

# 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