

Scientific Visualization

VTK - Isosurfacing

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1 Introduction

The provided code utilizes the Visualization Toolkit (VTK) to visualize medical imaging data from a VTK file named "head.60.vtk". It focuses on extracting and rendering isosurfaces representing skin and bone structures.

2 Implementation

2.1 Data Loading

```
1 import vtk
2
3 # Load the VTK file
4 filename = "head.60.vtk"
5 reader = vtk.vtkStructuredPointsReader()
6 reader.SetFileName(filename)
7 reader.Update()
```

2.2 Isosurface Extraction

```
1 # Extract the isosurfaces for bones and skin
2 iso_skin = vtk.vtkMarchingCubes()
3 iso_skin.SetInputConnection(reader.GetOutputPort())
4 iso_skin.SetValue(0, 25) # Skin value
5
6 iso_bone = vtk.vtkMarchingCubes()
7 iso_bone.SetInputConnection(reader.GetOutputPort())
8 iso_bone.SetValue(0, 75) # Bone value
```

2.3 Rendering Setup

```
1 # Create mapper and actor for skin
2 skin_mapper = vtk.vtkPolyDataMapper()
3 skin_mapper.SetInputConnection(iso_skin.GetOutputPort())
4
5 skin_actor = vtk.vtkActor()
6 skin_actor.SetMapper(skin_mapper)
7 skin_actor.GetProperty().SetColor(1, 0.8, 0.6) # Skin color
8
9 # Create mapper and actor for bones
10 bone_mapper = vtk.vtkPolyDataMapper()
11 bone_mapper.SetInputConnection(iso_bone.GetOutputPort())
12
13 bone_actor = vtk.vtkActor()
14 bone_actor.SetMapper(bone_mapper)
15 bone_actor.GetProperty().SetColor(1, 1, 1) # Bone color
```

2.4 Rendering Configuration

```
1 # Create renderer and render window
2 renderer = vtk.vtkRenderer()
3 renderer.AddActor(skin_actor)
4 renderer.AddActor(bone_actor)
5 renderer.SetBackground(0.1, 0.2, 0.4)
6
7 render_window = vtk.vtkRenderWindow()
8 render_window.SetSize(800, 800)
9 render_window.AddRenderer(renderer)
```

2.5 Visualization Interaction

```
1 # Create render window interactor
2 interactor = vtk.vtkRenderWindowInteractor()
3 interactor.SetRenderWindow(render_window)
4
5 # Start the visualization
6 render_window.Render()
7 interactor.Start()
```

3 Errors

While executing this code, I am getting an error, which I was not able to debug. I have on both Linux and windows, and here are the outputs from both of the machines.

3.1 Windows

```
C:\Users\91911\Documents\Codes\FSU\Scientific Vizualization\
HW6>python main.py
2024-03-24 20:17:02.170 ( 0.269s) [D49E5AE4CEB29AD5]
vtkDataReader.cxx:1024 ERR| vtkStructuredPointsReader (000
0020572284540): Unsupported point attribute type: aaaaa@abb
utpi^vaaaaaaaaaaabb^yd@a@?ekbkwx]zxl@aabb@=?a@ababaaaaaa@aaaa
tsiagkbb@?@?@?@aaacbaesprgopjgipl?ahfb??ababbbbbaaaabbc
rgpbbbaa@abaaaaaa@fzph`qnofj@b@ghti[wzxnjimompm?@aaaaaba
s|fbbbbakkaa@?@?@acowbh`vmkn[u=?>xdnlr^]deafllztdt=?@aabbh
nsqbb for file: head.60.vtk
```

3.2 Linux

```
• (pytorch_gpu) (base) bash-4.4$ python main.py
2024-03-27 20:41:50.900 ( 18.618s) [ 7FACA80DA740] vtkDataReader.cxx:1023 ERR| vtkStru
cturedPointsReader (0x1ede670): Unsupported point attribute type: aaaaa@abbutpi^vaaaaaaaaaaabb^y
d@a@?ekbkwx]zxl@aabb@=?a@ababaaaaaa@aaaatsiagkbb@?@?@?@aaacbaesprgopjgipl?ahfb??ababbbbbaaaabbc
brgpbbbaa@abaaaaaa@fzph`qnofj@b@ghti[wzxnjimompm?@aaaaaba|fbbbbakkaa@?@?@acowbh`vmkn[u=?>x
dnlr^]deafllztdt=?@aabbhnsqbb for file: head.60.vtk
○ (pytorch_gpu) (base) bash-4.4$
```

4 Output

This was the output by VTK.

