
Adversarial Network for Brain Tumor Segmentation

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Abstract

Generative Adversarial Networks are becoming widely used with a number of the number of application increasing everyday. They play a very important role in Medical Imaging and are proven to produce efficient outputs in segmentation and various other tasks. In this project, Adversarial Networks will be used to segment tumours in from MRI Scans of Brain along with a discriminator. The BraTS dataset from Annual BraTS Challenge will be used to train and test the implementation

1 Method

A lot of work has been done on Brain Tumour Segmentation using Neural Networks. This project is going to exploit Conditional GANs for training a semantic segmentation Convolution Neural Network (CNN) along with a discriminator for segmenting Brain Tumours. It is mainly inspired from the research paper on the area [1]. U-Net will be chosen as the generator architecture model [Figure 1]. The discriminator will be trained as a "Markovian GAN". Discriminator D estimates when the sample is from input sample or generated sample. The generative model will capture the data distribution and performs pixel wise segmentation

Once the architecture shown in Figure 1 is implemented, additional exploration on improving the efficiency of the network by training different architectures for Generator and Discriminator will be done.

The BraTS dataset from NCI-MICCAI 2013 Grand Challenges in Image Segmentation will be used to train the network [2].

2 Timeline

- Spring Break (17th March to 24th March) - Setting up all required libraries and software
- 30th March - Understanding the basic implementation and gathering references for beginning implementation
- 8th April - Implementation of U-NET for generative model
21st April - Implementation and testing of basic GAN Architecture
- 30th April - Producing a final implementation of proposed GAN Architecture
- 05 April - Evaluating the model and exploring methods or changes in architecture that could improve the model

References

[1] <https://arxiv.org/pdf/1708.05227.pdf>

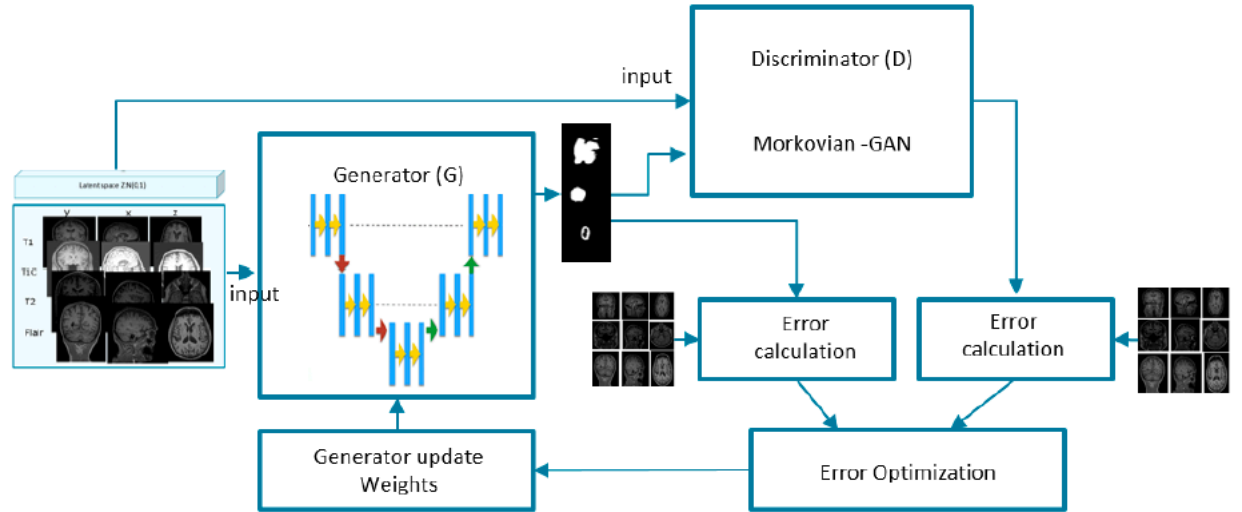


Figure 1: Proposed architecture for semantic segmentation of brain tumour

[2] <http://martinos.org/rtim/miccai2013/data.html>