Week 3

AI for Medical Diagnosis

Week 3

Discuss this week's modules here.

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Image segmentation on MRI images

By the end of this week, you will prepare 3D MRI data, implement an appropriate loss function for image segmentation, and apply a pre-trained U-net model to segment tumor regions in 3D brain MRI images.

Learning Objectives

- Perform image segmentation on 3D MRI data.
- Take random sub-samples from a 3D image.
- Standardize an input image.
- Apply a pre-trained U-Net model.
- Implement a proper loss function for model training (soft dice loss).
- Evaluate model performance by calculating sensitivity and specificity.

Less

Explore MRI data

Video: Medical Image Segmentation 51 sec — Resume

Lab: Explore MRI data 1h

Image segmentation

Video: MRI Data and Image Registration 3 min

Video: Segmentation 3 min

Lab: Get a sub section 1h

Reading: Convolutional Neural networks 10 min

Video: 2D U-Net and 3D U-Net 2 min

Reading: More about U-Net (Optional) 10 min

Lab: Implement U-Net 1h

Video: Data augmentation for segmentation 2 min

Video: Loss function for image segmentation 3 min

Practical considerations

Video: Different Populations and Diagnostic Technology 1 min

Video: External validation 2 min

Video: Measuring Patient outcomes 3 min

Quiz week 3

Practice Quiz: Week 3 Quiz: Segmentation on medical images 9 questions

Programming: 3D Image Segmentation

Programming Assignment: Brain Tumor Auto-Segmentation for Magnetic Resonance Imaging (MRI) 3h Due Nov 23, 1:59 AM CST

Summary of AI for Medical Diagnosis

Video: Congratulations! 1 min

Reading: Acknowledgements 10 min

Reading: Citations 10 min