

EN250 Medical Imaging

Lab # 3: Volume Visualization I

This lab introduces you to various volume visualization techniques using MATLAB. The lab comes with the three datasets, *mrhead.mat*, *spine.mat*, and *tpm.mat* that can be downloaded off the website. Use *mrhead.mat* whenever the problems say MRI dataset, *spine.mat* for Question 2 part *ii*, and *tpm.mat* for Question 2 part *iii*.

1. **Load/display 3D dataset** Load a 3D dataset of the skull.

- (a) Display the slices in the axial, coronal and sagittal directions. Note that the sampling rate is not the same in the z direction, and you have to take into account the non-uniform spatial sampling, $\Delta x = \Delta y = 0.86, \Delta z = 5.0$. Figure 1 shows the various different types of plane directions.

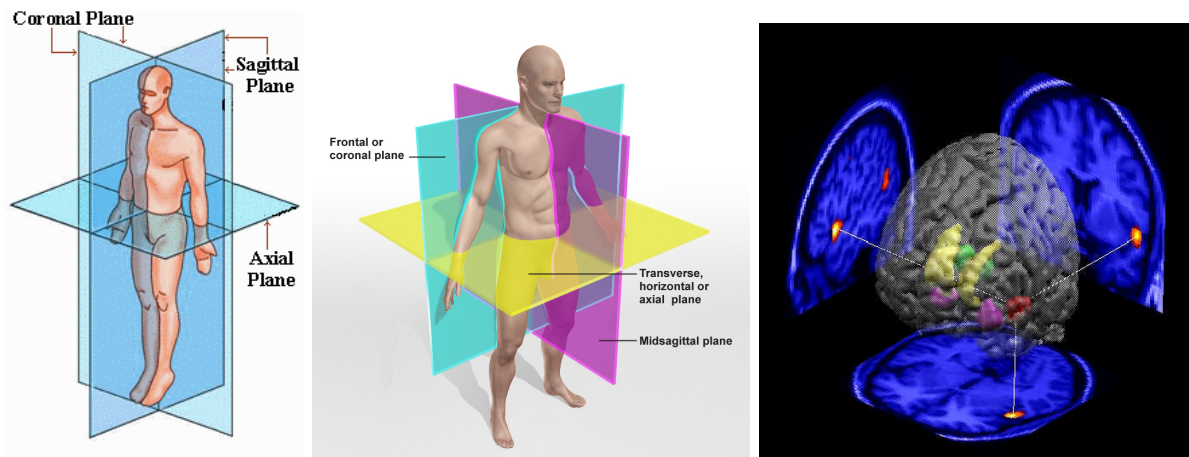


Figure 1: Views of the Different Planes used in Human Anatomy

- (b) Consider any arbitrary plane $ax + by + cz + d = 0$ where $a, b, c \neq 0$. Display the slices in the direction parallel to the above plane.
2. **Extracting an isosurface** A simplistic way to extract a surface model of a structure of interest from the 3D volumetric image is to pick an appropriate intensity value as the isovalue and reconstruct the corresponding isosurface. Use Matlab's "isosurface" function to extract (i) the skull surface from the given MRI dataset, (ii) spine surface from the CT dataset and (iii) zero level-set of the distance transform (DT) surface.