BRAIN TUMOR AUTO-SEGMENTATION FOR MAGNETIC RESONANCE IMAGING (MRI)

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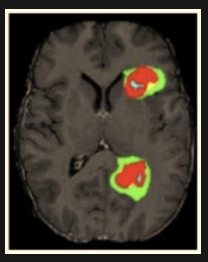
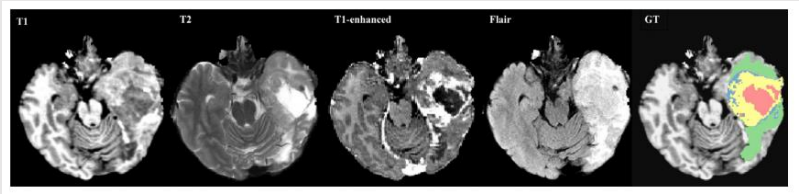


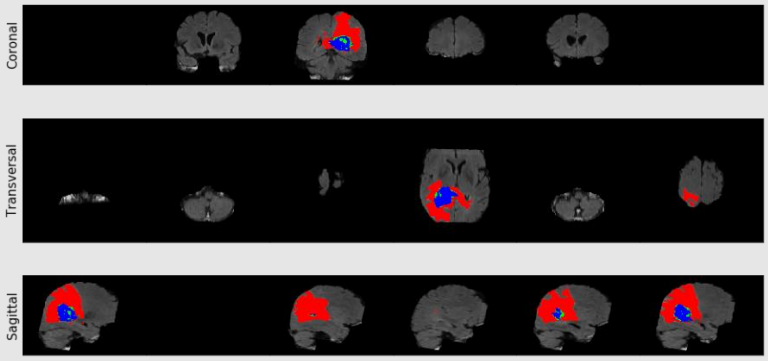
1. Dataset

1.1 MRI - *advanced imaging technique that is used to observe a variety of diseases and parts of the body.*



1.2 MRI Data Processing (DICOM format, Dataset: Decathlon 10 Challenge)

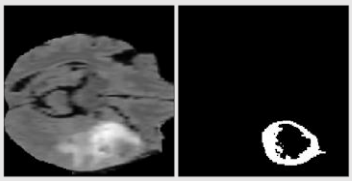
1.3 Exploring the Dataset (1st file: NifTI-1, 4D array (240, 240, 155, 4); 2nd file: labels, 3D array, (240, 240, 155))



1.4 Data Preprocessing

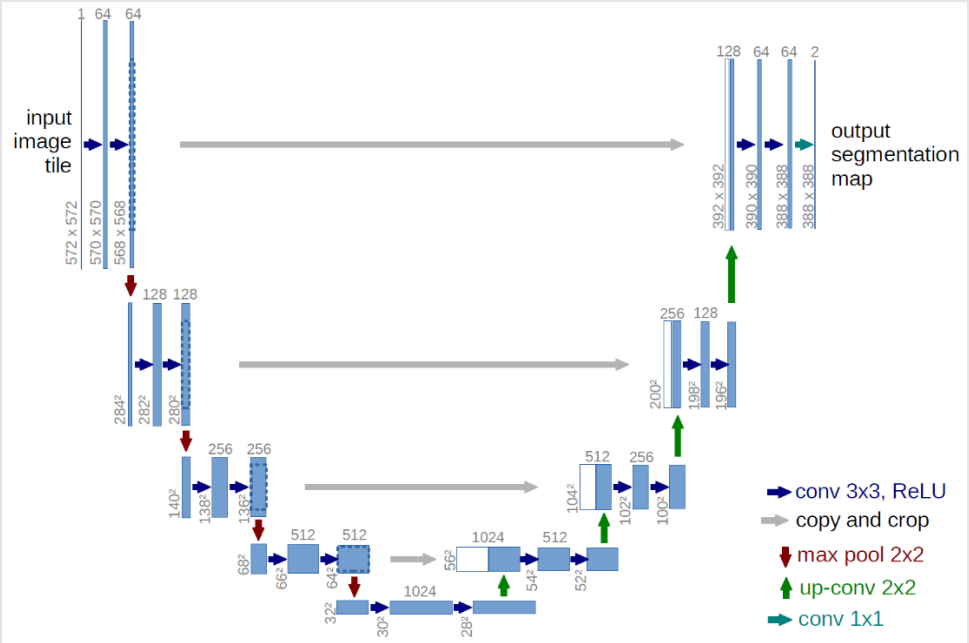
1.4.1 Sub-volume Sampling

- sub-volumes [160, 160, 16]
- pick patches of 95% non-tumor regions



1.4.2 Standardization (mean 0, stdev 1)

2. Model: 3D U-Net



3. Metrics

3.1 Dice Coefficient - measure of how well two contours overlap [0, 1] +

3.2 Soft Dice Loss - takes in discrete values (zeros and ones) [0, 1] -

4. Training - loss_function=soft_dice_loss, metrics=[dice_coefficient]

5. Evaluation

5.1 Overall Performance

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validation soft dice loss: 0.4742
validation dice coefficient: 0.5152
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5.2 Patch-level Predictions

	Edema	Non-Enhancing Tumor	Enhancing Tumor
Sensitivity	0.9085	0.9505	0.7891
Specificity	0.9848	0.9961	0.996

5.3 Running on Entire Scans