Interactive visualization using VTK by Examples

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What is visualization?

- The action or fact of visualizing; the power or process of forming a mental picture or vision something not actually present to the sight; a picture thus formed (http://www.oed.com)

- The process or action of rendering visible.
Why do we create visualization?

- Easier interpretability
- Emotional impact
- Simplify data
- Communication, e.g., articulate relationships
- Reveal / conceal trends, focus on relevant data
- Visual bandwidth, use human perception / cognition
- Crystallization of abstract ideas
What is VTK?

- An enormous library of C++ classes for interactive visualization of data
VTK Resources

- main website: http://www.kitware.com/vtk.html
- Only two books: VTI user’s guide and the visualization toolkit
- Numerous examples from kitware in C++, python, java, or TCL.
What does VTK do well?

- Creation and manipulation of geometrical data
- Efficient image processing (parallel implementation)
- Interactivity
- Caveat: a steep learning curve

Why we have this course to help you out!
Visualization pipeline

Data

Analysis

Encode

Graphics

Interact or browse

View
The VTK pipeline

- Your VTK program creates objects and joins them together.
- Every VTK program has at least one pipeline.
Pipeline diagram (1)

- **Source (data)**: Either reads the data from a file or create the data from scratch.
- **Mapper**: Moves the data from VTK to opengl.
- **Actor**: For setting colors, surface properties, and the position of the object.
- **Renderer**: The rectangle of the computer screen that VTK draws into.
- **Window**: The window, including the title bar and decorations.
- **Interactor**: Allows the mouse to be used to interact with the data.
Pipeline diagram

Reader (data)
Read the data from a file

Filter (data)
Process the data

All the rest
Viewer, renderer, interactor
I don’t program, what should I do?

- Paraview ([http://www.paraview.org/paraview/resources/software.html](http://www.paraview.org/paraview/resources/software.html))
- All you need to know are the concepts we learned today and the vtk format ([http://www.vtk.org/VTK/img/file-formats.pdf](http://www.vtk.org/VTK/img/file-formats.pdf))
- TITAN (for InfoVis: [https://www.kitware.com/InfovisWiki/index.php/Main_Page](https://www.kitware.com/InfovisWiki/index.php/Main_Page))
Thank you for your attention