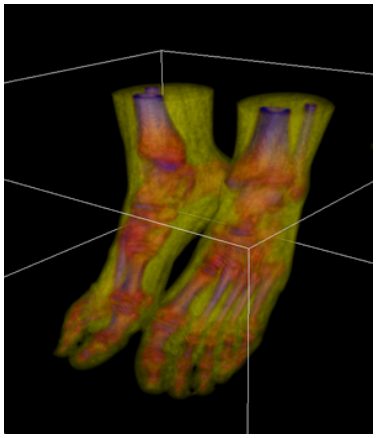
Assignment #4 - Streamlines, Isosurfaces, Volume Rendering, and Paraview
Due: Tuesday September 28th at 11:59pm

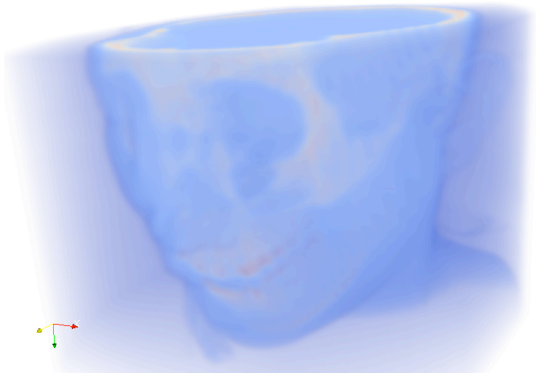
Background

As of recently, due to advances in computing hardware and graphics hardware, we are able to collect and visualize very complex data in new and exciting ways. These techniques are often used in medical imaging, mechanical engineering, and aeronautical engineering.

In medical imaging, CT scanners produce 2D slices of data. These slices can now be stacked together to get a full 3D view of the patient using volume rendering techniques.

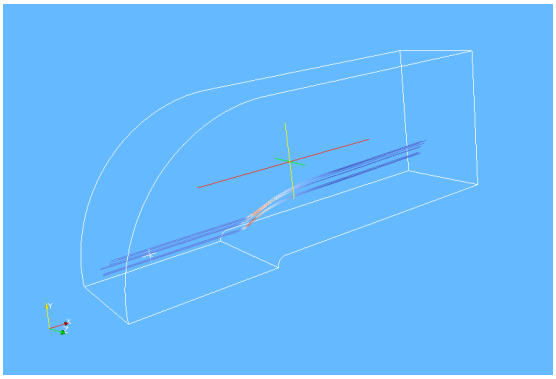


(Taken from http://www.siafoo.net/snippet/314)



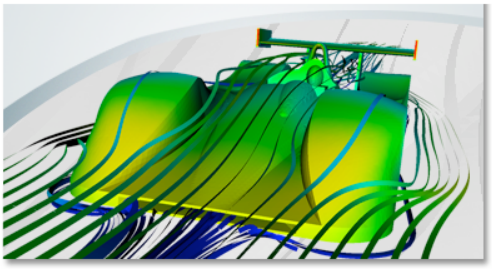
(Produced from quarter.nhdr in the VTKData repository)

In mechanical engineering, analysis of fluid flow is often required. Engineers have developed clever ways of tracking particles in a fluid (e.g. Particle Imaging Velicometry). They can now visualize the path of these particles to get a sense of the behavior of the system.



(Produced from bluntfin.vts in the ParaViewData repository)

Engineers can now also produce very detailed computer models of complex situations (fluid flow, etc). These models are most useful when they can be visualized in ways that highlight interesting data. Here we see a model of a race car and a simulation of the airflow over the car.



(Taken from paraview.org)

Assignment

It is your job to obtain a dense, 3D data set and find “something interesting”. You must then visualize what you have found in such a way that helps you explain to your peers what you have found. For example, you could highlight the regions with the fastest air over moving over a wing. You could also highlight sections of turbulent air. You could should that the air flowing over a wing is moving faster than the air flowing below it (lift!). We will have a “show and tell” during the next class.

Grading Criteria

(5 pts) Creativity
(15 pts) Effectiveness of visualization

<u>Submission Requirements</u>

1. Upload a screenshot of your visualization to LMS.
2. Post a brief description of what you have chosen to visualize to the course website.
3. Create a “professional looking” document (a la Cagri’s example) including your screenshots together with your explanation of them. Save it in PDF format.
4. Include a README.txt file describing your collaborators, your time breakdown, and other comments. Rather than “Time spent: 5 hours”, please breakdown the time something like this:
   3 hours - Struggling with Twitter C++ Libraries to No Avail
   1 hours - Parsing data
   3 hours - Creating Working VTK Graphs
   2 hours - Debugging, writeup