

3D Medical Imaging

Processing CT/MRI volume data with 3D CNN, utilizing spatial context for lesion detection and segmentation

3D Imaging Modalities

Volume Data Sources

- CT: Continuous slices (axial)
- MRI: Multi-sequence (T1, T2, FLAIR)
- PET/SPECT: Functional imaging
- Ultrasound: 3D reconstruction

3D CNN Architecture

Networks for volume processing

- 3D convolution kernels ($3 \times 3 \times 3$)
- 3D U-Net: Segmentation
- V-Net: Medical specialization
- nnU-Net: Automatic configuration

Spatial Features

Advantages of 3D

- Utilizing Z-axis context information
- Volume measurement accuracy
- 3D structure preservation
- Adjacent slice correlation

Multimodal 3D Integration

Multiple volume data fusion

- CT + PET: Anatomy + Function
- MRI multi-sequence fusion
- 3D imaging + Clinical data
- Spatial registration

Lung Nodule Detection

Brain Tumor Segmentation

Organ Volume Measurement