MRI BRAIN TUMOR SEGMENTATION USING DEEP LEARNING

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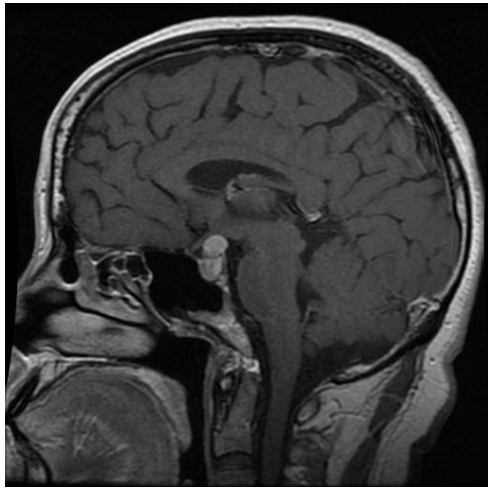
PROBLEM STATEMENT

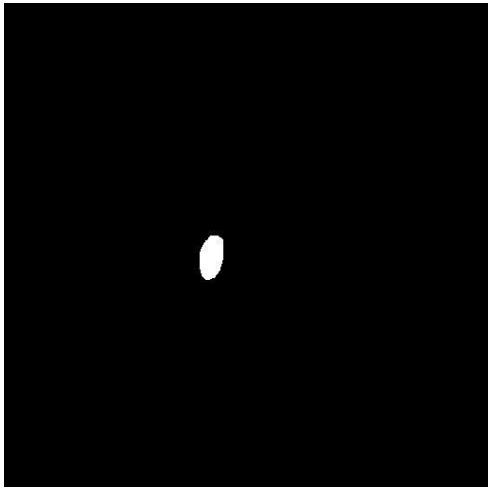
Deep learning accurately segments regions of interest in MRI scans, improving medical diagnosis and treatment planning. This is particularly beneficial for identifying tumors and other neurological disorders in medical imaging analysis.

DATA COLLECTION AND DESCRIPTION

- Data source: Open source dataset from the Brain Tumor Segmentation figshare 2017.
- GitHub Link.



Brain MRI Image



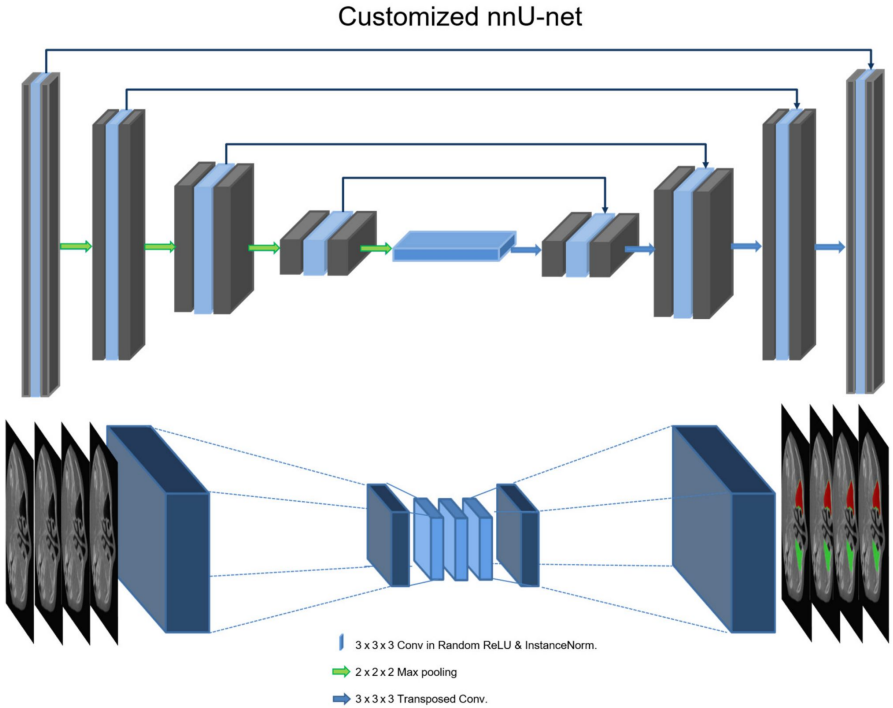
Ground Truth

DATA SAMPLING, SPLITTING AND CLEANING

- Raw data containing 3064 T1-weighted contrast-enhanced images with its corresponding masks.
- Data collected from 233 patients with three kinds of brain tumor: meningioma, glioma, and pituitary tumor.
- The data can be split into three sets: 85% for training, 10% for validation, and 5% for testing.
- Cleaning: Missing data was removed and intensities were normalized performed on the data in jpg format before analysis.

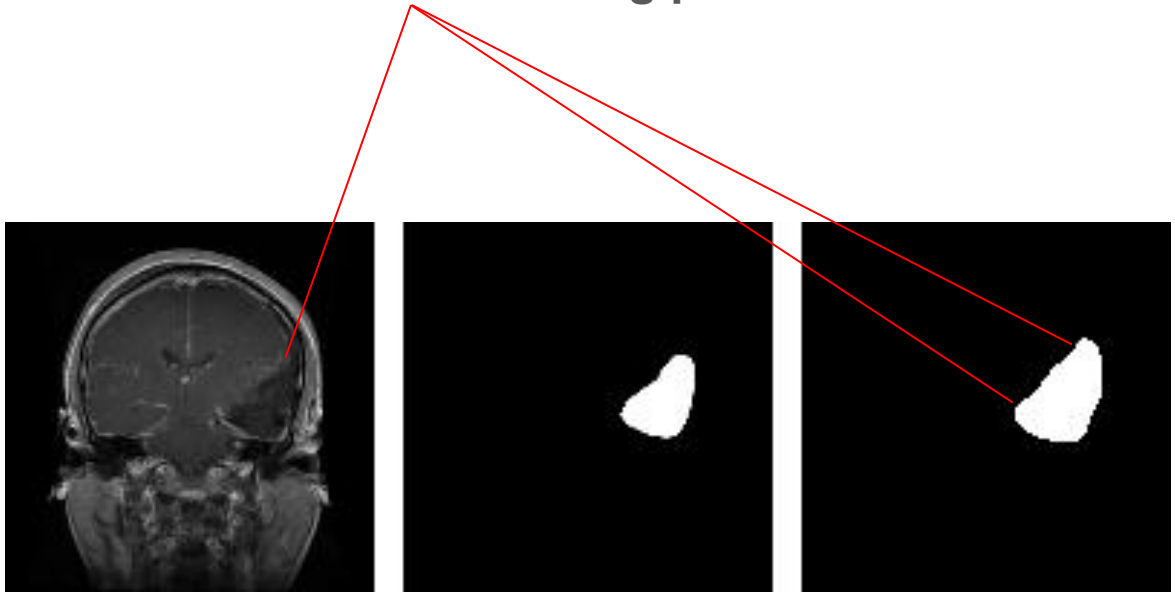
MODELING

CONVOLUTIONAL ENCODER-DECODER



MODEL 1(FPN) RESULTS

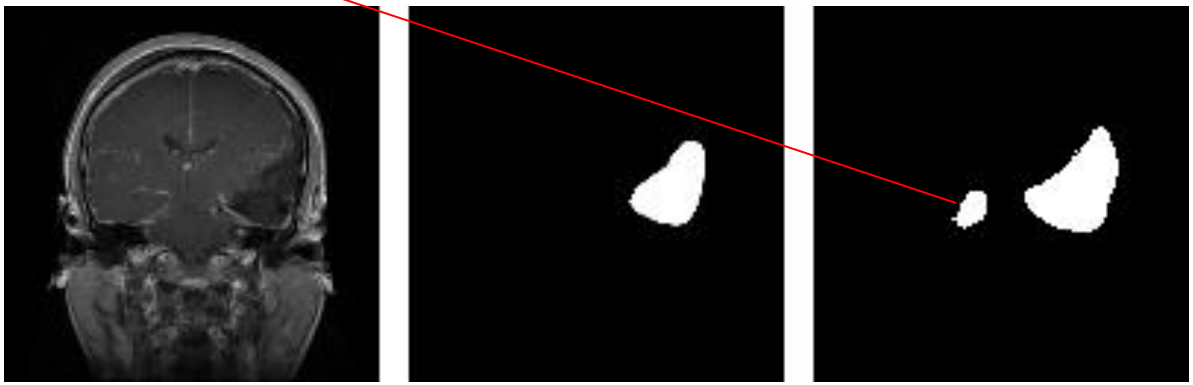
- Red lines indicate incorrect or missing predictions



Brain MRI | Ground Truth | Predicted Segmentation

MODEL 2 (VGG16) RESULTS

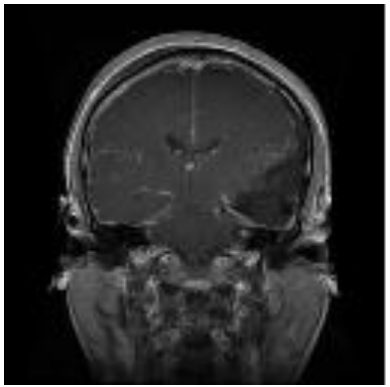
- The VGG16 model produces inaccurate predictions, which include extra spots.



Brain MRI | Ground Truth | Predicted Segmentation

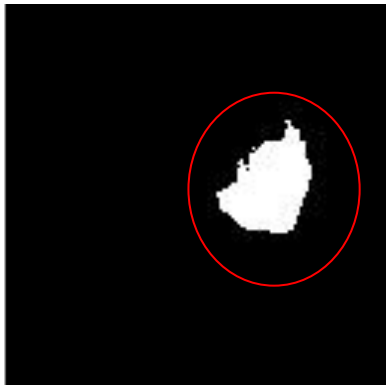
MODEL 3 (Unet) RESULTS

- The Unet model provided the best prediction without missing any tumors



Brain MRI

Ground Truth



Predicted Segmentation

CONCLUSIONS

- **The Unet model outperformed the VGG16 and FPN models in brain tumor segmentation on MRI images, accurately identifying all tumors without missing any.**

- **The Unet model has a larger number of trainable parameters compared to the VGG16 and FPN models, suggesting that its more complex architecture is better suited for this task.**

QUESTIONS?