SVVR Assignment 2

Sander Nugteren (6042023)   Merel de Groot (6103677)

November 17, 2014

1   Visualization Pipeline

The assignment is to create a visualization pipeline with VTK. The source will
be a dataset consisting of images from a CT scanner. These 2D images combined
form a 3D image of a body. Using VTK we will create a pipeline that takes the
dataset as input and creates a 3D visualization of the body. The order of the
sections will correspond to the steps of the pipeline.

1.1   Source

The data consists of 94 images created by a CT scanner. Each file is 131,072
bytes and the images are 256x256 or 512x512 pixels in size. Since 131,072
devided by 512x512 is only a half, we know that this is not possible. Devid-
ing 131,072 by 256x256 however, gives us 2 bytes, which is a reasonable size
of data per pixel. The collection of binary images is read by using VTKIm-
ageReader2.

1.2   Filter: Contour

At this stage a contour filter is used to create the isosurface. The range of the
values is $[0, 65535.0)]$. The suggestion to start with a halfway value only renders
a jaw, i.e. the dense bone. But by lowering the value softer tissues become
visible. Around 700 the skin is smooth, showing the soft tissue of the body and
when increased to 1200 we can see the bones. So the isosurfaces correspond to
the density of the material.

1.3   Mapper

1.4   Actor: Colours

Unfortunately VTK maintains a default of a dark blue object on a black back-
ground. To make the image more visible, three ways of changing this are im-
plemented:

- Tell the contour filter stage to not compute scalar values and then set a
  colour in the actor

- Tell the mapper stage to ignore scalar values and then set a colour in the actor

- Tell the mapper what the actual scalar range is

1.5   Data Spacing

By default voxels are isotropic, but this has to be adjusted to get a proper view of the head. In this case the voxels need to be adjusted to $(1, 1, 2)$ to make the data spacing more accurate.

1.6   Renderer: Setting the Scene

The renderer configures the visualization in the window.
    There are two models in VTK to manipulate the camera:

- Camera is focused at a focal point and moves around this focal point using the Elevation, Roll and Azimuth methods.

- The movement of the camera is centered at the position of the camera and the orientation of the camera is controlled using the Yaw, Roll and Pitch methods.

2   Results

Explore all contour values in the dataset: histogram.