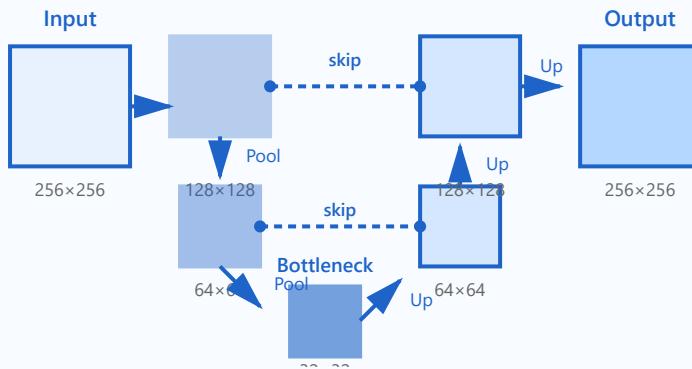


Segmentation with U-Net

U-Net Architecture: Encoder-Decoder with Skip Connections



Key Components:

- Encoder (Contracting path)
Captures context, reduces spatial dim
- Decoder (Expanding path)
Localizes, increases spatial dim
- Skip Connections
Preserve spatial details
- Bottleneck
Highest-level features

Operations:

U-Net Architecture

Encoder-decoder with skip connections. Standard for medical image segmentation

Skip Connections

Combine low and high-level features. Preserve spatial details for precise boundaries

Loss Functions

Dice loss, focal loss, boundary loss. Address class imbalance and boundary precision

3D U-Net

Extension to volumetric data. Processes entire 3D volumes for organ/tumor segmentation

nnU-Net Framework

Self-configuring U-Net. Automatically adapts to dataset characteristics