VU Visualisierung medizinischer Daten 1

Topics
From signal-theoretic point of view explain the Nyquist criterion
From the signal-theoretic point of view explain the origin of aliasing
Explain the difference between prealiasing and postaliasing
Can post-aliasing be avoided and how? Explain from the signal theoretic point of view
Can pre-aliasing be avoided and how? Explain from the signal theoretic point of view
From the signal theoretic point of view explain reconstruction of sampled data
Qualitatively explain the differences between reconstruction using linear and cubic reconstruction filters

The DICOM Standard, basic characteristics of the format, role of DICOM images in a hospital
Classification of 3D grids and their representation in a computer

CT tomography, basic description, physical background and CT data characteristics
MRI, basic description, physical background and MRI data characteristics
Explain the basics of spatial localization in MR tomography and of measurement in arbitrary planes
MRI, scanning protocols, T1, T2 and proton density images
Anatomic and functional acquisition techniques, PET & SPECT

Volume viewing techniques
Basics of visualization with mapping
Compare direct volume rendering and isosurfacing
Basics of direct volume rendering, DVR techniques
Object order and image order rendering

Problems which may occur in perspective visualization of volume data and their possible solutions
Methods for specification of density-based transfer functions in volume rendering.
The special case of transfer functions to be used for CT data.
Multidimensional transfer functions

Surface rendering by the Marching Cubes approach and its problem
Compare the Marching Cubes and the Marching Tetrahedra approaches
Advantages and disadvantages of surface rendering. Surface Shading

Segmentation of volumetric data.
Segmentation by thresholding – comparison of CT and MRI data from the point of thresholding