EC899-Application of Machine Learning techniques for Medical image analysis

Report on BraTs Project

13 December 2019

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Datasets

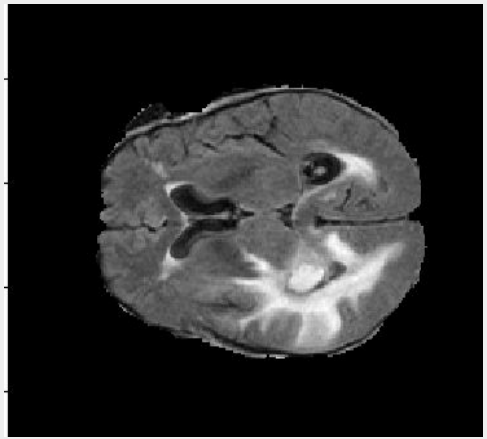
Total 465 images of dimension 640*480 were given for training.

Training data: 390 images

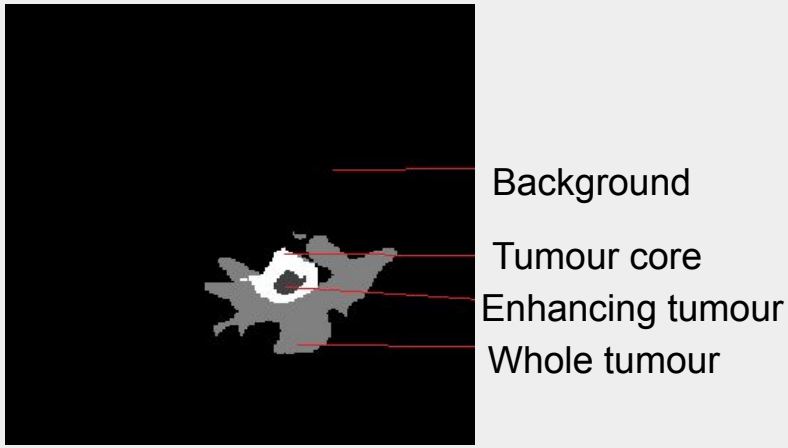
Validation data:30 images

Test data: Separate 100 images were given

Classes



Original image



Ground truth

Background :(0,0,0)
Enhancing tumour:(255,255,255)
Tumour core:(64,64,64)
Whole tumour:(128,128,128)

Pre-processing

- Train and validation data and labels were cropped to 320*320 from 640*480.
- Blank data were removed to avoid learning unnecessary features.

Models

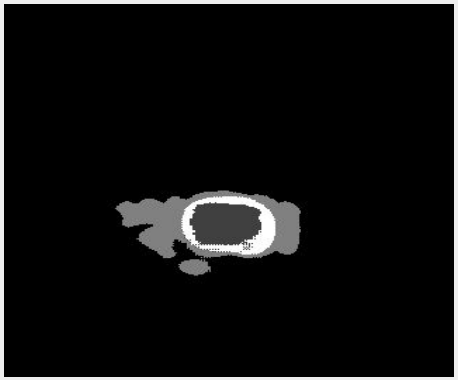
Different models used

- U-Net skip
- DeepLab

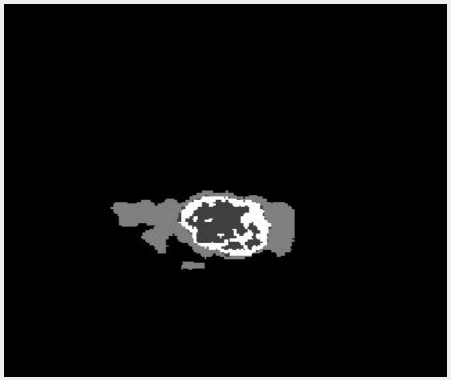
Performance

- No improvement with other models.
- U-Net worked better compared to other models.

Performance on validation data

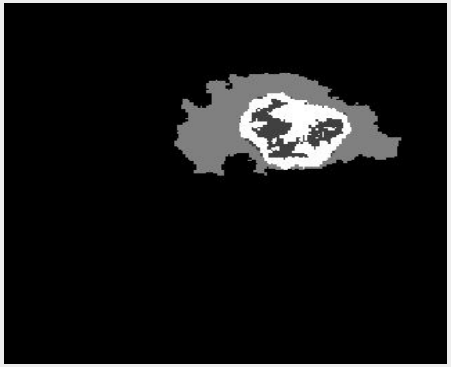


Predicted image

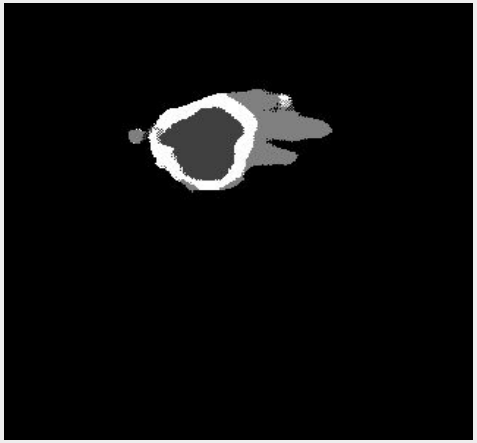


Ground truth

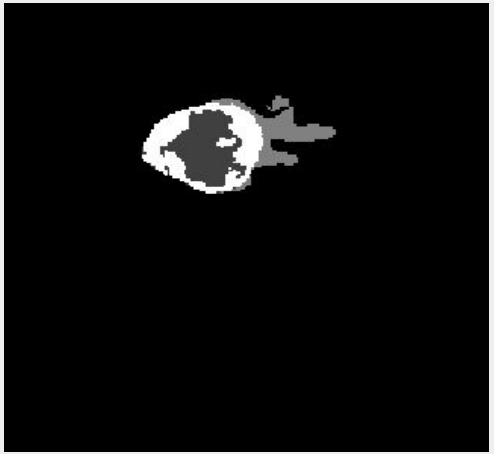
Predicted image



Ground truth



Predicted image



Ground truth

Performance continued

Observations:

Model was not able to exactly differentiate between core tumour and enhancing tumour resulting in accuracy around 75%

Decent accuracy was achieved for whole tumour.

```
background = 0.997295
enhancing_tumour = 0.790931
whole_tumour = 0.859900
tomour_core = 0.737423
Validation precision =  0.9889873950538866
Validation recall =  0.9879624023437501
Validation F1 score =  0.9874744647517331
Validation IoU score =  0.77428870993429

--------confusion matrix after epoch 723 is
 [[1974300    1132    3638     440]
 [   1037   12432    1592    3094]
 [   2925    4330   29037    1877]
 [    220    3761     607    7658]]
```

Thank you