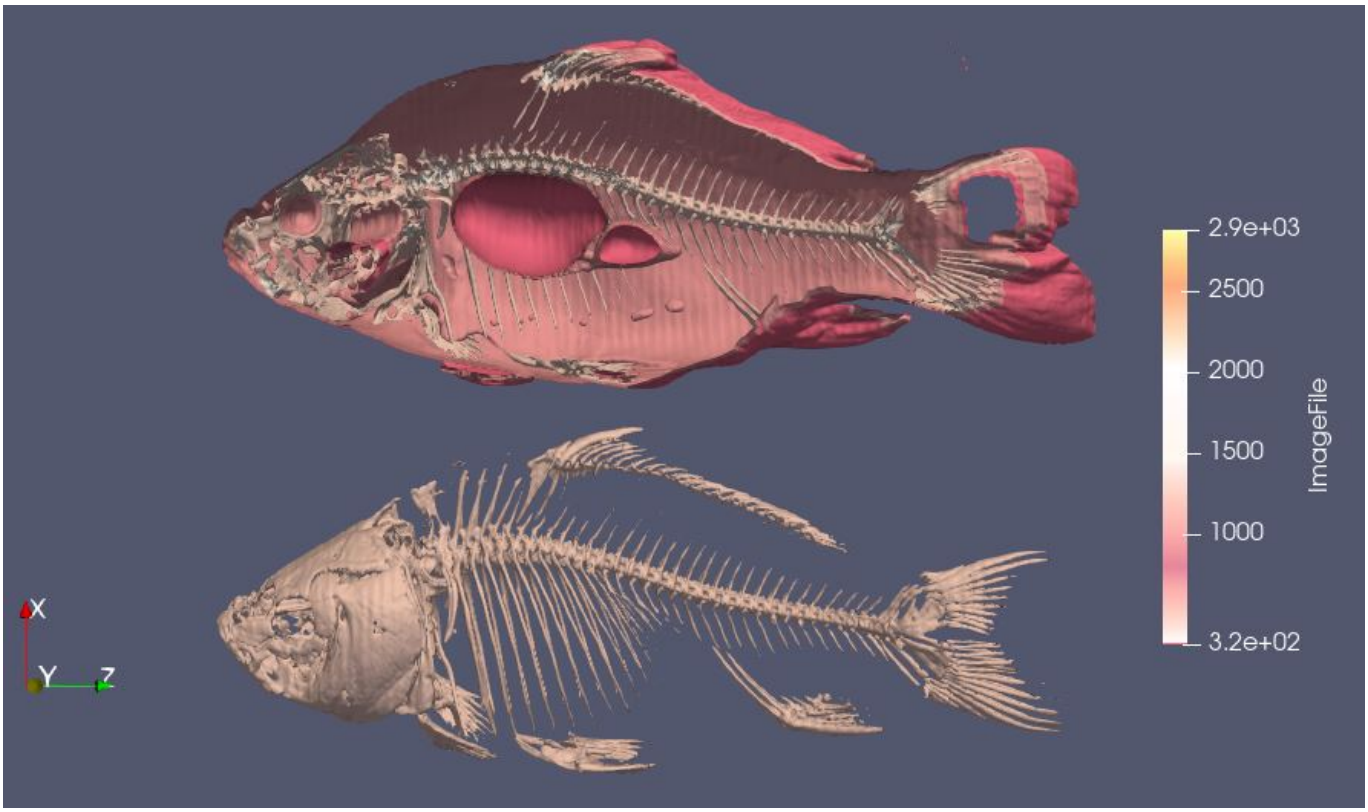
The aim of this visualization is to explore the given data using techniques of volumne visualization to find interesting and meaningful visualization.

Visual Design Type

Volume Visualization showing the object within the raw dataset `data2`.

Visualization

Volume render of an object(fish) showing the inner skeleton with the outer body. Also an cross-section of fish to relate the position of carcus with the body.



Visual Mappings

Legends

Mapping	Range
Bone	
Flesh	

Mapping	Range
Outer Skin	

Color Map

A custom color map has been used in this visualizaton. Following are the settings for the preset

No	Value	R	G	B
1	319	1	0.435	0.5568
2	319	1	1	1
3	800.509	0.9098	0.525	0.6078
4	1450.55	1	0.9098	0.945
5	2020.33	1	1	1
6	2871	0.9843	1	0.6705

Opacity Transfer function values

Value	Opacity
319	0.45
1956.13	0.3812
2871	1

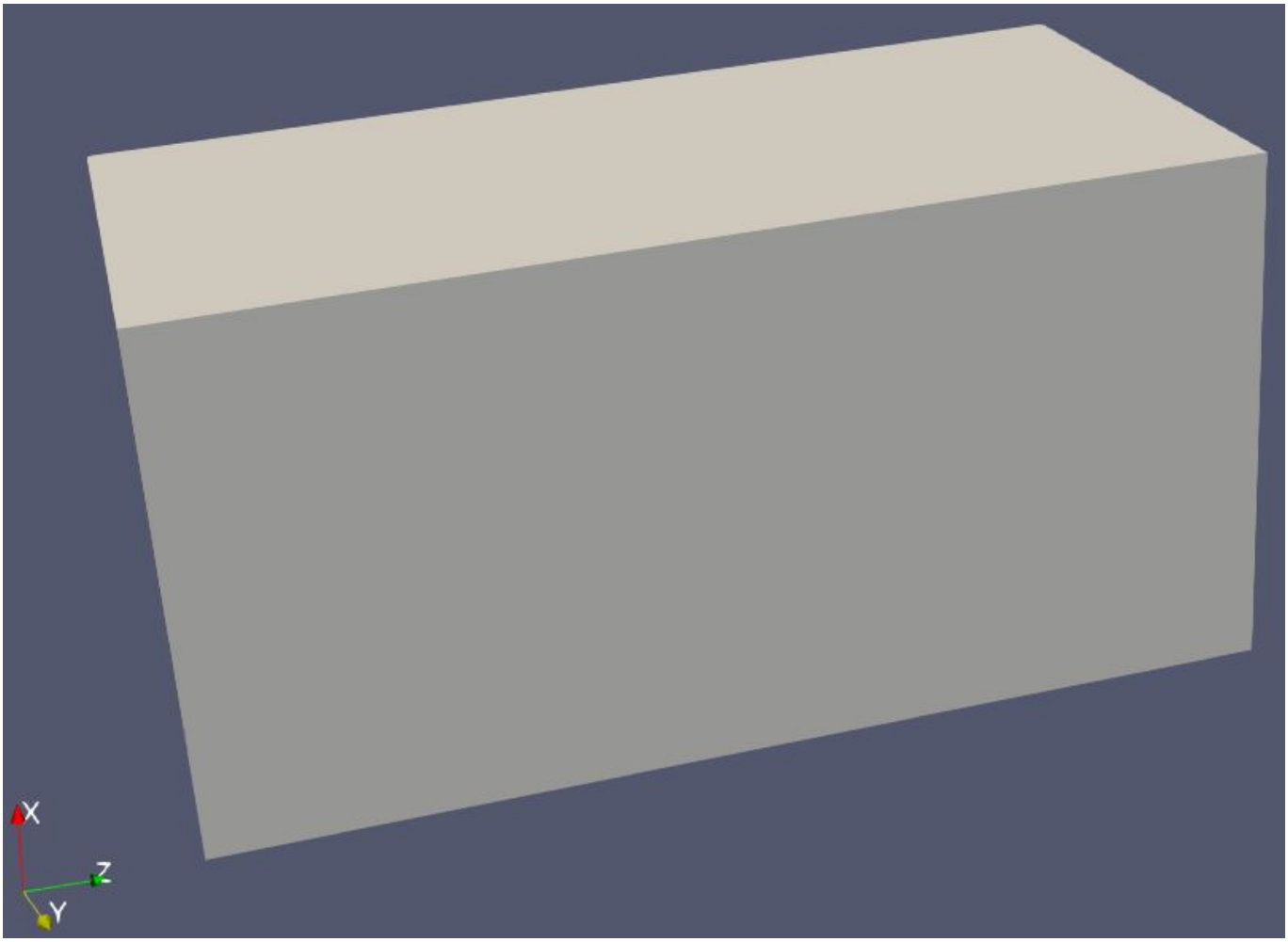
Data Preparation

We need to explore the dataset and find the hidden pattern in it. We take the below steps to achieve this.

1. Load the dataset `data2` and specify the Data Extent in properties window with respresentation as `Surface`. The values used for Data Extent as listed below.

Property	Value:
X	255
Y	255
Z	511
Read As Image Stack	Y

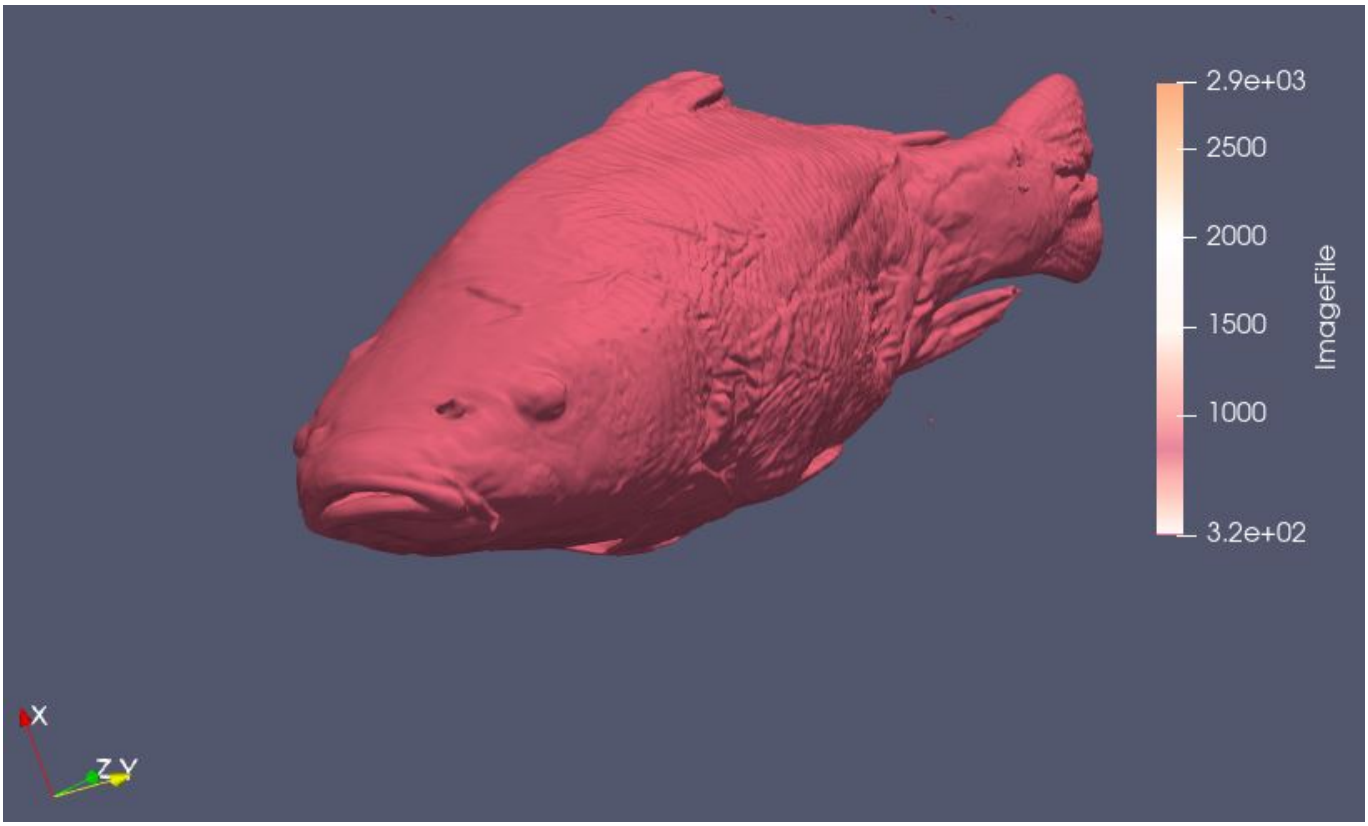
produced the below image



2. Since the previous step didn't show much of object. We will apply the `Contour filter` to find the iso surfaces in the dataset with a `Linear Series` of `10 data points` with range `[0,2871]`, however this would result in a very noisy result which need to be filtered further. A short summary below of the setting is below. `Colormap` used is `X Ray` preset.

Property	Value
Sample size	10
Range	0 - 2871
Type	Linear
Compute Normals	Y
Compute Gradients	N
Compute Scalars	Y
Compute Triangles	Y
Representation	Surface
Data Axes Grid	N

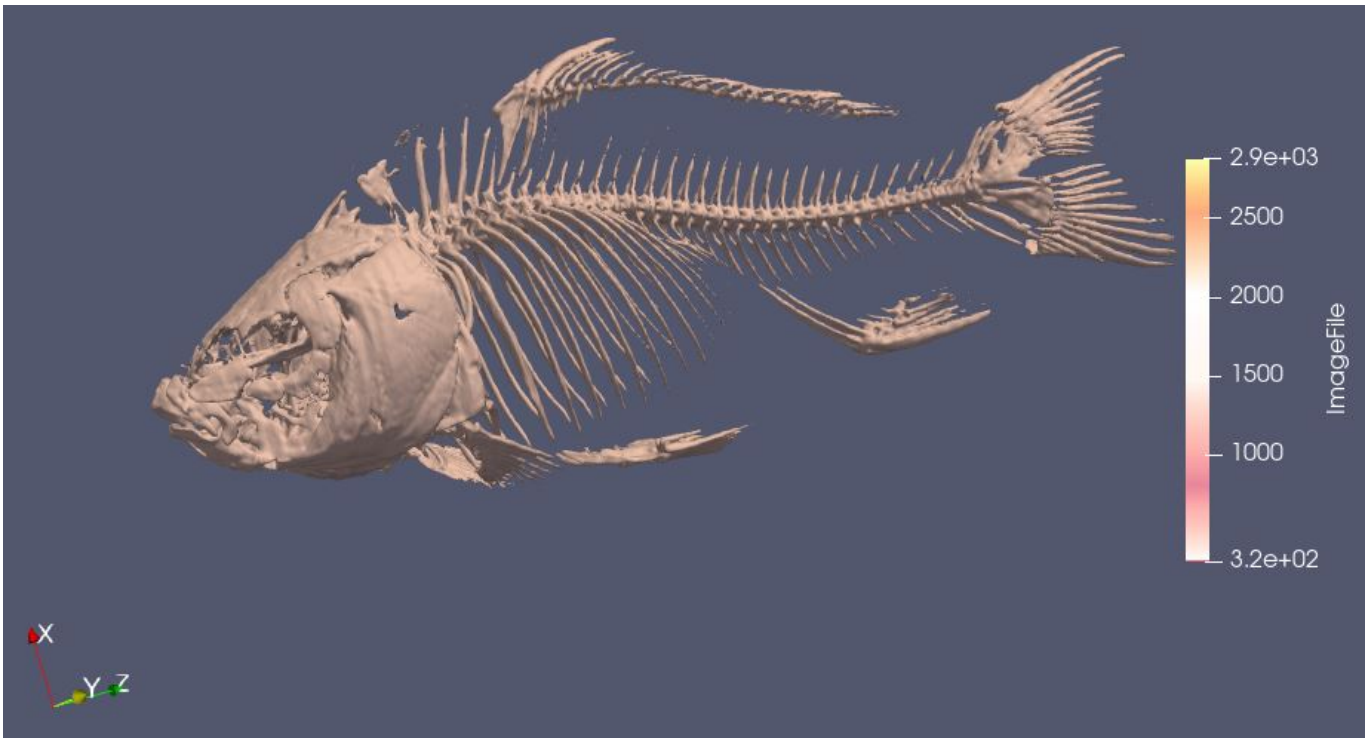
produced the below image



3. Now that we have the subject visible as now need to explore the inner parts of the subject to reveal more details. We use the `Threshold filter` to find out the scalar which lie in the range(1000-3000), this parameter needs to be selected carefully yo obtain the desired result.

Property	Value
Scalars	ImageFile
Minimum	1000
Maximum	3000
All Scalars	Y
Use Continious Cell Range	N
Invert	N
Representation	Surface

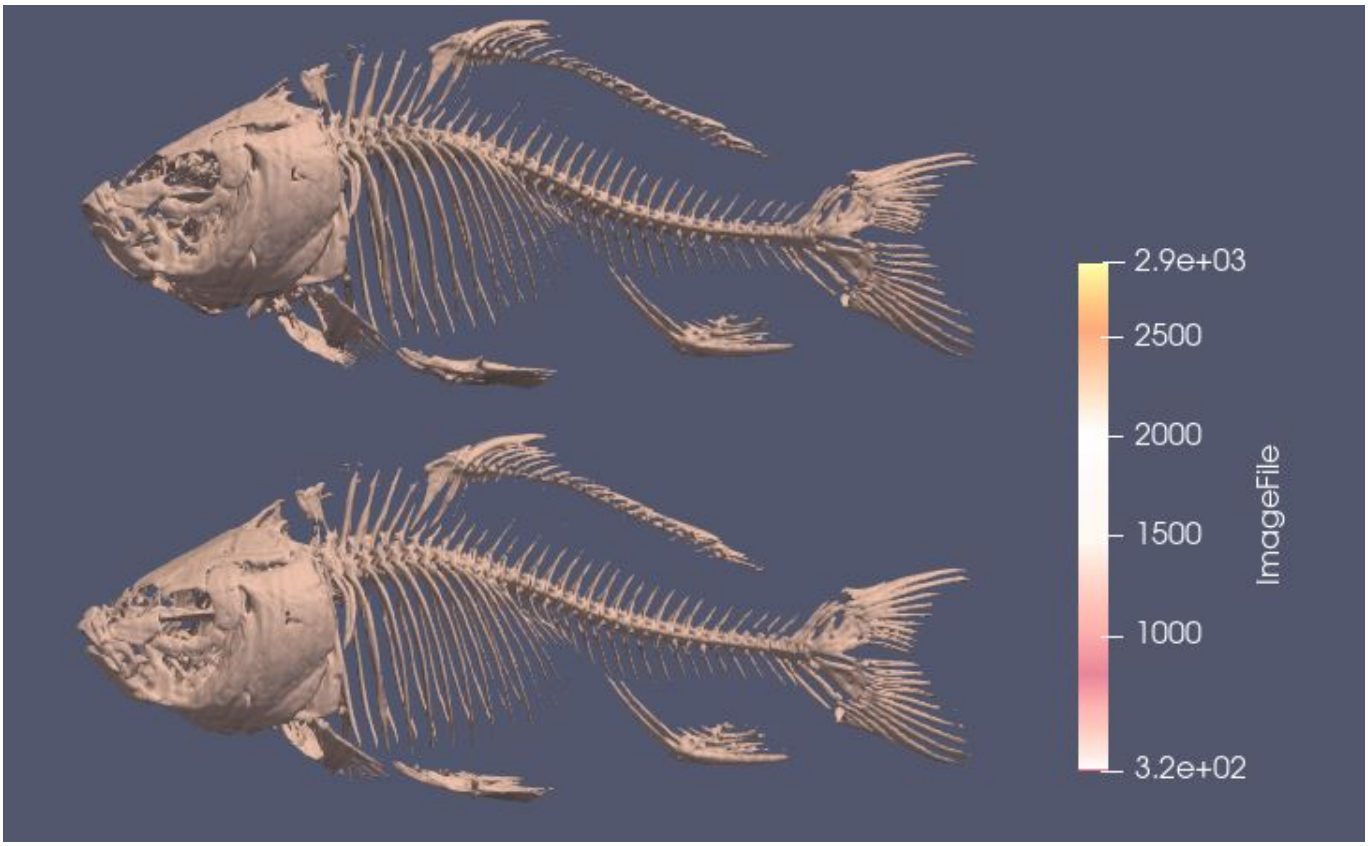
produced the below image



4. To do a more comprehensive comparision we make a copy of the object just below it using the `Transform filter` with the below settings.

Property		**Value**
Show Box		N
Parameters	Translate	(-220, 11.98, 0)
	Rotate	(0,0,0)
	Scale	(1, 0.945, 1)
Translation		Y
Scaling		Y
Rotation		Y
Face Movement		Y

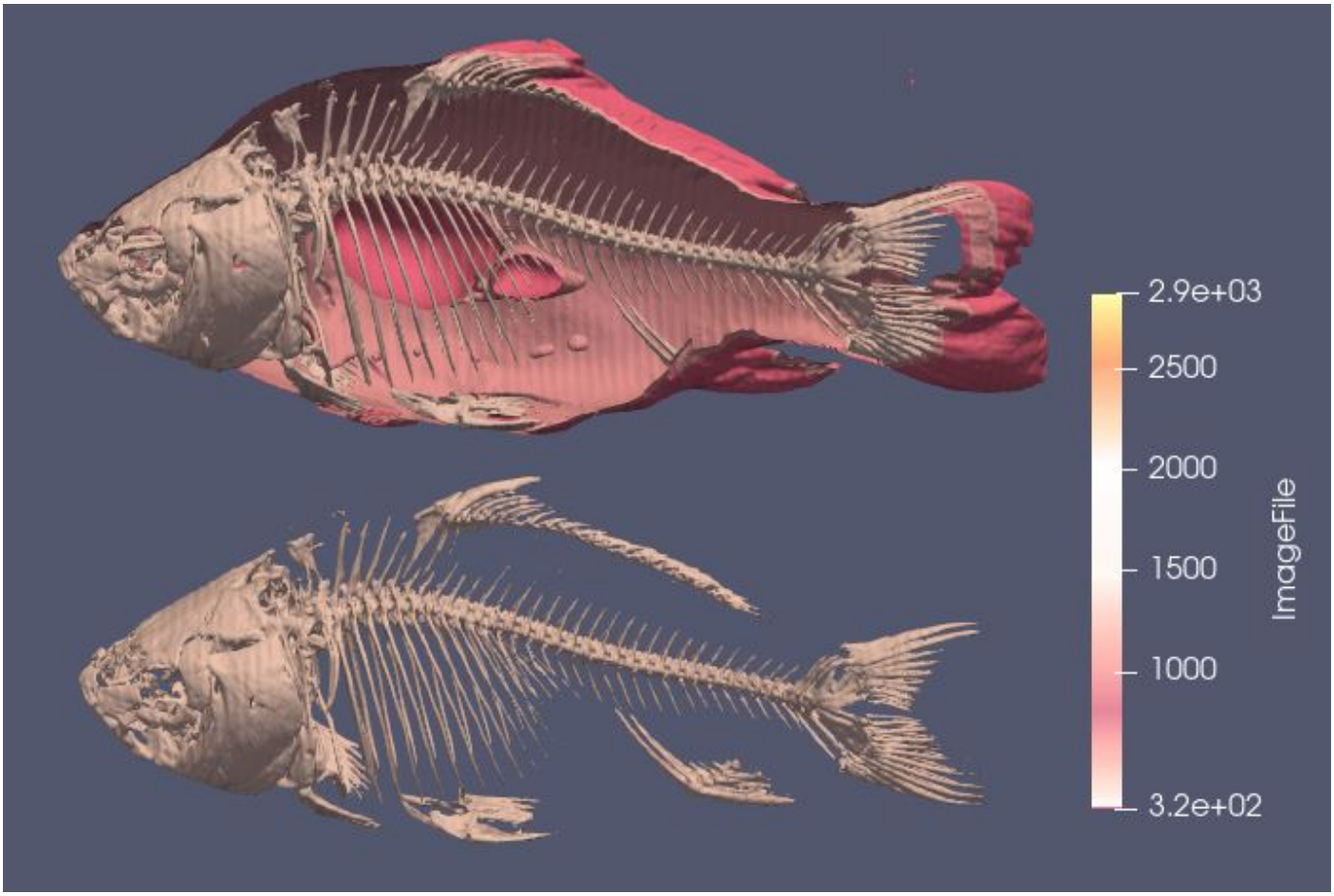
and produced the below image



5. Finally we apply a `Clip filter` on the `Contour filter` which will be applicible on the top object to get a cross-section of the fish and get a clear view of the relationship between the carcus and the flesh body. Settings for the clip filter are below.

Property		**Value**
Clip type		Plane
Show Plane		N
Parameters	Origin	(131.35, 147.435, 248.45)
	Normal	(-0.046,0.955,0.2901)
Invert		Y
Crincle Clip		N

and produced the below image



Improvements

1. This visualization is limited to the representation of object in the dataset.
2. It could be better visualized with the data about the organs of the fish.

Aim

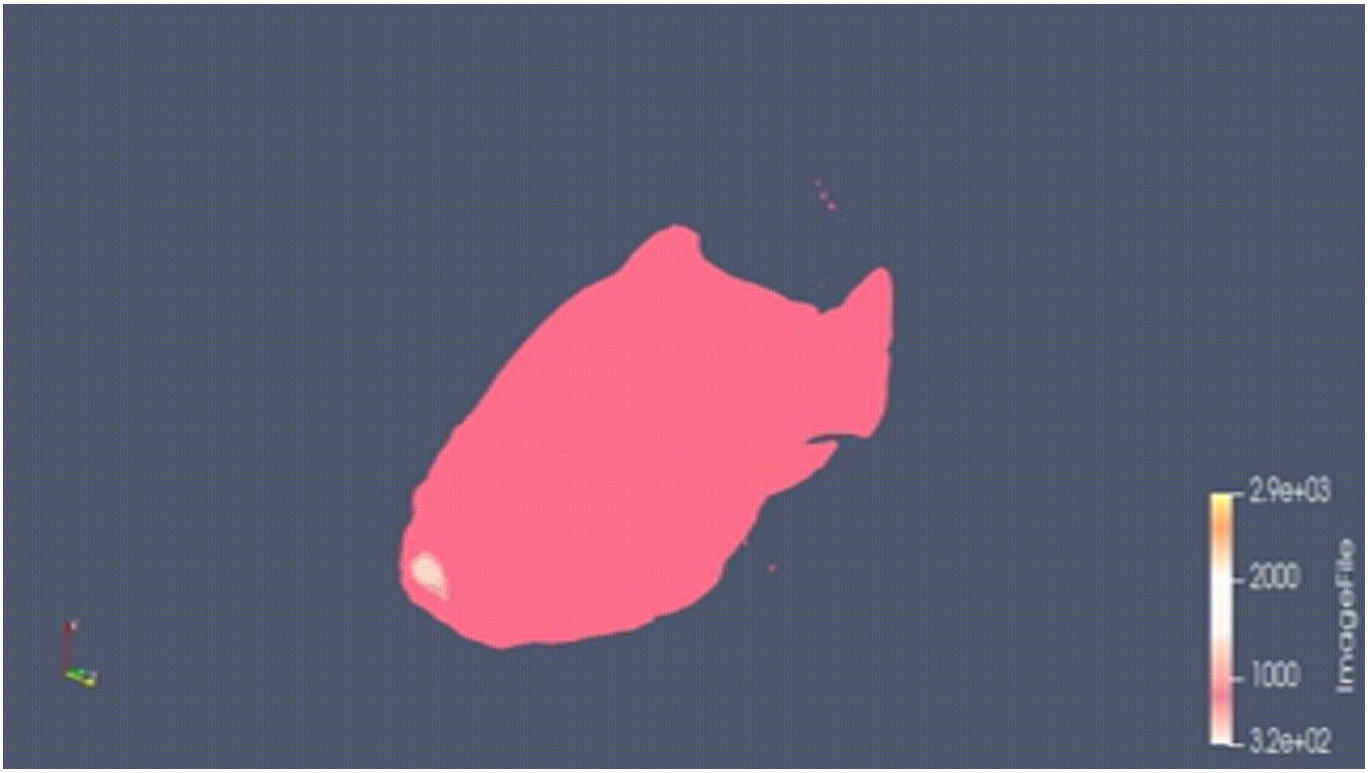
The aim of this visualization is to explore the given data using techniques of volumne visualization to find interesting and meaningful visualization.

Visual Design Type

Volume Visualization showing the object within the raw dataset `data2`.

Visualization

Volume Visualization showing an animation of the different cross-section of the obejct(fish).



Visual Mappings

Legends

Mapping	Range
Bone	
Flesh	
Outer Skin	

Color Map

A custom color map has been used in this visualizaton. Following are the settings for the preset

No	Value	R	G	B
1	319	1	0.435	0.5568
2	319	1	1	1
3	800.509	0.9098	0.525	0.6078
4	1450.55	1	0.9098	0.945
5	2020.33	1	1	1
6	2871	0.9843	1	0.6705

Opacity Transfer function values

Value	Opacity
319	0.45
1956.13	0.3812
2871	1

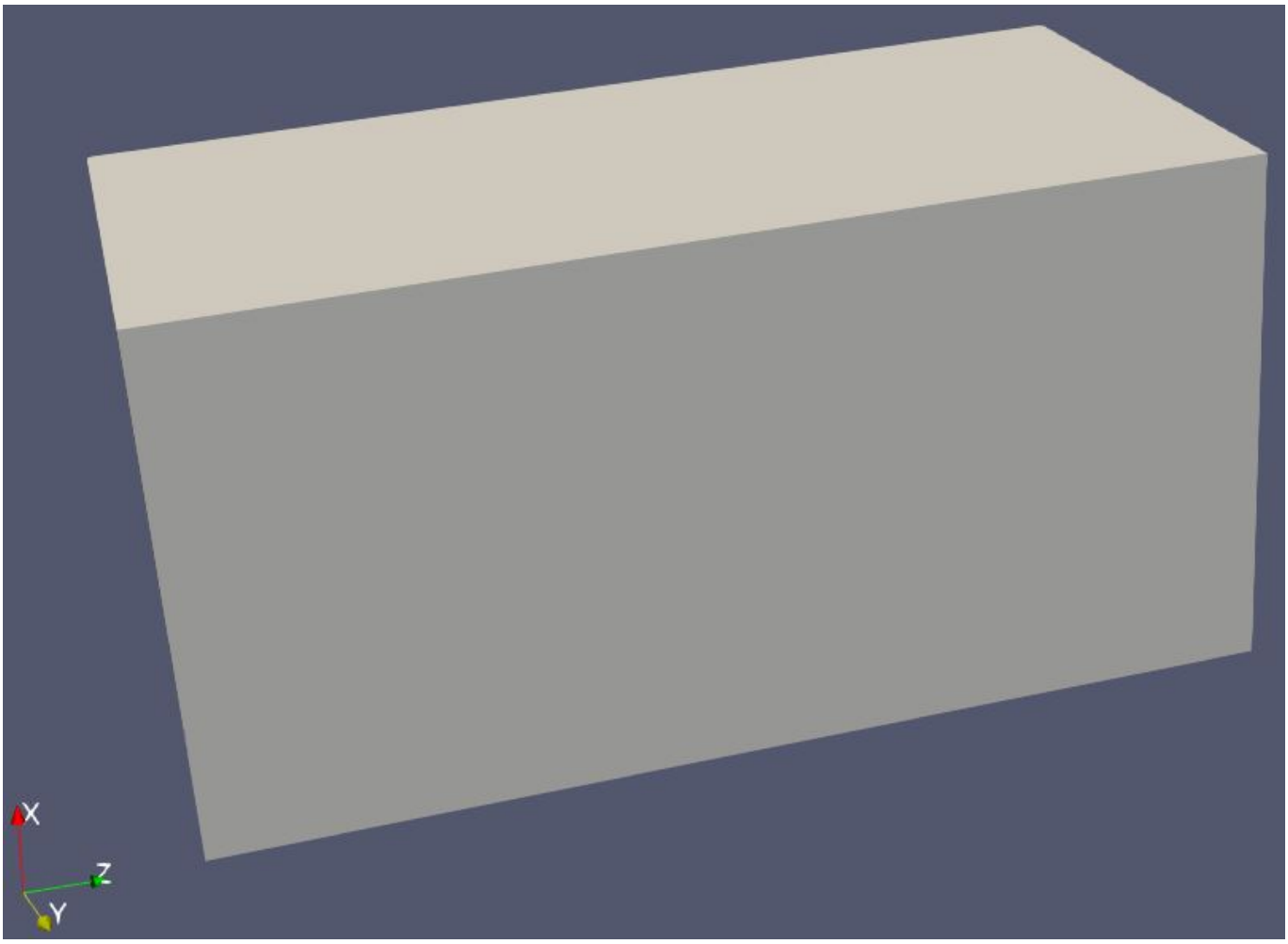
Data Preparation

We need to explore the dataset and find the hidden pattern in it. We take the below steps to achieve this.

1. Load the dataset `data2` and specify the Data Extent in properties window with respresentation as `Surface`. The values used for Data Extent as listed below.

Property	Value:
X	255
Y	255
Z	511
Read As Image Stack	Y

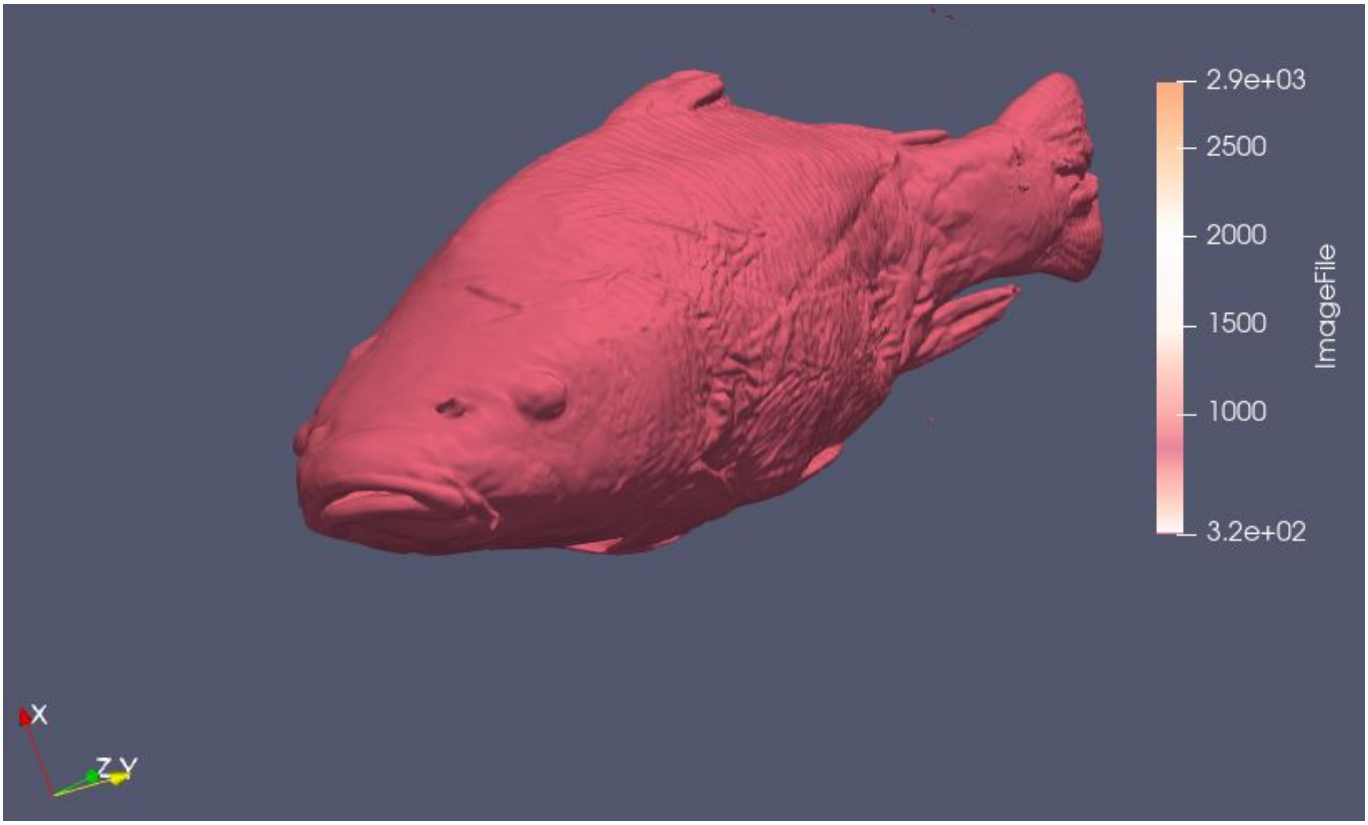
produced the below image



2. Since the previous step didn't show much of object. We will apply the `Contour filter` to find the iso surfaces in the dataset with a `Linear Series` of `10 data points` with range `[0,2871]`, however this would result in a very noisy result which need to be filtered further. A short summary below of the setting is below. `Colormap` used is `X Ray` preset.

Property	Value
Sample size	10
Range	0 - 2871
Type	Linear
Compute Normals	Y
Compute Gradients	N
Compute Scalars	Y
Compute Triangles	Y
Representation	Surface
Data Axes Grid	N

produced the below image



3. Once we have the model for fish ready, we need to get multiple slices inorder to get an cross-section animation.

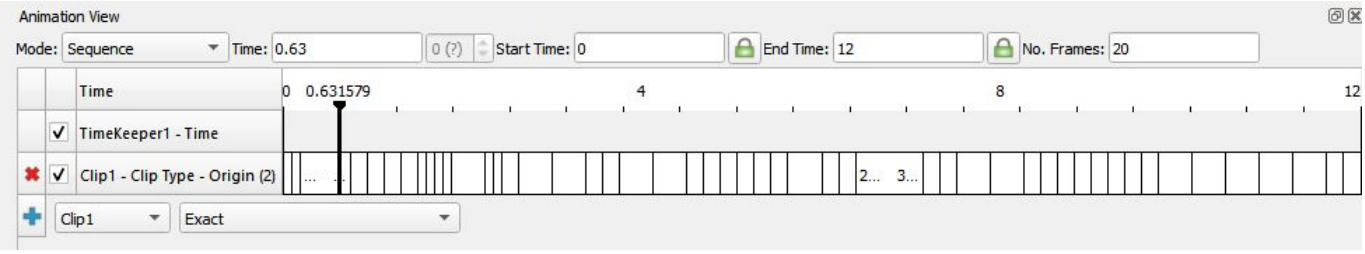
- Add a `Clip filter` and and position the clipping plane at the start of the fish on z-axis by applying the below settings to get the clips.

Property		**Configuration**
Clip type		Plane
Show Plane		Y
Invert		Y
Representation		Wireframe
Crinkle clip		Y
Parameters	Origin	`(50.70, 53.82, 51.63)`
	Normal	`(0.0066,-0.00713,-0.999)`

- Add animation view from the top menu bar, view -> Animation view. We need to add clips on the animation veiw that would apply `clips at different interval` and keep clipping the fish along `z-axis`.

Property	**Configuration**
Type	Clip1

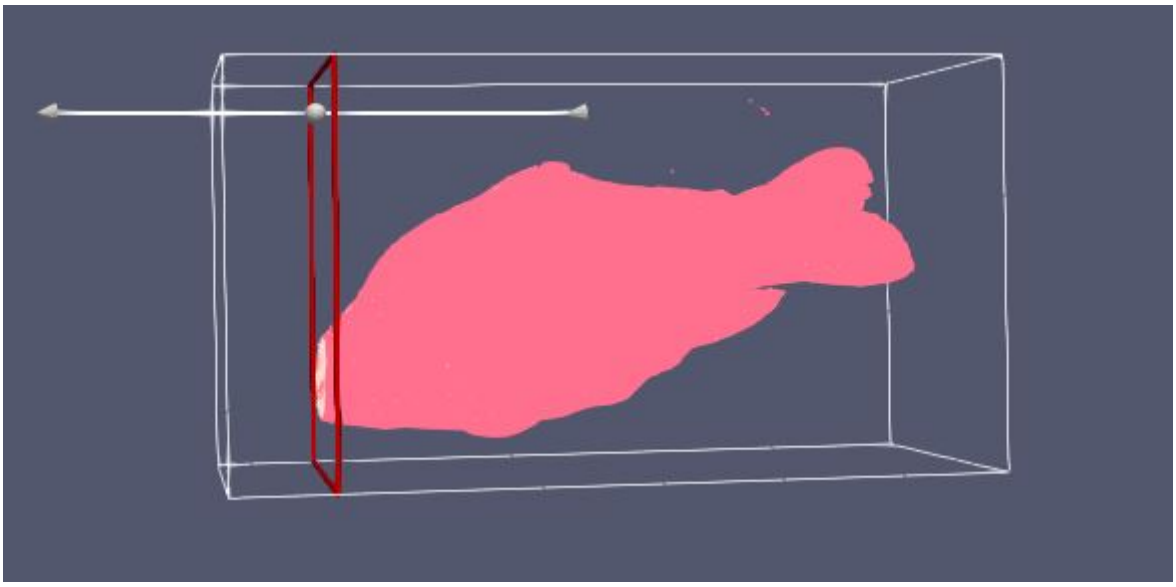
Property	Configuration
Property	Clip1 - Clip Type - origin (2)



- Double click on the empty keyframes and add keyframes, that would clip the fish at specified time interval and display the clip selection.

Property	Configuration :
data representation	wireframe
Keyframes	[24, 28.101, 32.203, 56.812, 64.265, 71.718, 79.171, 86.825, 90.135, 94.078, 97.804, 101.531, 116.43, 120.164, 123.890, 131.343, 146.25, 161.156, 168.609, 176.0625, 190.96, 205.875, 213.328, 220.781, 228.234, 243.140, 250.593, 265.5, 272.95, 280.40, 310.21, 317.67, 340.031, 362.3990, 377.296, 392.203, 407.109, 429.46, 459.28, 474.18, 496.546, 504]
TIme	[0, 0.093, 0.187, 0.75, 0.93, 1.125, 0.6315, 1.5 , 1.68, 1.78, 1.875, 2.25, 2.343, 2.43, 2.625, 3, 3.375, 3.75, 4.12, 4.5, 4.68, 4.87, 5.062, 5.25, 5.437, 5.625, 6, 6.187, 6.375, 7.125, 7.312, 7.5, 7.875, 8.25, 8.437, 8.62, 8.812, 9 , 9.187, 9.375, 9.56, 9.75, 10.125, 10.5, 11.25, 11,625, 11.812, 12]
Mode	Sequence
Start Time	0
End Time	12
No. Frames	20

this will produce a picture like below



Improvements

1. This visualization is limited to the representation of object in the dataset.
2. It could be better visualized with the data about the organs or viens of the fish.

Aim

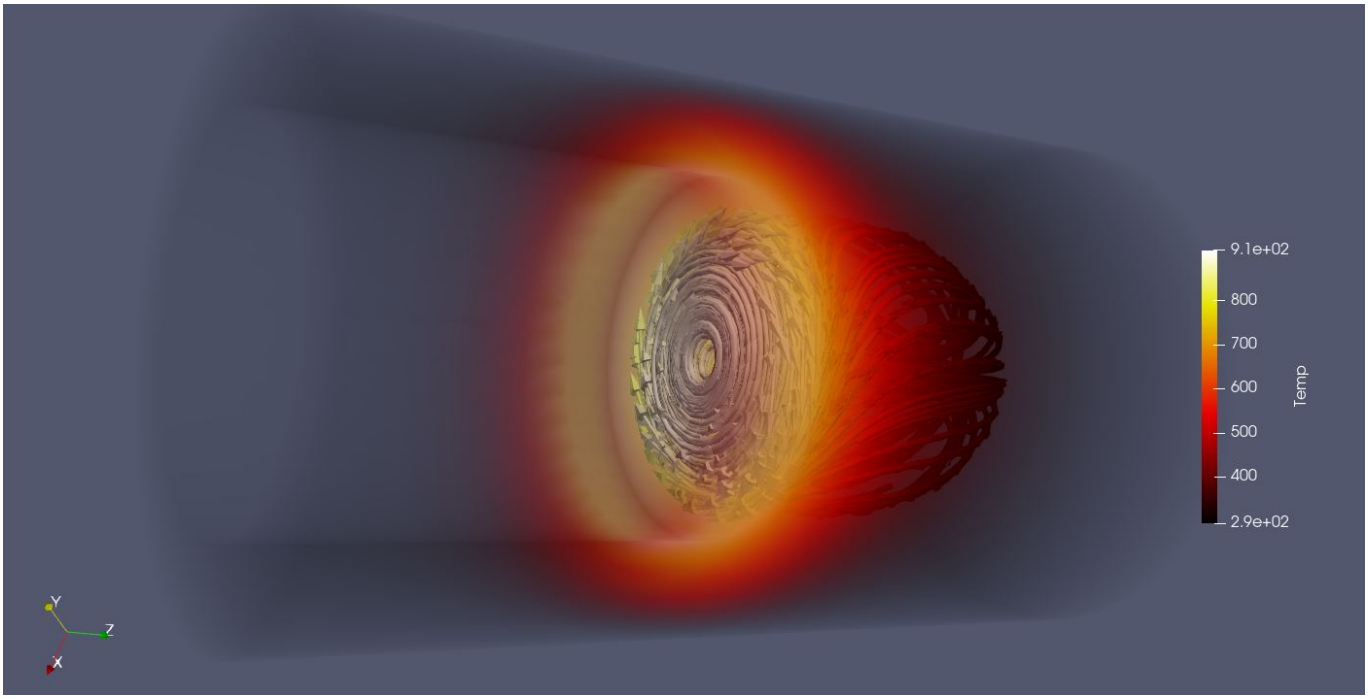
The aim of this visualization is to explore the given data using techniques of volumne visualization to find interesting and meaningful visualization.

Visual Design Type

Volume Visualization showing the object within the preloaded example dataset `disk_out_ref.ex2`.

Visualization

1. Volume render of an Tube in which possibly a liquid is flowing, showing the `relationship between the velocity and temperature` as the liquid moves through the tube.
2. It is quite evident from the image as the liquid flows through the tube, it's temperture increases rapidly.



Visual Mappings

Legends

Mapping	Range
High temp	
Medium Temp	
Low Temp	

Color Map

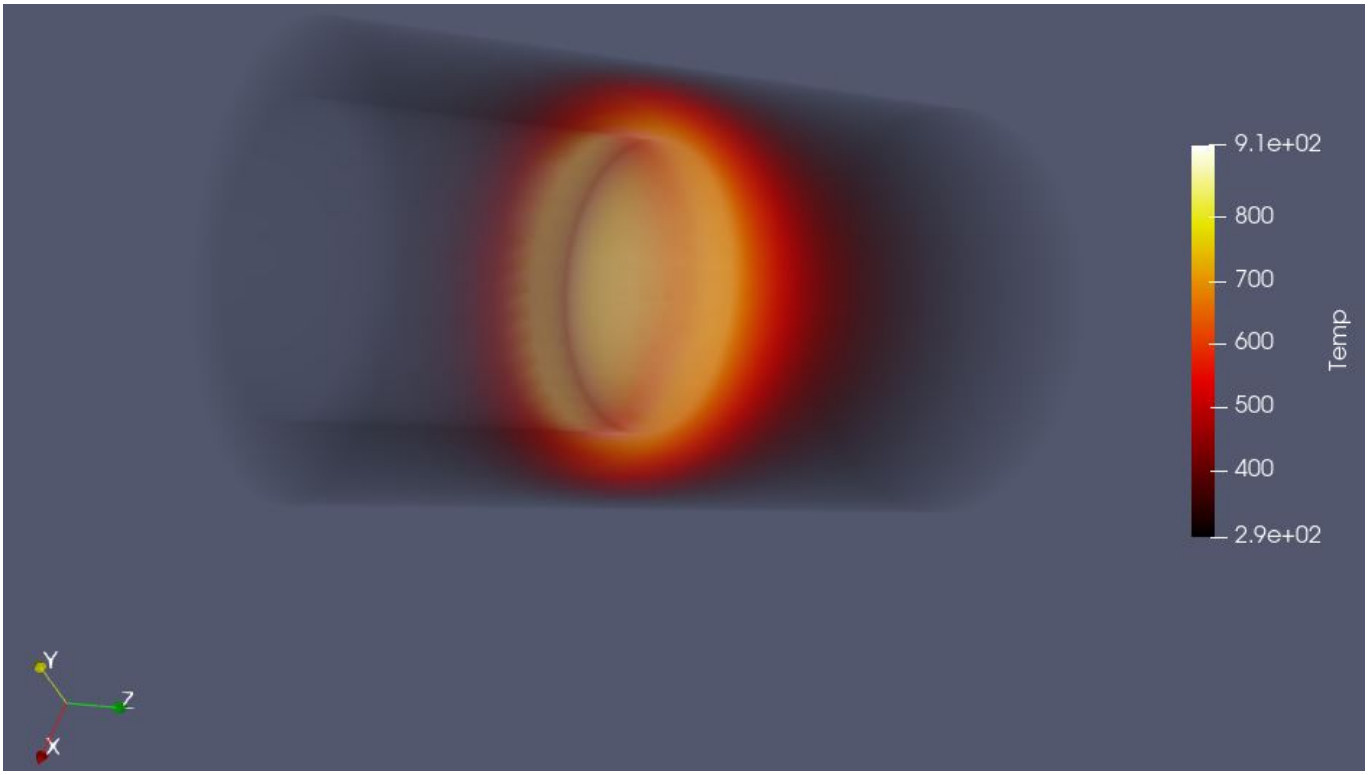
This Visualization uses a `Black body raidtion` color pallete from the default set of presets.

Data Preparation

We need to explore the dataset and find the hidden pattern in it. We take the below steps to achieve this.

1. Load the dataset `disk_out_ref.ex2` with respresentation as `volume`. Select all variables from the properties list.
2. select `Temp` as color from the `Coloring` section in properties.

produced the below image



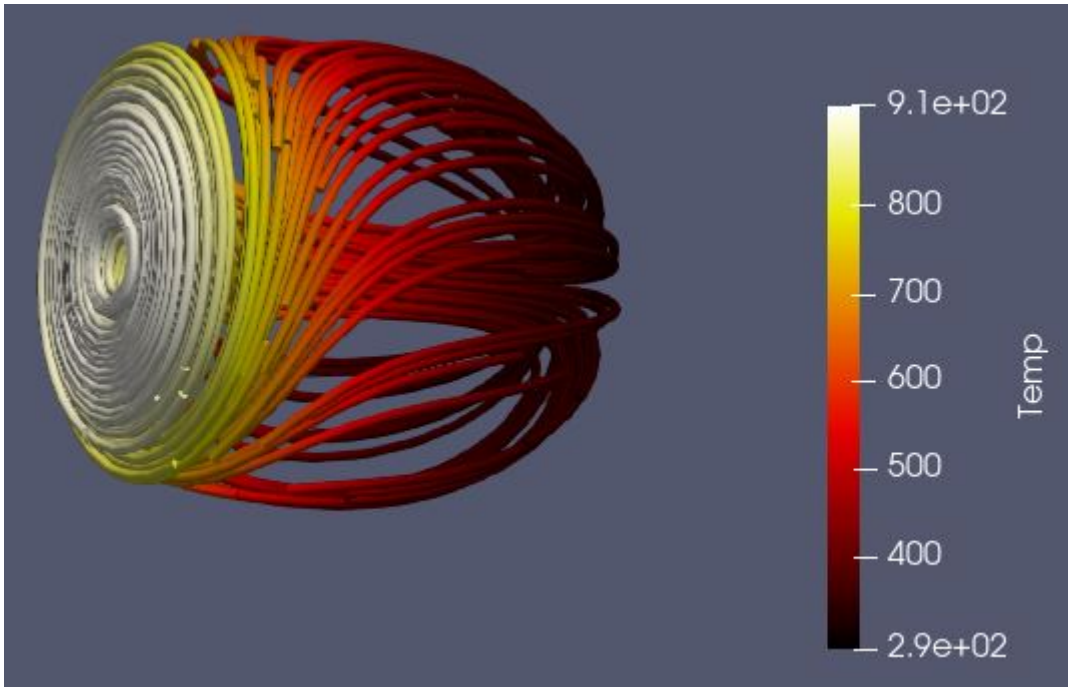
3. Liquid is flowwing in the center of the tube, we need to map the temperature of the liquid while it flows through the channel.
    - We trace the flow of liquid with `Stream Tracer filter`, which will give us the flow lines of the liquid. Settings for velocity tracer are below

Property	Value
Vectors	V
Seed Type	Point Cloud
Coloring	Temp
Representation	Surface

Property	Value
Show sphere	N

4. The lines with stream tracer filter are vey thin and hard to work with, hence we convert them in to tubes by using a `Tube filter`.

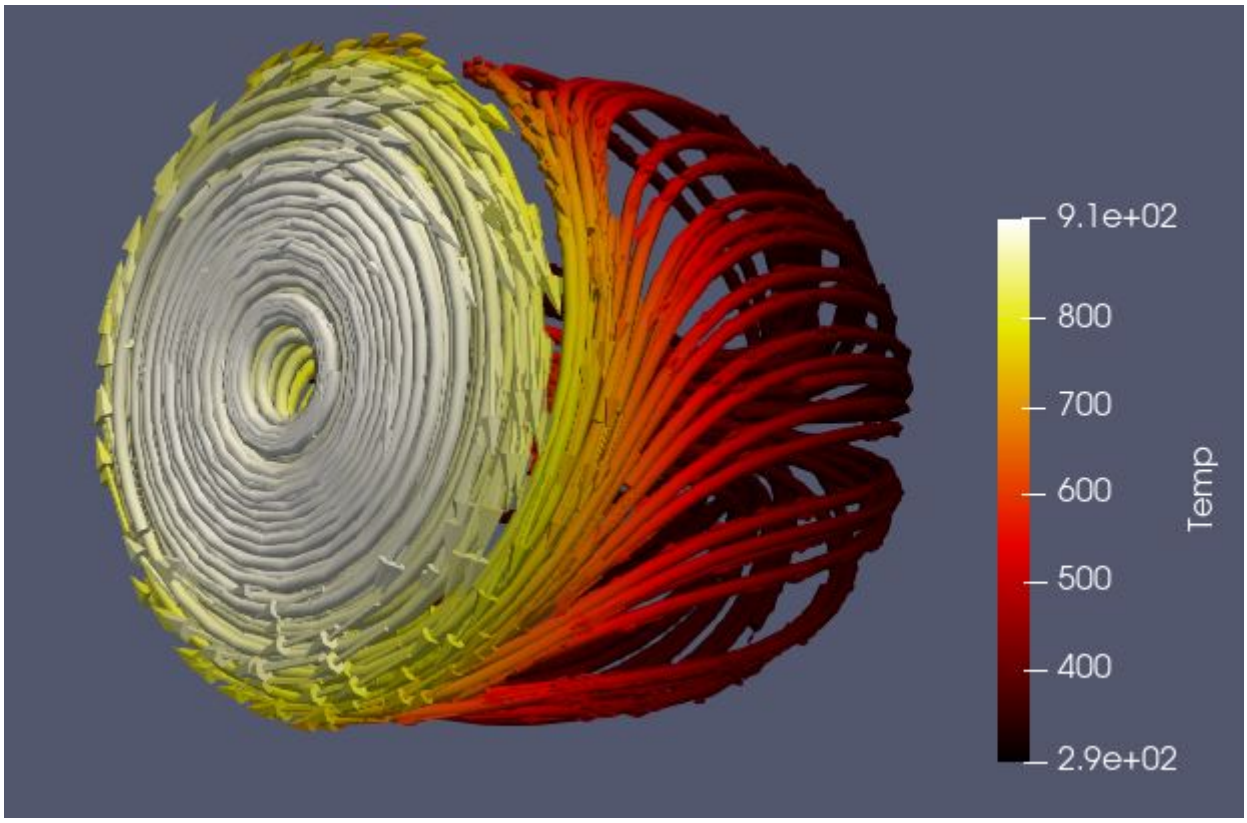
   which gives us an image like



5. Once we have the lines we need to convert them to vectors to determine the flow of liquid. So we use the `Glyph filter` to add the vectors. This gives us the vectors tanget to the flow of liquid, depciting direction of flow of liquid. Settings for the Glyph filter are listed below

Property	Value
Orientation Array	V
Scale Array	V
Scale factor	0.0919

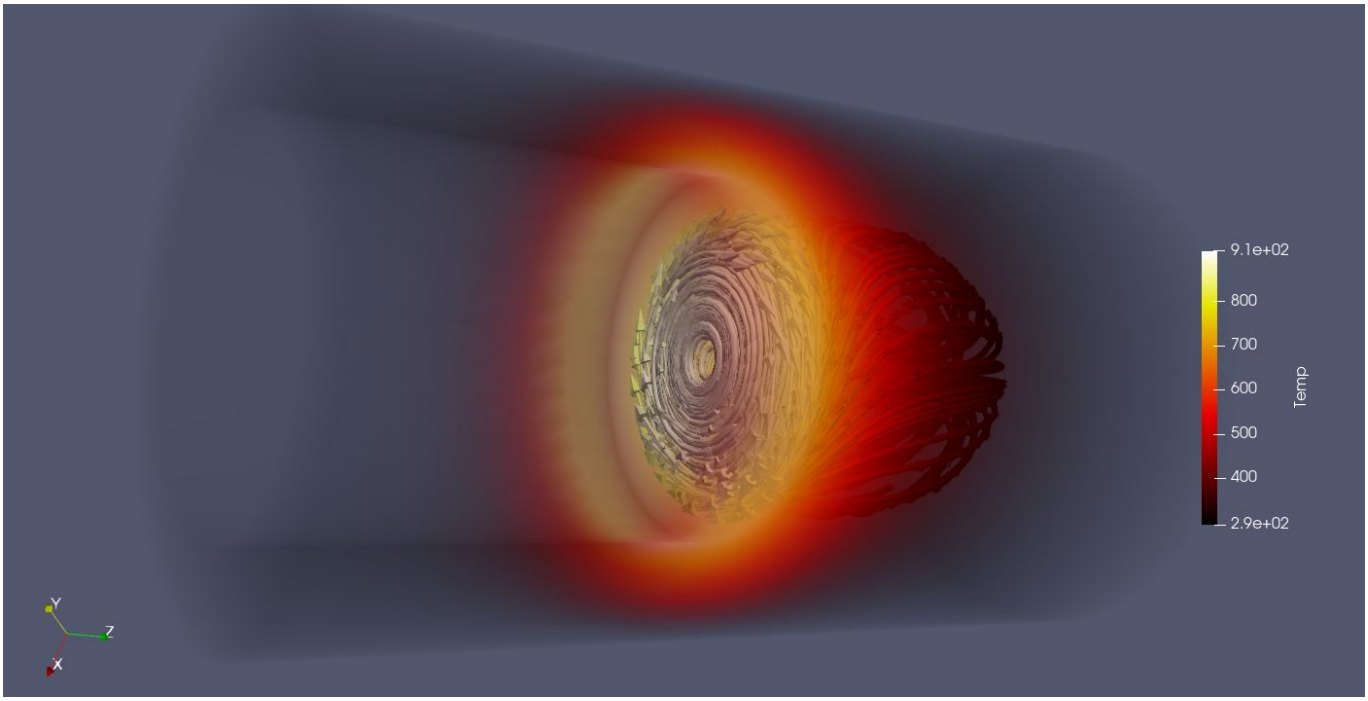
   producing an image such as below



6. Finally we enable the view for

    - data load from file which present the volume render for the tube
    - Tube filter which gives us the lines
    - Glyph filter which tells us the direction of flow of liquid.

which gives us the complete image giving the relationship between the velocity and temperature. and produced the below image



Improvements

1. This could have been better visualized with a flow animation.
2. The flow is interupted at the junction where it meets the tube, and it then flows back, this can be explored more to understand how it disrupts the incoming flow.