3D Reconstruction

Volume rendering
Ray casting through 3D data

Surface rendering
Isosurface extraction (Marching Cubes)

Maximum intensity projection
MIP shows brightest voxels

Multi-planar reformation
MPR creates arbitrary slice planes

3D printing applications
Surgical planning, prosthetics

Volume Rendering
Transfer Function
Rays
Low   High
Intensity → Color/Opacity
Accumulates values along ray

Surface Rendering
256 Cases
Threshold = 0.5
Creates triangle mesh

MIP (Max Intensity Projection)
Volume   MIP Image
Shows vessels & bones

MPR (Multi-Planar Reformation)
Sagittal
Axial
Coronal
Oblique
Any angle slice

3D Printing Pipeline
CT/MRI Scan → Segment / Extract ROI → 3D Model / STL/OBJ → 3D Print → Physical Model / Surgery Plan

Applications: Surgical guides • Prosthetics • Education • Implants
Precision medicine through personalized models