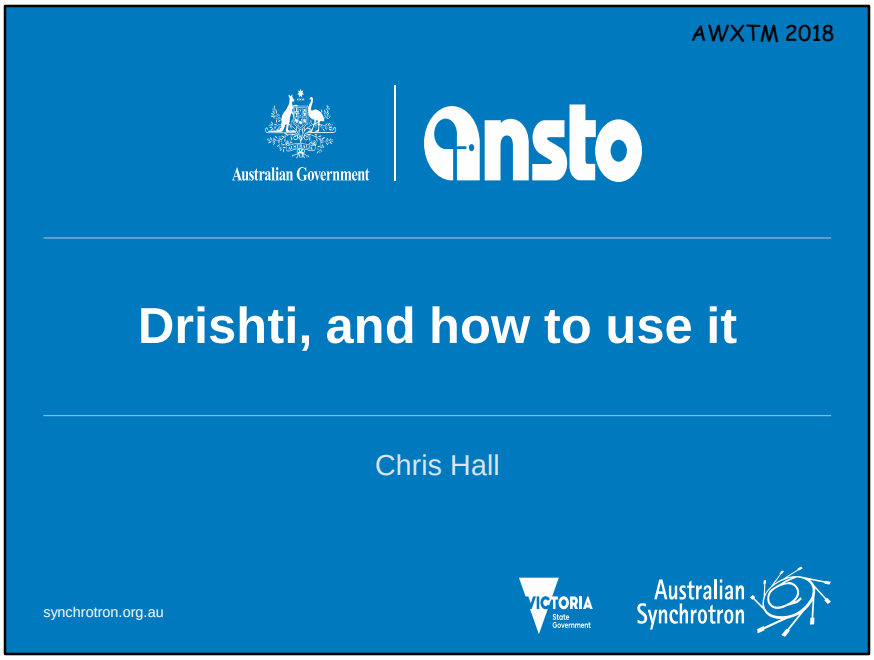

This tutorial will run through the basic aspects of the rendering program Drishti

We will generally follow the manual called 'The Basics of Drishti' written and complied by Bailey Lovett of the Australian National University Research School of Biology…

http://www.scribd.com/doc/191007517/The-Basics-of-Drishti-A-Free-To-Download-Volume-Exploration-Presentation-Tool

- Importing an Image File into Drishti
- Opening an Image in Drishti
- Adjusting Image Lighting & Shading in Drishti
- Using Transfer Functions in Drishti
- Carving Images In Drishti
- Using Clipping Planes in Drishti

The program is complex, with a lot of functionality
Help is available on the web in the Author's You Tube channel and elsewhere.
The best source of information is the GitHub repository:
https://github.com/nci/drishti

Surface rendering

- Technology has allowed great advances in 3-D graphical visualisation
- Most games and other applications use ‘Surface rendering’ to show the 3-D object on a screen
- Here a surface is constructed from thousands of polygons (e.g. triangles)
- Light ray intensity, reflectance and colouring is calculated for each polygon, from your ‘eye’

The technology for surface rendering is used a lot in gaming.
The surfaces can be described by many polygons, either the same or similar size, depending on the resolution and curvature of the surface.
Graphics cards are designed to make thousands of these calculations in fraction of a second.
The surface can be described by colour, reflectivity, and reflectance direction.

Volume rendering

- For visualising a 3-D data (volume) set we need a more sophisticated visualisation
- Each element (voxel) in the data set effects the colour and intensity of light rays reaching your eye
- Calculations have to be made on the cube, and include opacity as well as colour in the ray-tracing

To look through an object as if with x rays we need something more sophisticated.
Voxels are singular values (for our intents). These are the x-ray opacities of the material in that voxel, derived from the attenuation coefficients.
The matrix is usually isotropic (all voxels are of equal dimensions and there are no gaps)
A voxel is an area of non-varying value surrounding a central grid point.
The voxel approach has the advantage that no assumptions are made about the behaviour of data between grid points, only known data values are used for generating the image.
When visualising, these values are mapped to a colour (RGB) and a transparency (alpha).
There are many more ray calculations compared to surface rendering, are they are slightly more involved.
Currently only high end graphics cards can cope with this.

Rendering software

- VG Studio – commercial
- 3-D Slicer - medical
- Avizo – commercial, analytical
- Many other academic (free) applications:
  - MeVisLab, Osirix, ImageVis3D, LiveVolume, Volview, 3DView… etc.
- We will focus on: Drishti – free from the ANU

There are many to choose from
Some are expensive and include sophisticated analytical tools (segmentation and FEA)
Some are specifically designed for medical use with set colour maps, and an ability to handle DICOM
A lot are free, but you need to work with them to see how useful they are

Dristhi

- Drishti is an open-source scientific visualisation software designed by Ajay Limaye at the National Computational Infrastructure's VizLab, at the Australian National University, Canberra
- Drishti works on GPUs with OpenGL 2.0 capability.
- *Citation: A volume exploration and presentation tool. Proc. SPIE 8506, Developments in X-Ray Tomography VIII, 85060X (October 17, 2012)*

Drishti stands for vision or insight in Sanskrit.
The author is Ajay at the ANU in Canberra, Australia
He has been working on the program and updating is for many years.

The best way to learn something is to do it…