

## Visualization One: velocity flow

### What can we learn from the visualization?

In this visualization from data set `disk_out_ref.ex2` provided by paraview application gives us an idea of how velocity flow varies from point to point with respect to surface temperature of the tube.

### Description:

This Visualization gives an idea of how the velocity flows in a tube using stream Tracer filter with respect to velocity and comparing with temperature of the surface of the tube.

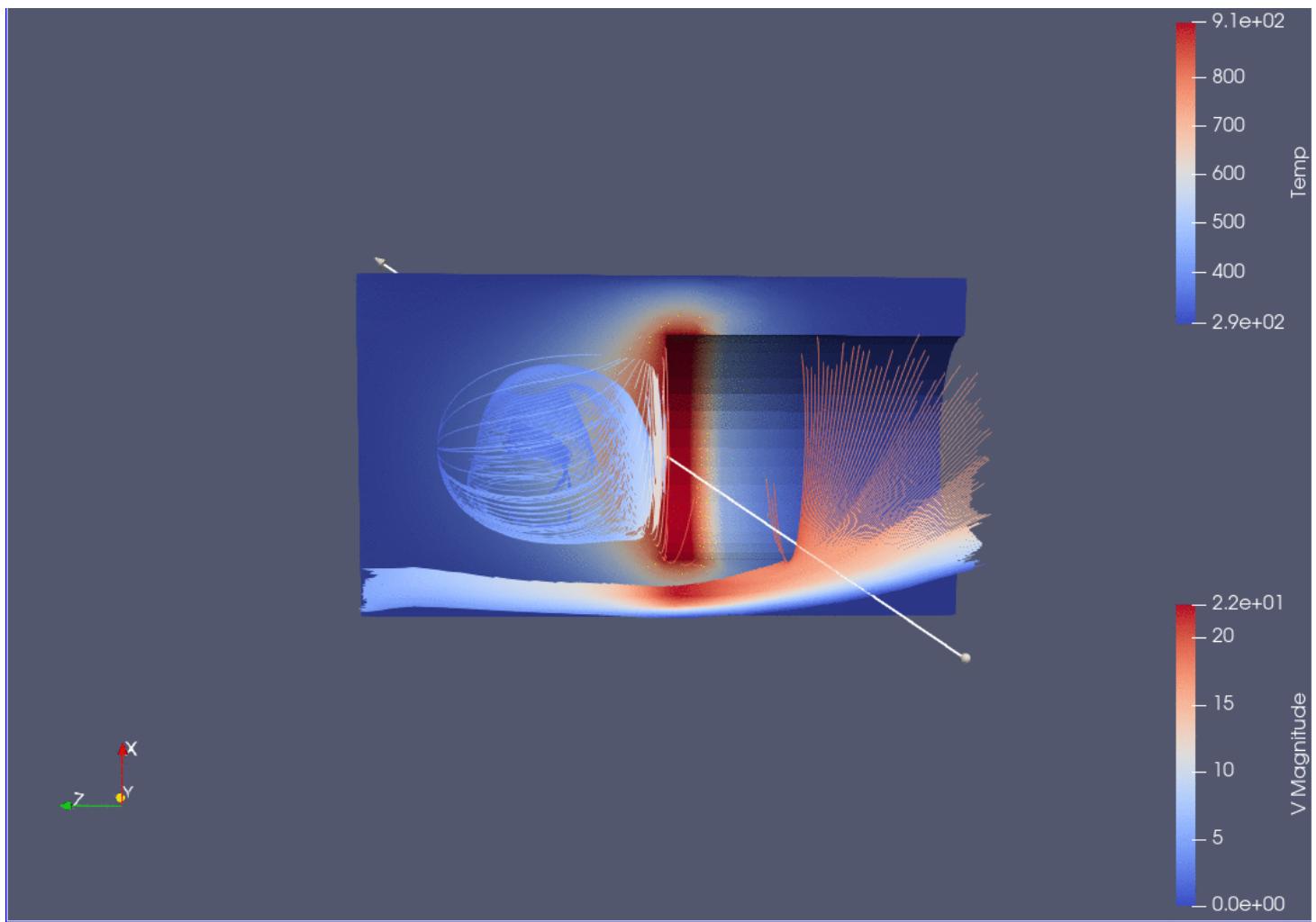
From figure(2), we get overall idea of flow of velocity in tube in respective to surface temperature.

From figure(3) and figure(4), we can understand effect of velocity flow based on surface temperature. generally, this gives an insight of how velocity changes from point to point in the tube and how temperature is effecting the velocity inside the tube.

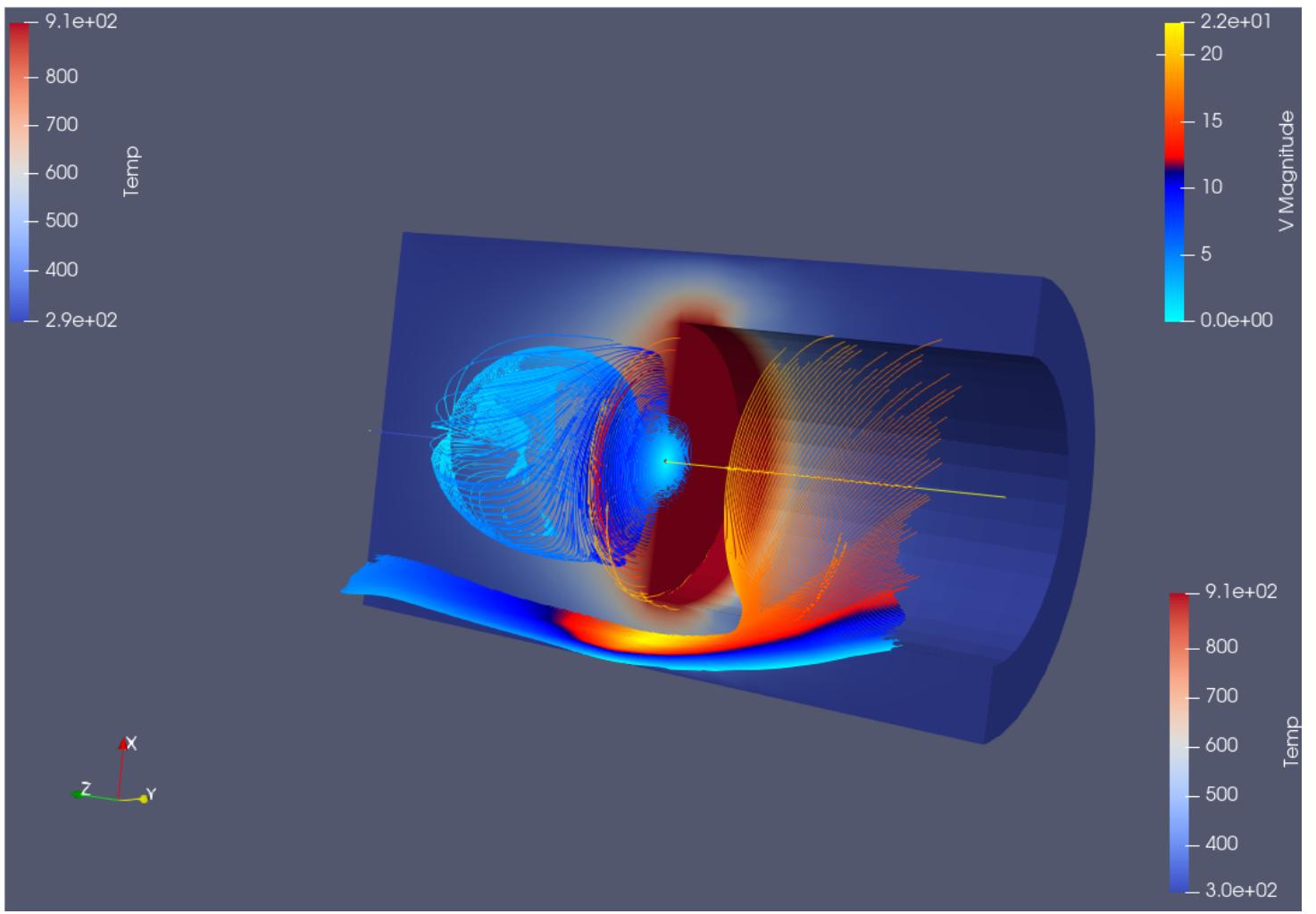
### What is the name for the type of visualization(s) used?

Volume visualization and flow visualization.

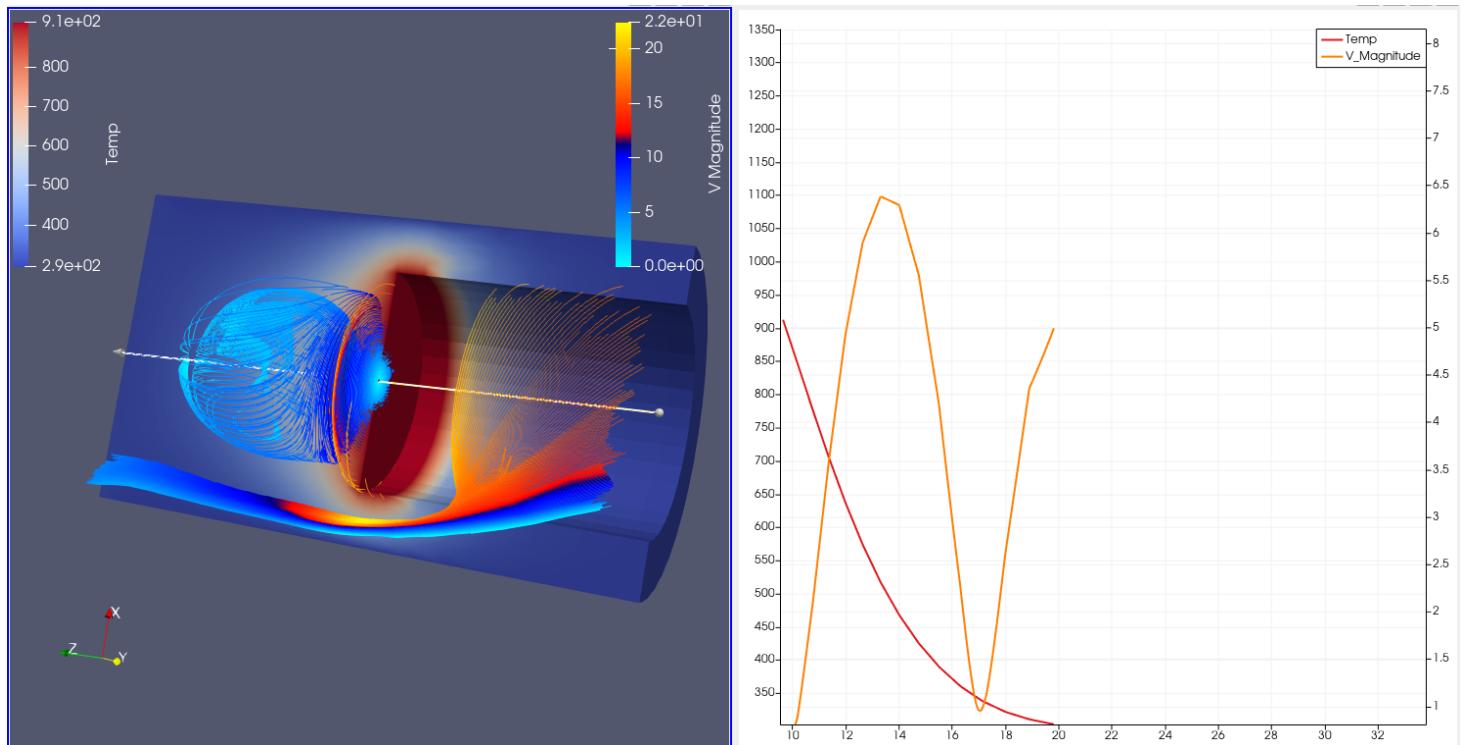
### Visual Outputs :



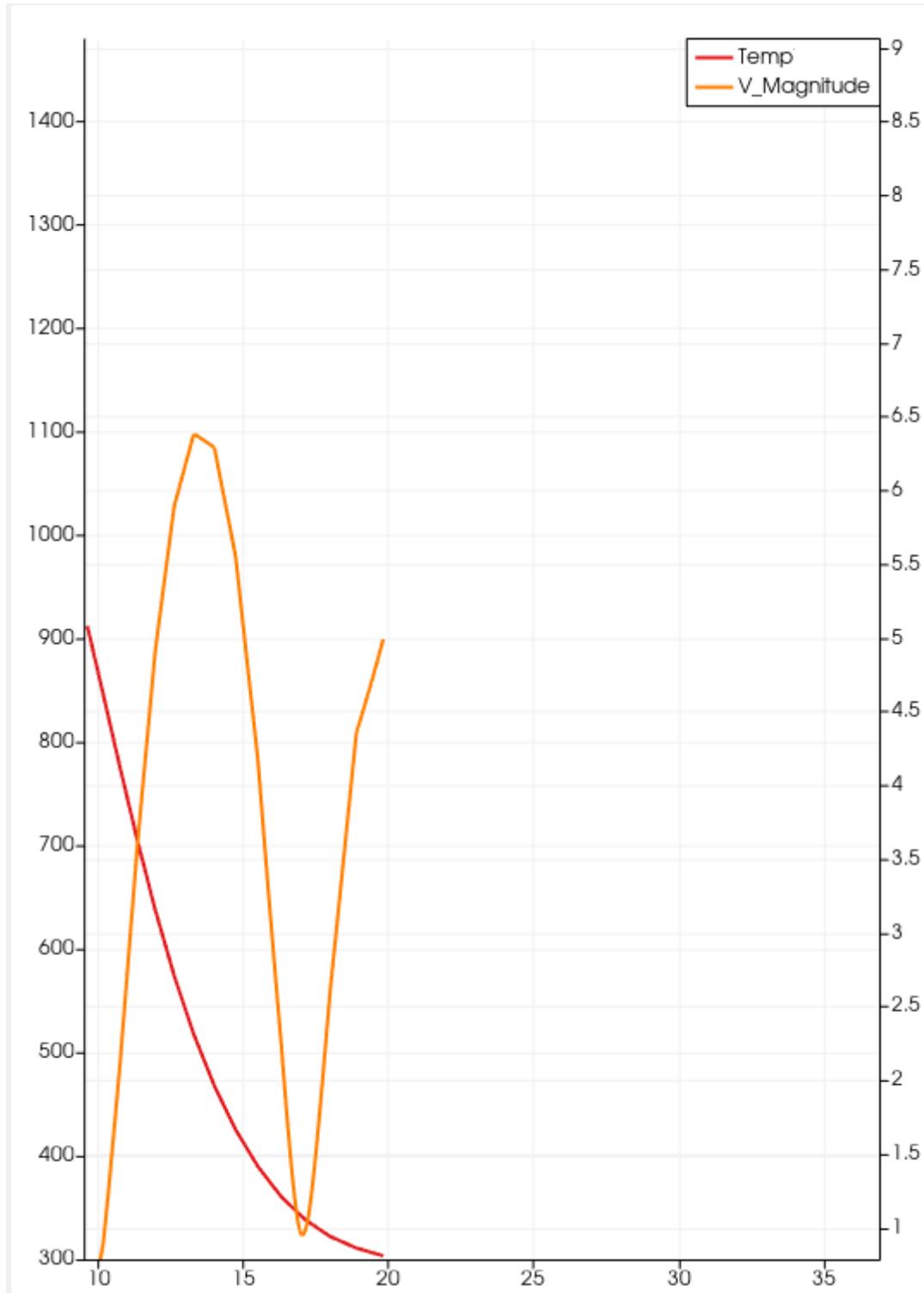
**Fig 1:**Different view points of visualization.



**Fig 2: velocity flow in a tube with respect to the surface temperatures of the tube.**



**Fig 3: line graph of temperature and velocity plotting based on data points of visualization.**



**Fig 4: line graph of temperature and velocity.**

**What are all visual mappings used?**

- **Type of filters used:**

The following filters are used on the data set for proper insights

- Surface rendering
- clip filter
- Stream Tracer filter

- **Color Mapping Parameters :**

For interpolation of data with colors below color spaces are used,

- Surface rendering: 'diverging' color space
- Stream Tracer : 'RGB' color space with 'cold and hot' preset.

- **Line Graph color space:**

- Temperature line: Red( HTML code : #e3191c)
- Velocity line: Orange( HTML code: #ff8000)

*Different data ranges are used for this proper insight, they are as follows*

- **Tube surface temprature range :** 2.9e+02 to 9.1e+02

- **velocity stream line range :** 0.0e+00 to 2.2e+01

- **line graph:**

- temperature:
  - x axis: 0 to 35
  - y axis: 300 to 1300
- velocity magnitude :
  - x axis: 0 to 35
  - y axis: 0 to 9

- **Color transfer function values :**

1. velocity stream line inside tube

Value	R	G	B
0	0	1	1
10.0885	0	0	1
11.2094	0	0	0.501961
10.0885	1	0	0
10.0885	1	1	0

2. surface temperatures of the tube

Value	R	G	B
293.15	0.231373	0.298039	0.752941

Value	R	G	B
603.15	0.865003	0.865003	0.865003
913.15	0.705882	0.0156863	0.14902

- **opacity transfer function values :**

1. velocity stream line

Value	opacity
0	0
22.4188	1

2. Tube surface temperature

Value	opacity
293.15	0
913.15	1

### Was there any special data preparation done?

For this visualization only certain data such as temperature and velocity is considered from the provided data set. For surface rendering, temperature variable is used for the rendering of the data of a tube. Then a clip filter is used for clipping tube into half for better understanding of how velocity is flowing inside of the tube. For velocity flow, Stream Tracer filter is used with velocity data variable.

### What are the limitations of your design?

In this visualization, it gives a complete picture of how velocity changes at different points with respect to surface temperature but it hard for user to understand how temperature is effecting velocity at different temperature values. For instance, this visualization can not give a proper insight of velocity flow at low surface temperatures or high surface temperatures.

# Visualization Two : Teddy Bear

## What can we learn from the visualization?

This Visualization gives overview of provided data set as a teddy bear.

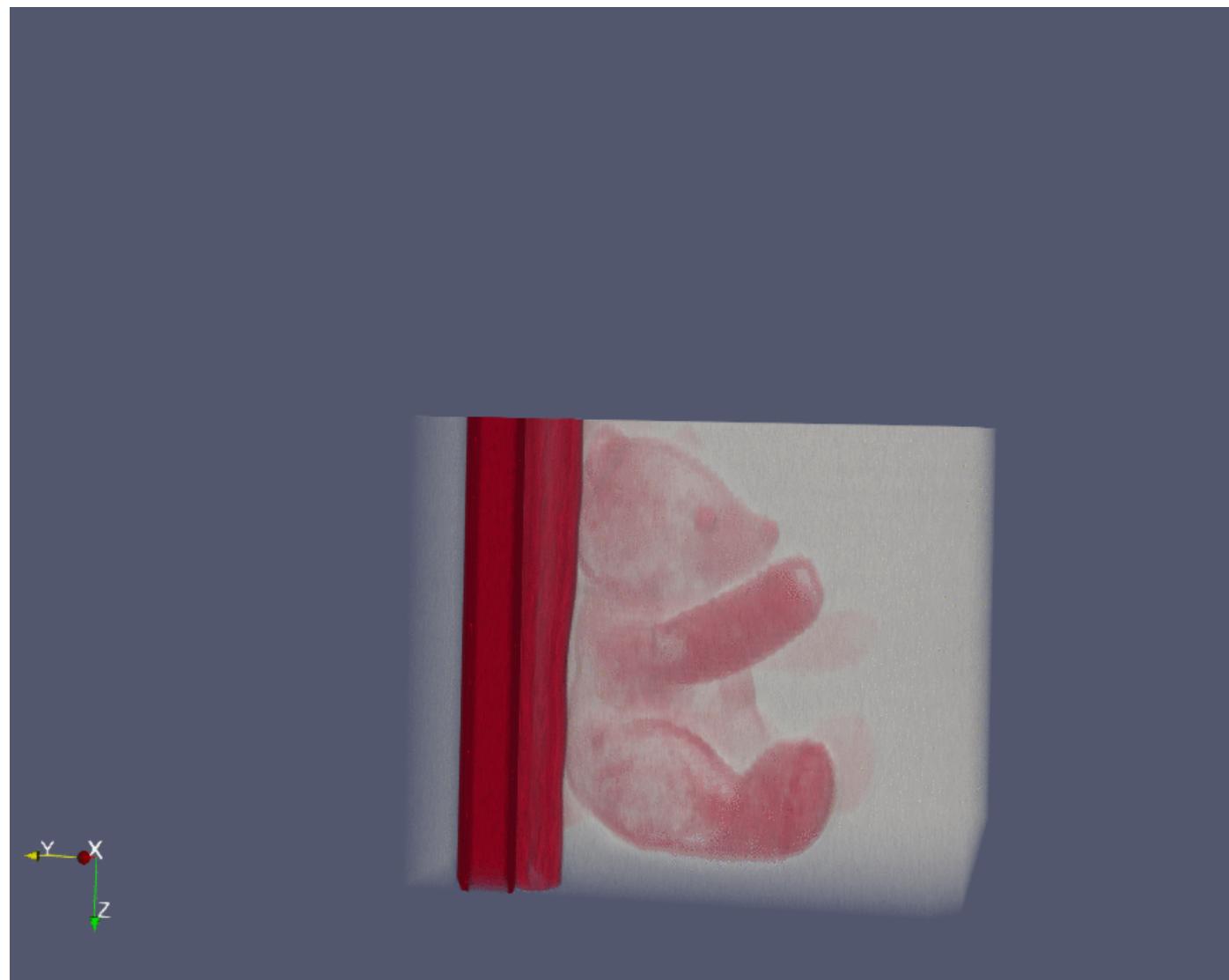
## Description:

From this visualization we can understand that, the provided data set gives us insight of a teddy bear. from figure(2) we can understand that given data set is related to a teddy bear.

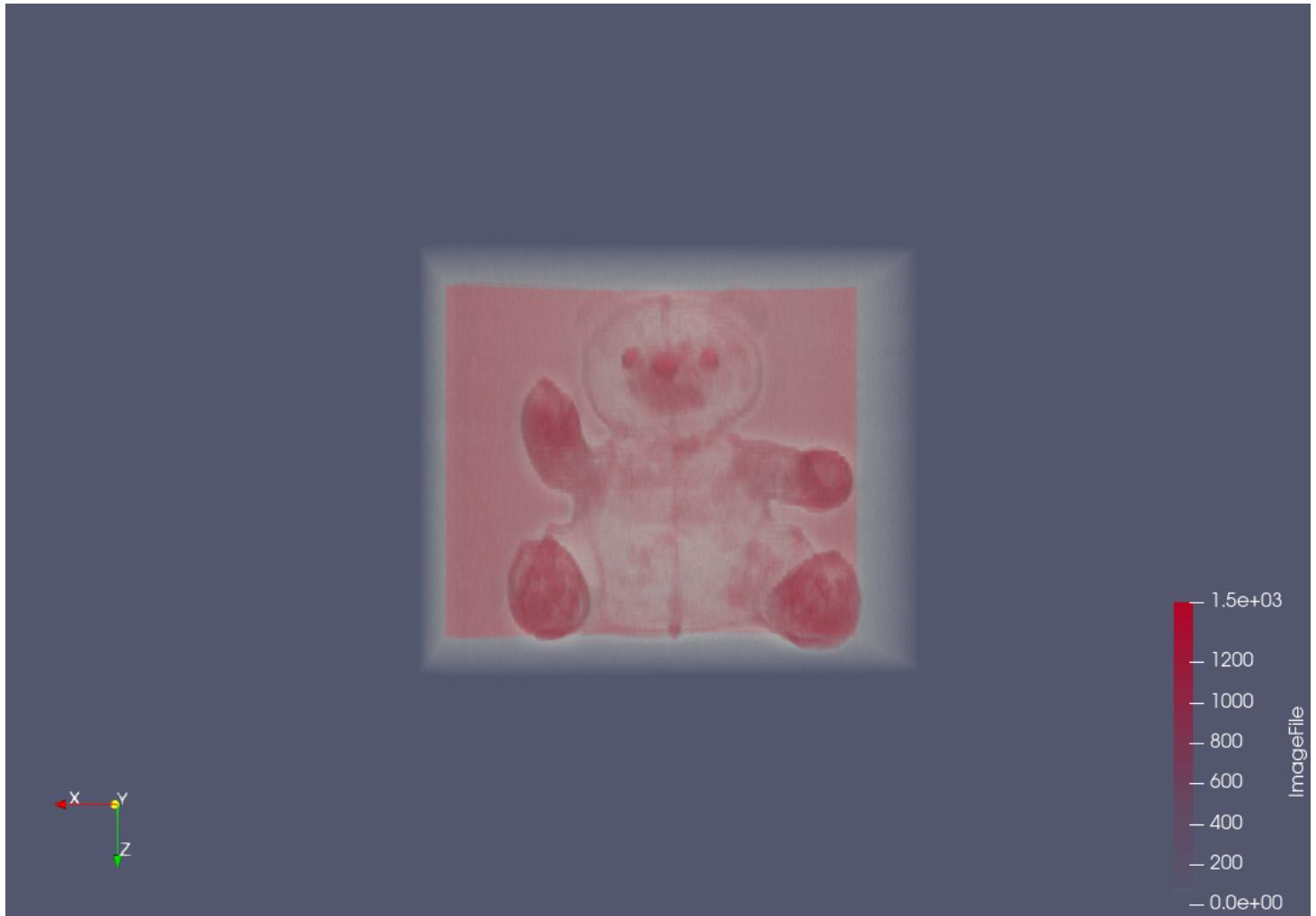
## What is the name for the type of visualization(s) used?

volume visualization

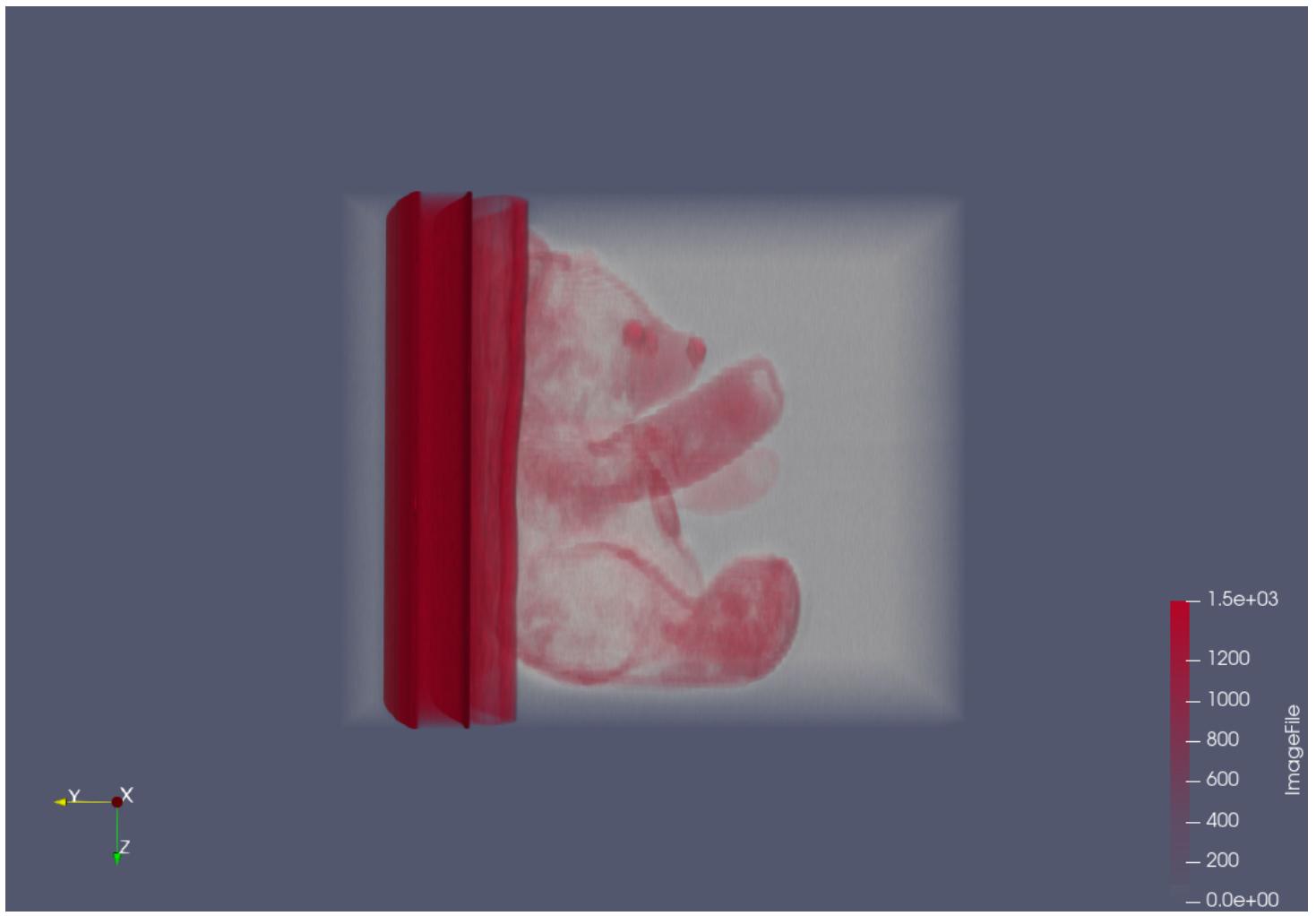
## Visual Outputs :



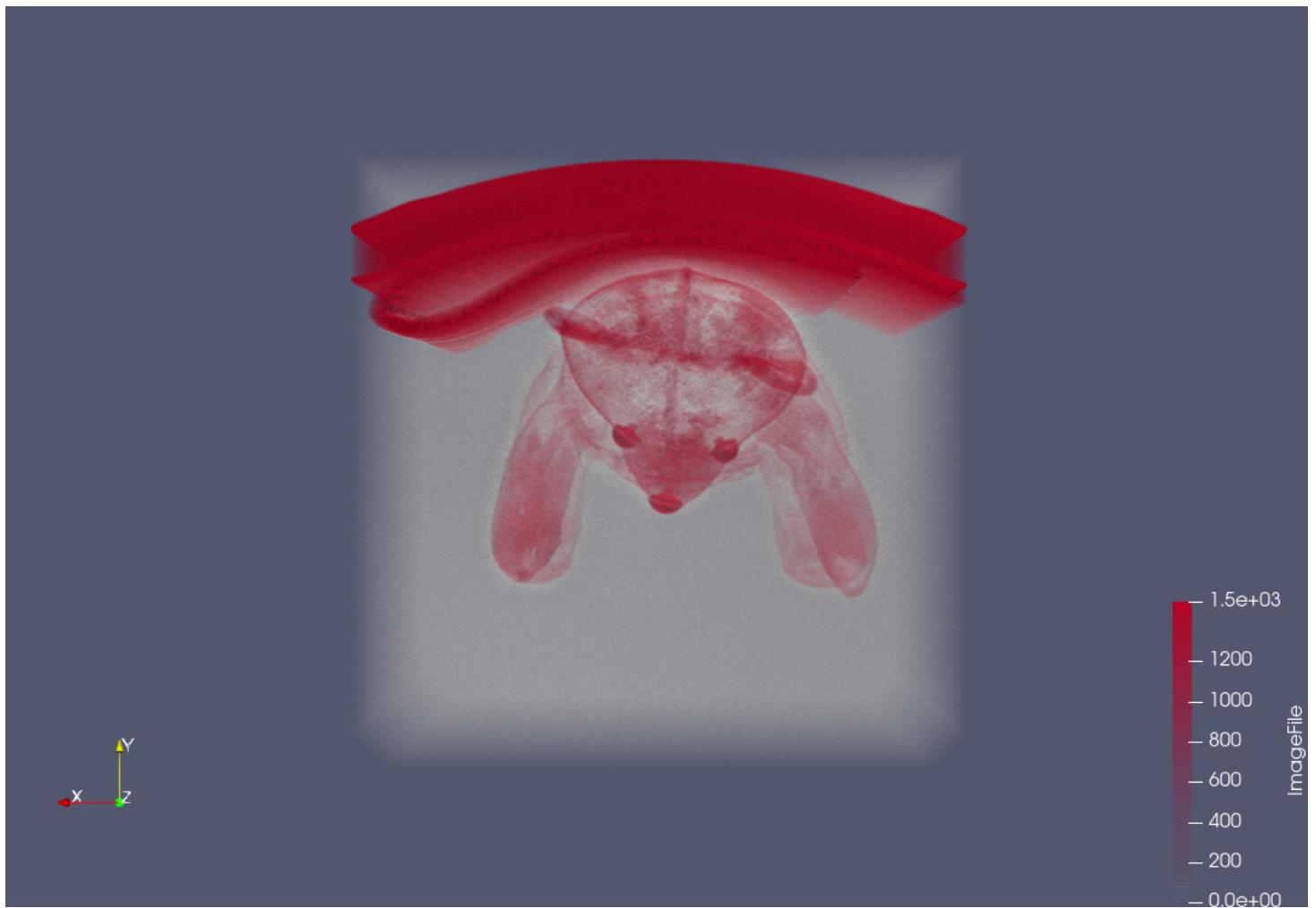
**Fig 1:Different view points of visualization.**



**Fig 2: Front view of Toy.**



**Fig 3: Side View of Toy .**



**Fig 4: Top view of toy.**

#### **What are all visual mappings used?**

- **Type of filters used:**

The following filters are used on the data set for proper insights

- volume rendering

- **Volume rendering Properties:**

- Mode: Smart
- blend Mode : Composite
- shade: enabled

- **Color Mapping Parameters :**

For interpolation of data with colors below color spaces are used,

- volume rendering: 'Step' color space

*Different data ranges are used for this proper insight, they are as follows*

- **image range :** 0.0e+00 to 1.5e+03

- **Color transfer function values :**

<b>Value</b>	<b>R</b>	<b>G</b>	<b>B</b>
0	0.231373	0.298039	0.752941
82.6189	0.865003	0.865003	0.865003
82.6189	0.866667	0.866667	0.866667
1492	0.705882	0.0156863	0.14902

- **opacity transfer function values :**

<b>Value</b>	<b>opacity</b>
0	0
442.254	0.153061
855.349	0.459184
1492	1

### **Was there any special data preparation done?**

For this visualization, The properties of data spacing of z-axis has been changed from 1 to 7 for better understanding of data set.

### **What are the limitations of your design?**

From this visualization, we can only get a basic idea of the data set as a teddy bear but we can't determine other properties like material of toy, original size, soft toy or hard toy and it may or may not have a zip or not, etc.

# **Visualization Three : Over view of materials**

## **What can we learn from the visualization?**

This visualization gives over view of materials of the teddy bear to us and this visualization gives outline that given data set is a stuffed animal toy teddy bear.

## **Description:**

From this visualiztion user can understands that, in teddy bear different materials have been used.

From Figure(3), we can uderstand that there are two different materials used, one is soft material that is represented as blue and another is hard material that is represented as orange in color in visualization.

From Figure(4), we can comprehend hard material and perceive hard and soft material of teddy bear.

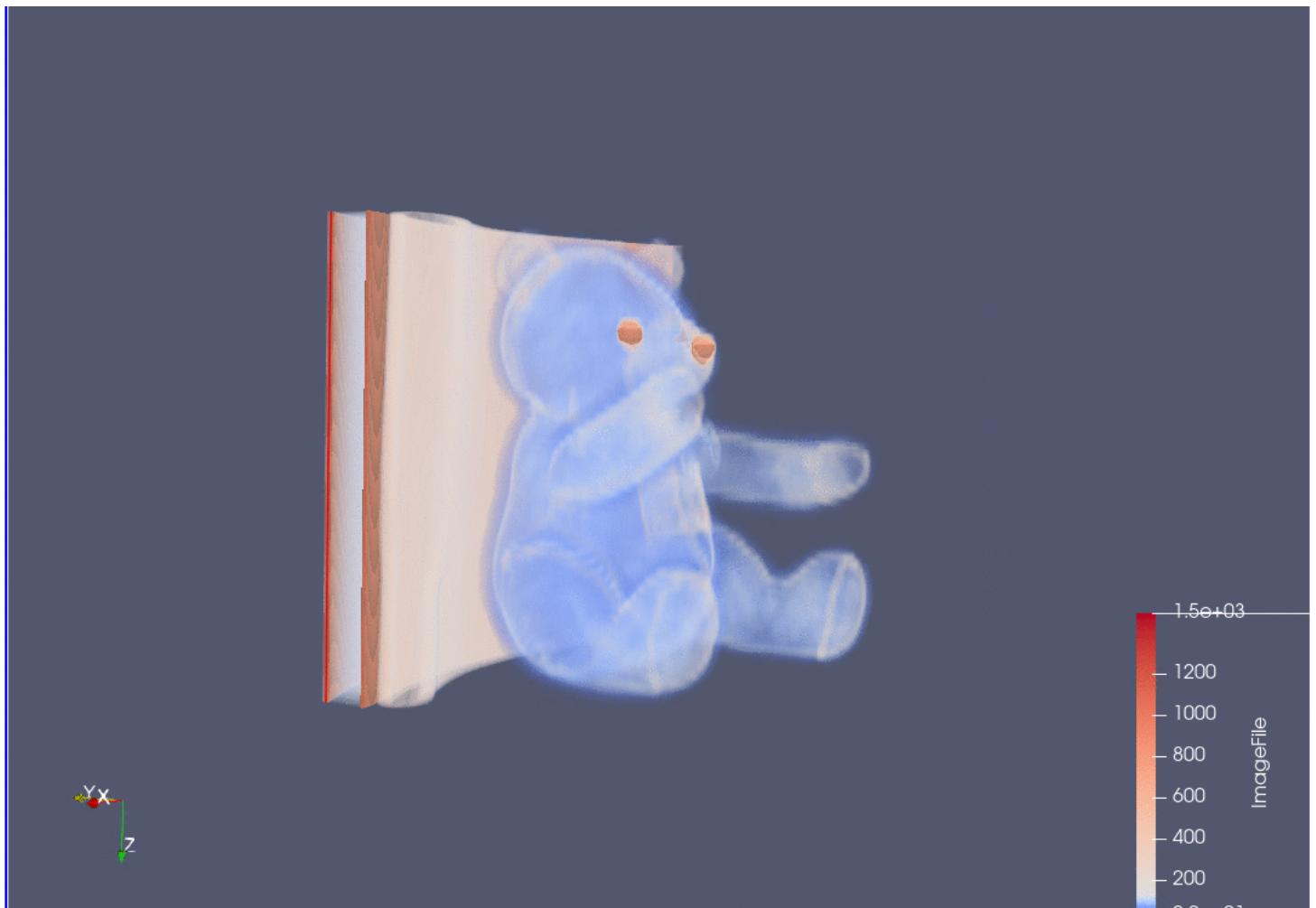
Figure(5) gives conspectus of hard material.

To summarize, this visualization gives an idea about the materials of the teddy and most of the teddy has soft material and it has limited amount of hard material.

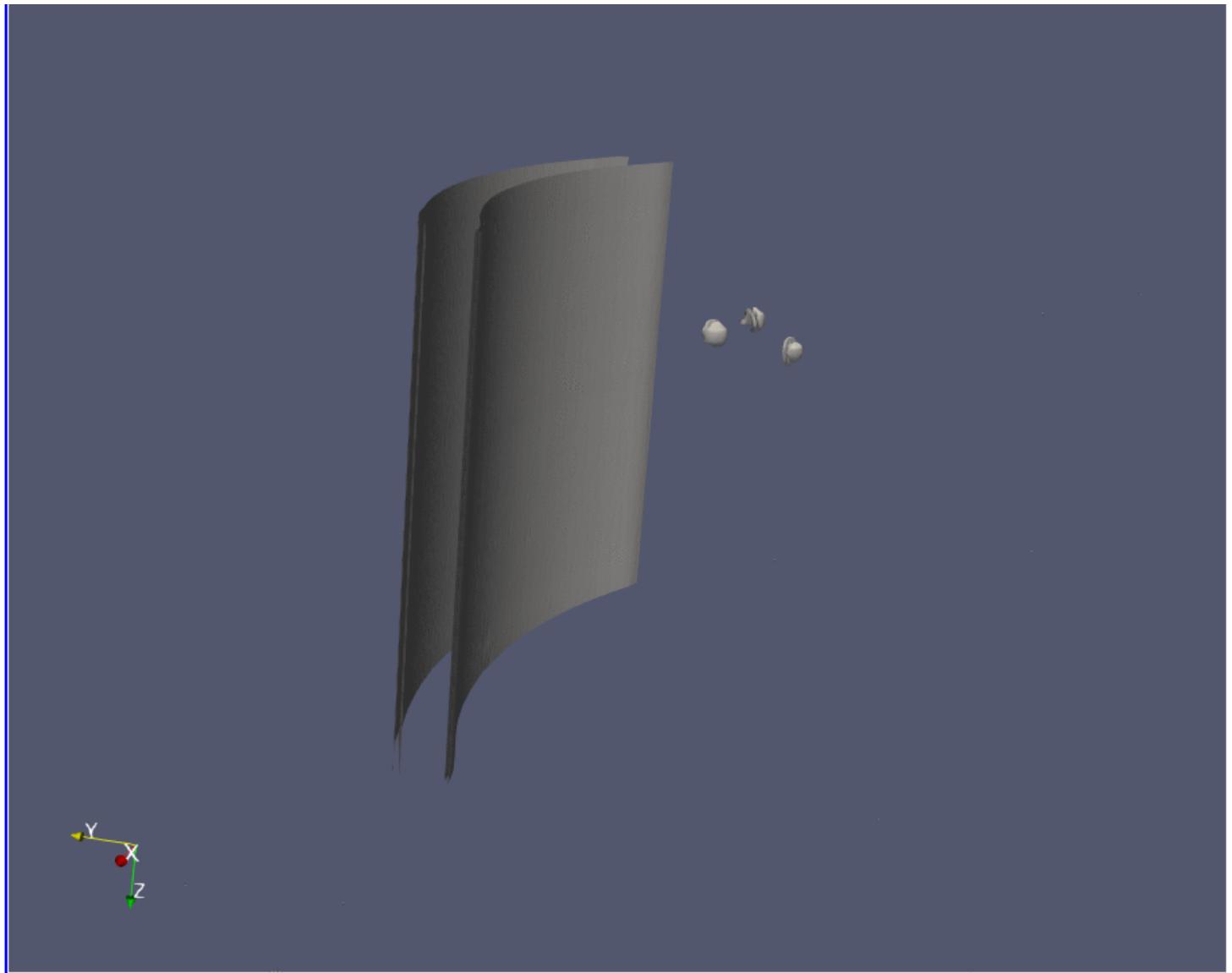
## **What is the name for the type of visualization(s) used?**

volume visualization

## **Visual Outputs :**



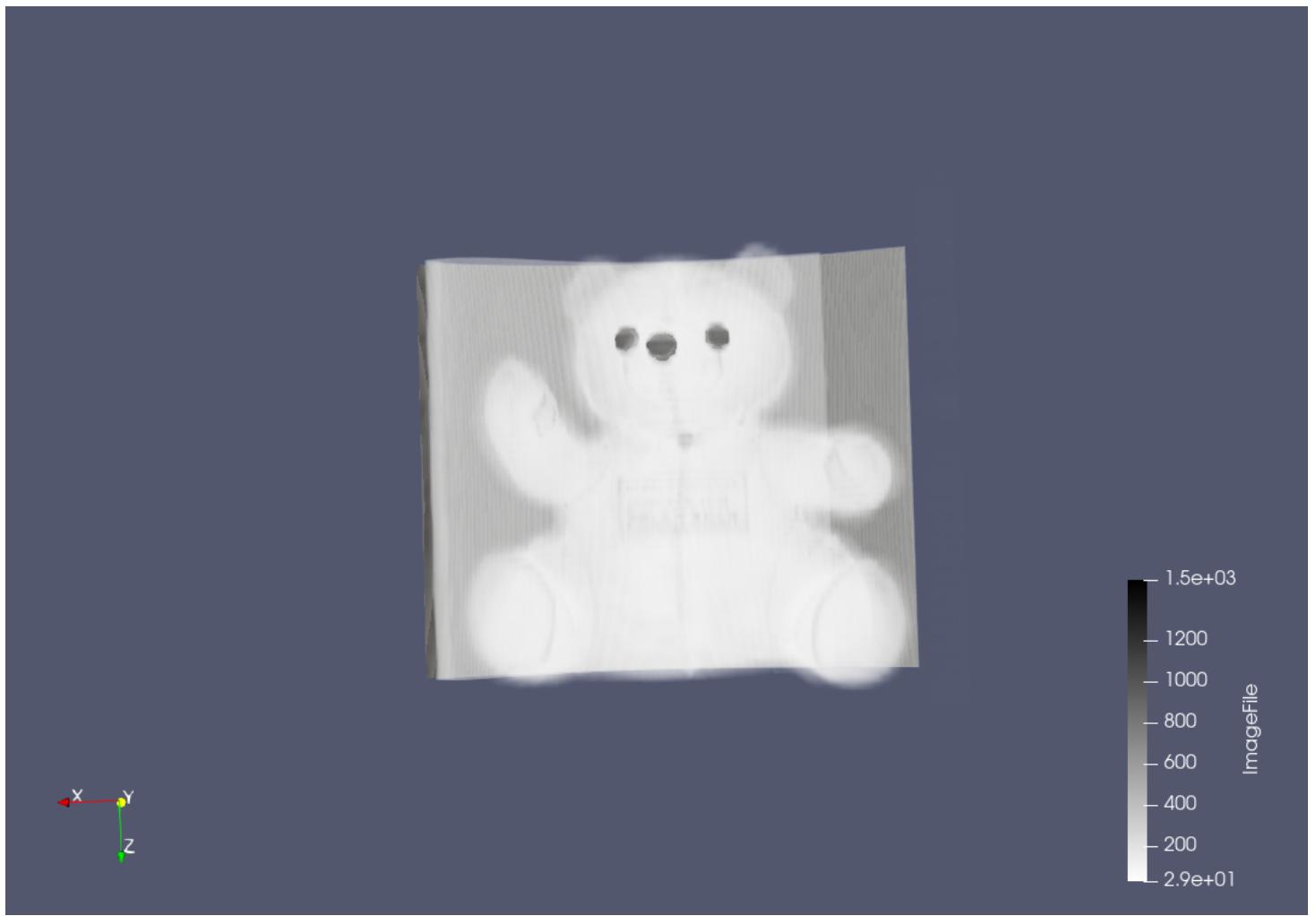
**Fig 1:**Different view points of visualization.



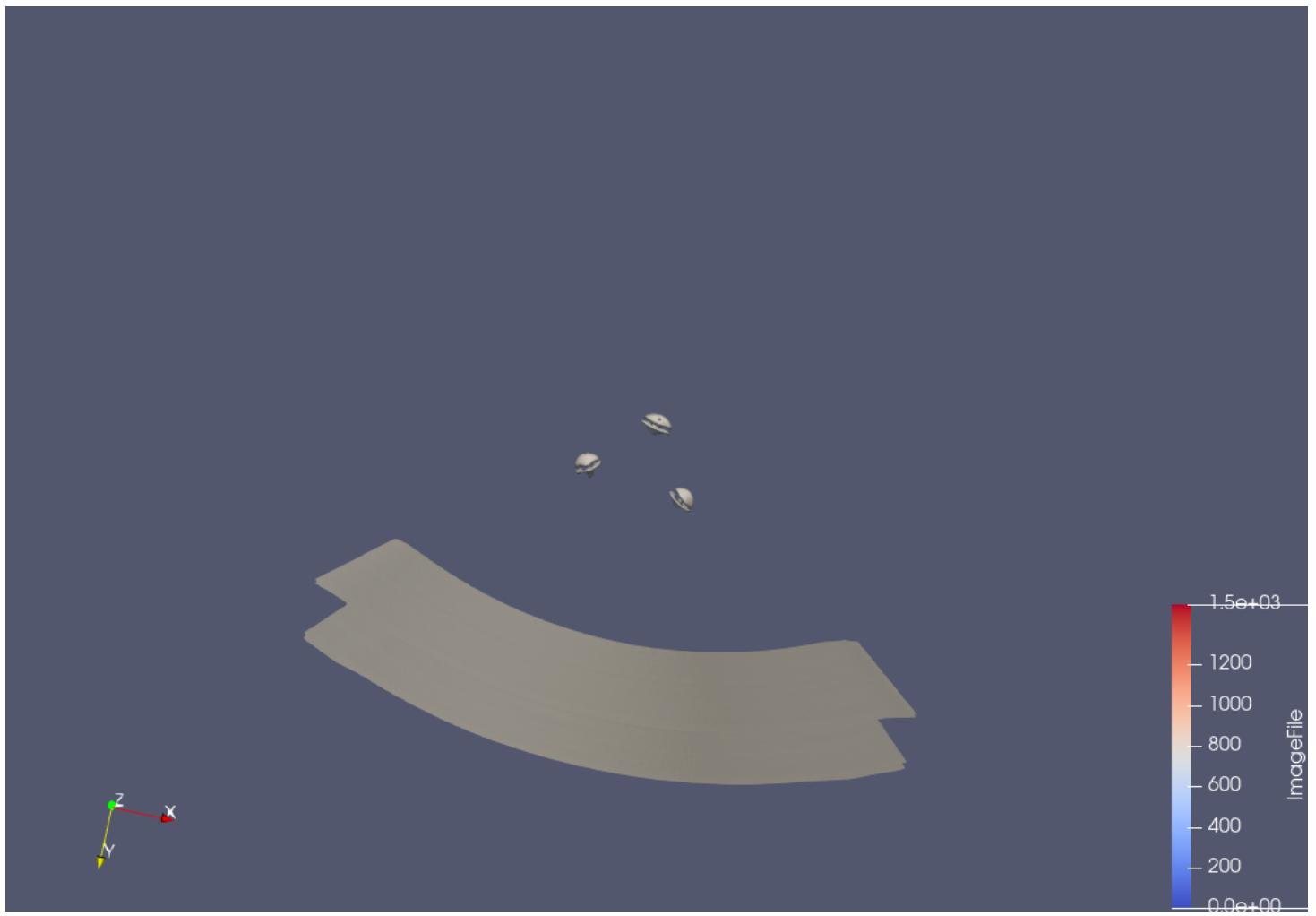
**Fig 2:** view of Hard material of teddy bear.



**Fig 3: front view of toy .**



**Fig 4: X-Ray View of Toy .**



**Fig 5: Top view of hard material of toy.**

**What are all visual mappings used?**

- **Type of filters used:**

The following filters are used on the data set for proper insights

- volume rendering
- contour filter

- **Volume rendering Properties:**

- Mode: Smart
- blend Mode : Composite
- shade: disabled

- **Contour properties:**

- Isosurface parameters:
  - Isosurface range : 0 to 1492
  - Isosurface value : 746
- compute Normals: enabled
- compute Gradients: enabled
- generate Triangles: enabled

- **Color Mapping Parameters :**

For interpolation of data with colors below color spaces are used,

- volume rendering: 'Diverging' color space
- volume rendering: 'RGB'color space with X-ray preset

*Different data ranges are used for this proper insight, they are as follows*

- **image range :**

- diverging image range: 0.0e+00 to 1.5e+03
- X-ray image range: 0.0e+00 to 1.5e+03

- **Color transfer function values :**

- diverging color space:

Value	R	G	B
0	0.231373	0.298039	0.752941
97.1987	0.865003	0.865003	0.865003
1492	0.705882	0.0156863	0.14902

- x-ray color space:

Value	R	G	B
39.8424	1	1	1
1492	0	0	0

- **opacity transfer function values :**

- diverging color space:

Value	opacity
0	0
388.795	0.367347
806.749	0.530612
1492	1

- x-ray color space:

Value	opacity

<b>Value</b>	<b>opacity</b>
0	0
388.795	0.367347
806.749	0.530612
1492	1

### **Was there any special data preparation done?**

For this visualization, The properties of data spacing of z-axis has been chagned from 1 to 7 for better understanding of data set.

### **What are the limitations of your design?**

This visualization gives an overall idea of materials of the teddy but it cant determine what soft or hard material is used. For instance, we can not predict what kind of hard material is used, hard material can be plastic or a metal or other carbon fiber which is hard to predict from this visualization.

# Visualization Four: Fish and its skeleton structure

## What can we learn from the visualization?

The visualization gives overview of the provided data set as a fish and its skeleton structure.

## Description:

From this visualization we can understand that, the provided data set gives us insight of a fish. For further study contour filter is used for insight of its skeleton structure. From figure(2) we can understand that given data set is fish and from figure(3) we can understand the skeleton structure of the fish.

Overall, this visualization gives us an idea, that given data set related to a fish and furthermore gives structure of its skeleton.

## What is the name for the type of visualization(s) used?

volume visualization

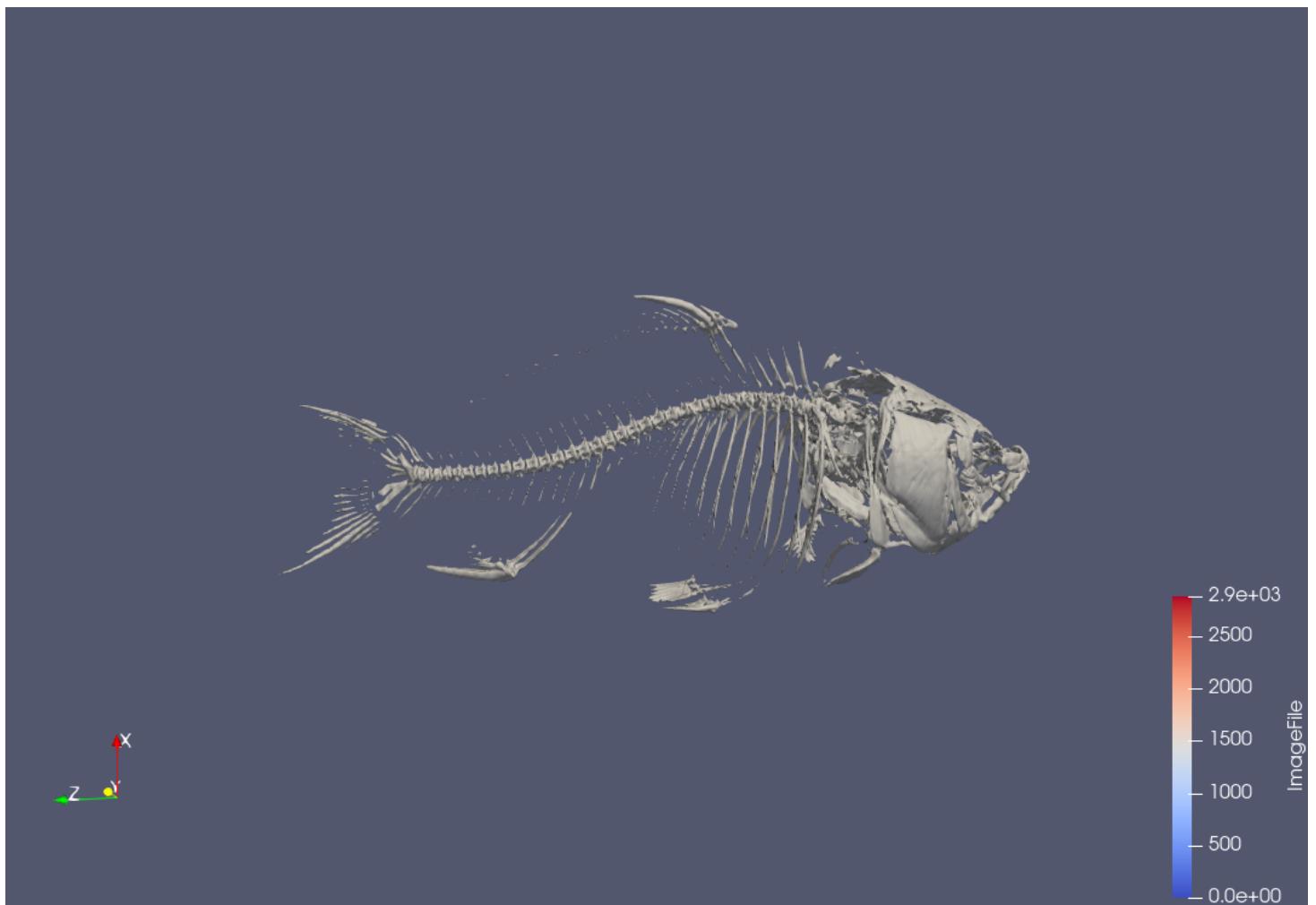
## Visual Outputs :



Fig 1: Different view points of visualization.



**Fig 2: Front view of Fish.**



### **Fig 3: Front view of fish skeleton structure.**

#### **What are all visual mappings used?**

- Type of filters used:**

The following filters are used on the data set for proper insights

- volume rendering
- contour filter

- Volume rendering Properties:**

- Mode: Smart
- blend Mode : Composite
- shade: disabled

- Contour properties:**

- Isosurface parameters:
  - Isosurface range : 0 to 2871
  - Isosurface value : 1435.5
- compute Normals: enabled
- compute Gradients: disabled
- generate Triangles: enabled

- Color Mapping Parameters :**

For interpolation of data with colors below color spaces are used,

- volume rendering: 'Diverging' color space

*Different data ranges are used for this proper insight, they are as follows*

- image range :**

- diverging image range: 0.0e+00 to 2.9e+03

- Color transfer function values :**

Value	R	G	B
0	0.231373	0.298039	0.752941
97.1987	0.865003	0.865003	0.865003
2871	0.705882	0.0156863	0.14902

- opacity transfer function values :**

Value	opacity
0	0

Value	opacity
2871	1

### **Was there any special data preparation done?**

There is no data modification or preparation done for this visualization.

### **What are the limitations of your design?**

This visualization provides us with details of data set as fish and by future gives its skeleton structure but, it can not provide furthermore information about fish such as skin texture or placement of other organs of the fish and other related facts of fish.

# Visualization Five: placement of swim bladder of fish.

## What can we learn from the visualization?

This visualization provides prescience of location of swim bladder of the fish.

## Description:

From this visualization we can understand the position of one of the fish organ called swim bladder with respective to skeleton structure of fish.

From figure(2) we can understand that exact location of swim bladder along with respective to spine of fish in 3D view.

From figure(3) and figure(4) we can understand location of swim bladder from side view.

## What is the name for the type of visualization(s) used?

volume visualization

## Visual Outputs :

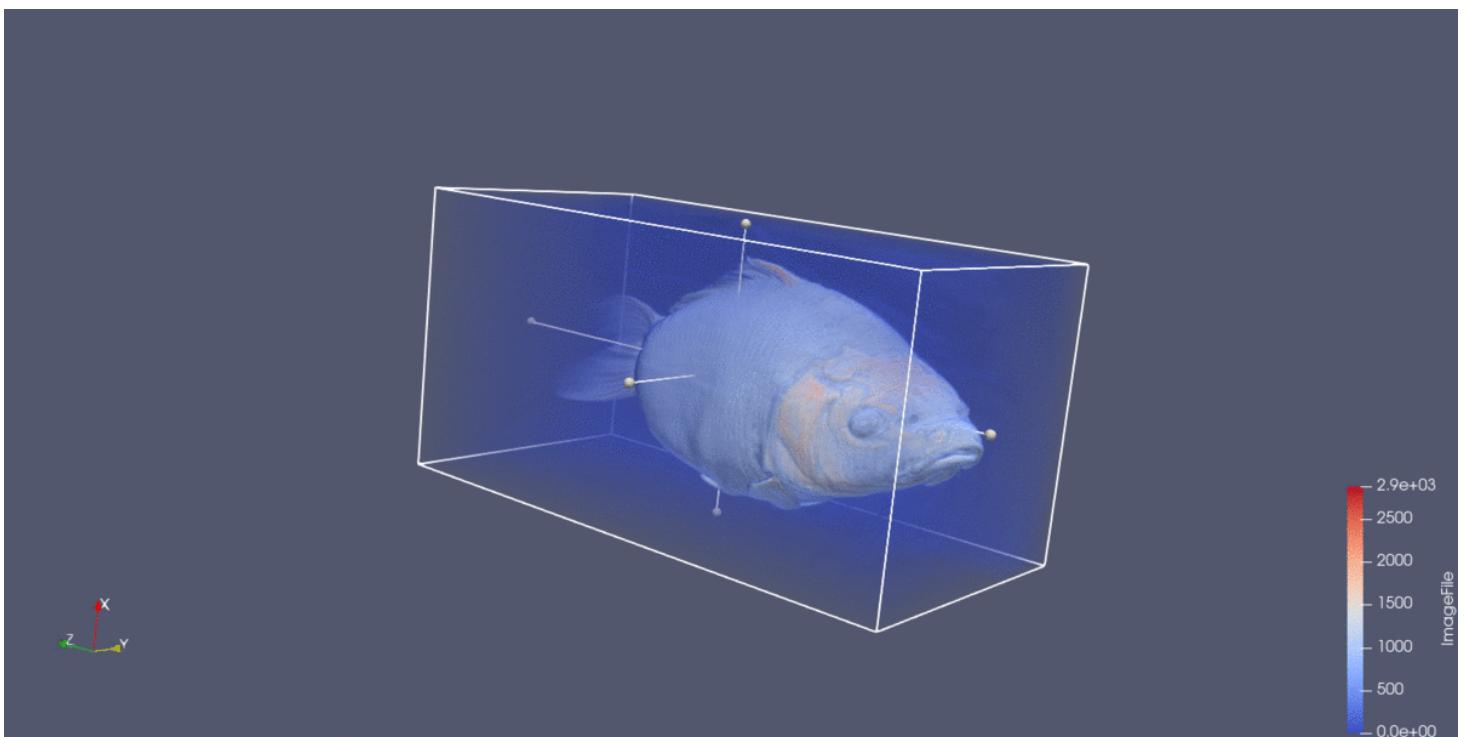
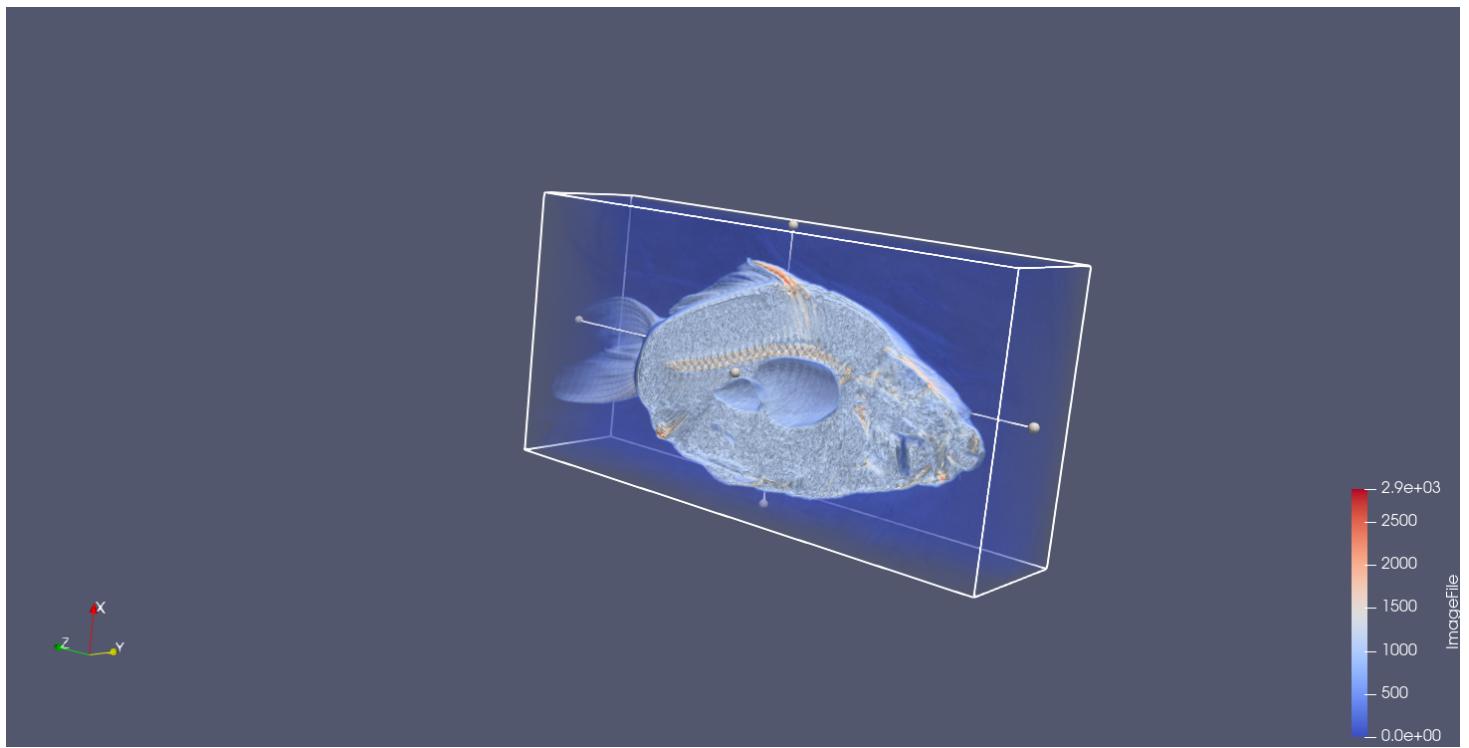
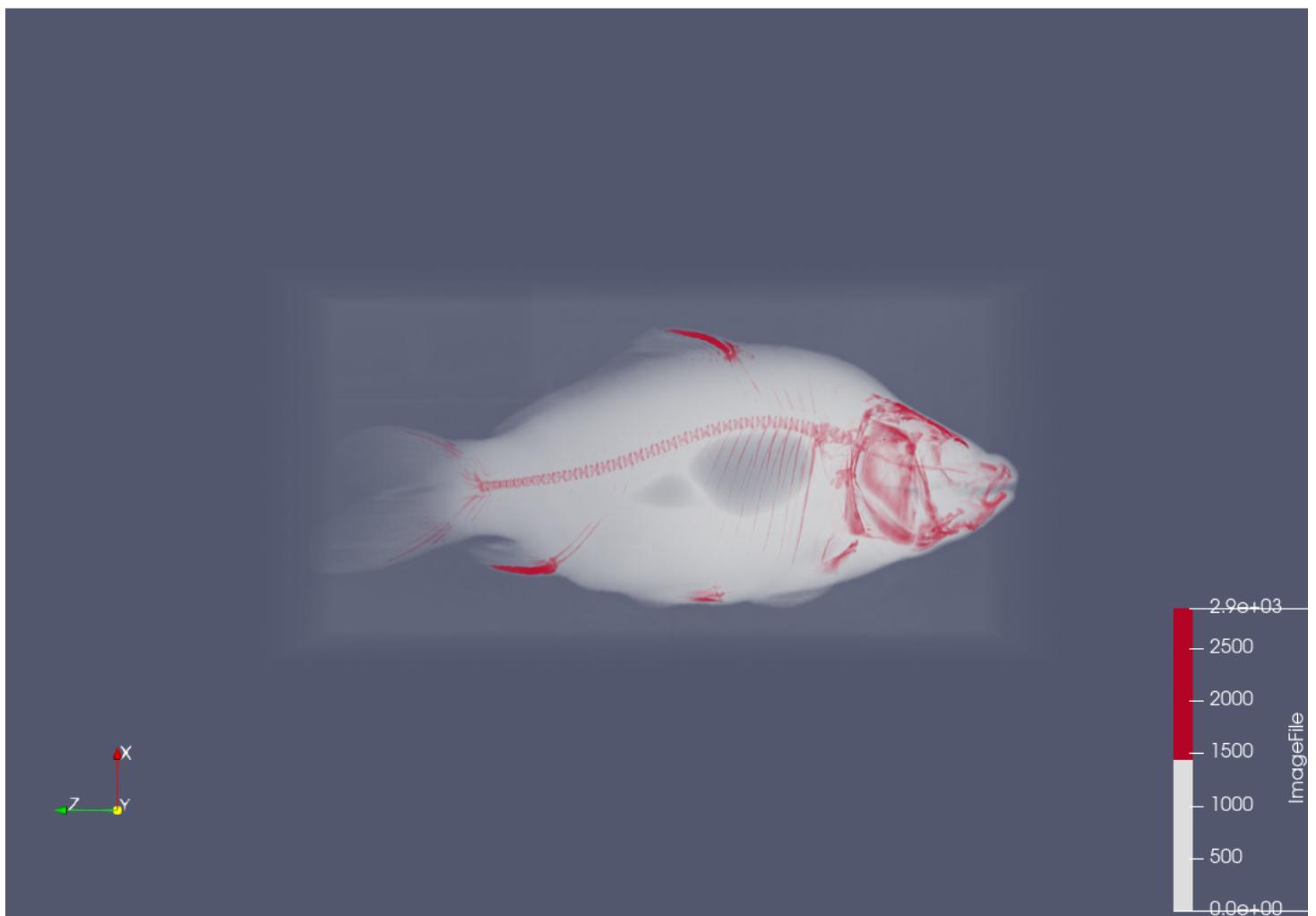


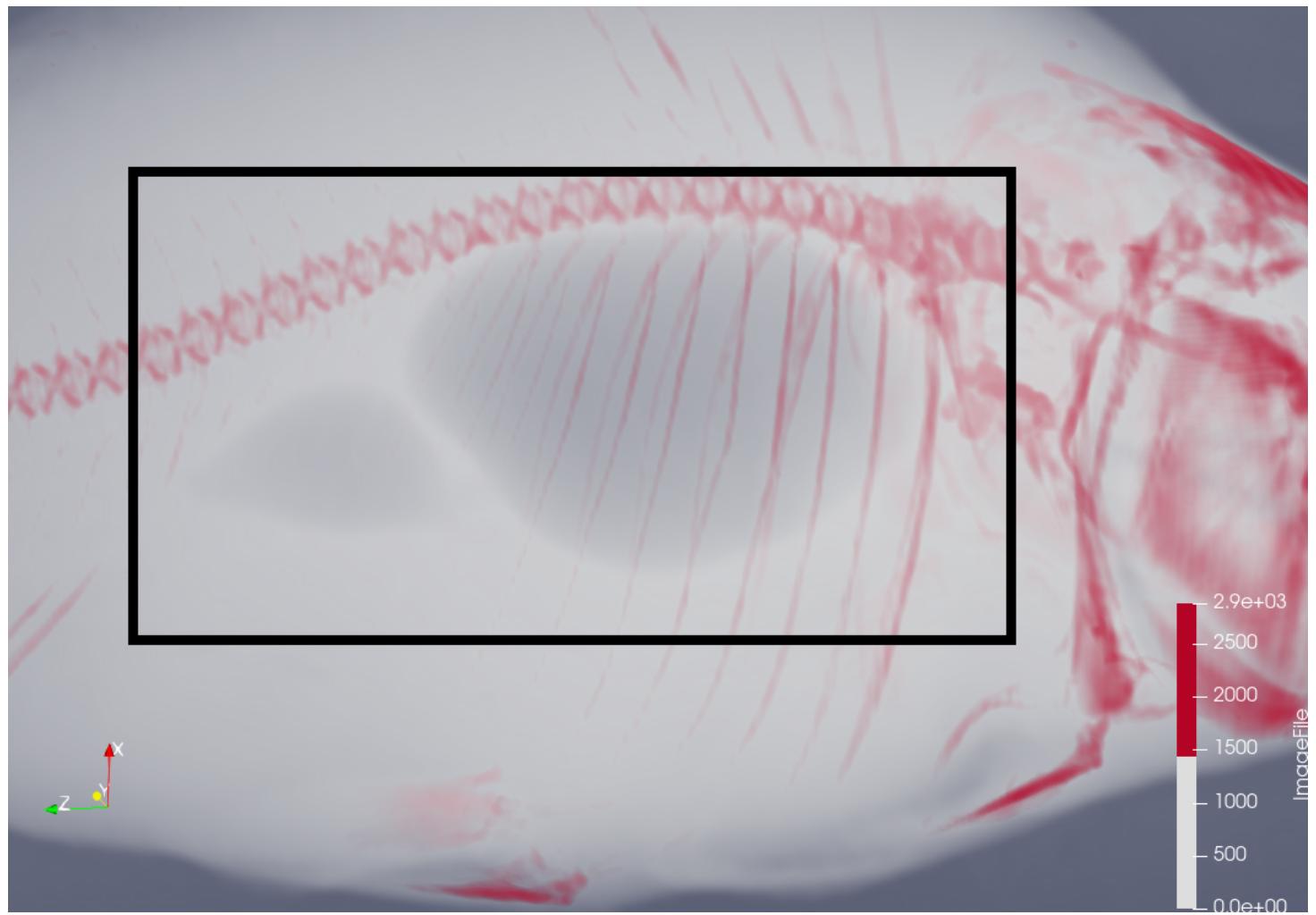
Fig 1:Different view points of visualization.



**Fig 2: Location of swim bladder in respective of skeleton structure in 3D.**



**Fig 3: side view of fish exhibit swim bladder and skeleton structure.**



**Fig 4: Exact location of swim bladder of fish.**

**What are all visual mappings used?**

- **Type of filters used:**

The following filters are used on the data set for proper insights

- volume rendering

- **Volume rendering Properties:**

- Mode: Smart
- blend Mode : Composite
- shade: enabled
- use Cropping: enabled

- **Cropping Parameters:**

- parameters:

parameter	x-axis	y-axis	z-axis
cropping origin	0	136.569	0
cropping scale	1	0.464437	1

- show box: enabled

- **interactivity controls:**

- Translation: enabled
- scaling: disabled
- face movements: enabled

- **Color Mapping Parameters :**

For interpolation of data with colors below color spaces are used,

- volume rendering: 'Diverging' color space

*Different data ranges are used for this proper insight, they are as follows*

- **image range :**

- diverging image range: 0.0e+00 to 2.9e+03

- **Color transfer function values :**

- diverging color space:

Value	R	G	B
0	0.231373	0.298039	0.752941
1435.5	0.865003	0.865003	0.865003
2871	0.705882	0.0156863	0.14902

- step color space:

Value	R	G	B

<b>Value</b>	<b>R</b>	<b>G</b>	<b>B</b>
0	0.231373	0.298039	0.752941
1435.5	0.865003	0.865003	0.865003
2871	0.705882	0.0156863	0.14902

- **opacity transfer function values :**

- diverging color space:

<b>Value</b>	<b>opacity</b>
0	0
2871	1

- step color space:

<b>Value</b>	<b>opacity</b>
0	0
1486.93	0.0357143
2871	1

### **Was there any special data preparation done?**

There is no data modification or preparation done for this visualization.

### **What are the limitations of your design?**

This visualization gives pictorial notion of location of one of the fish organ called swim bladder, but this visualization can not provide proper insight of other primary organs like heart, liver or stomach. This visualization is limited to provide insight of swim bladder.