

Progress Report

I. General Information

Project Title: Deep Learning Techniques for Medical Image Segmentation

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Submitted to (supervisor name): Dr. Saad

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a) Progress made since previous report. If this is the first report, list progress made so far.

Since my last report I have completed a graduate course on visual processing and learned how to implement a number of convolutional and deep neural-network architectures such a UNet and k-Dense UNet. I am currently looking into 3D segmentation methods using UNet/ResNet to recreate 3D structures in medical images from image slices. I have also completed the first iteration of my project's website/repository (though I may redo it with Flask).

(<http://brigugls.myweb.cs.uwindsor.ca/60334/project/html/home.php>)

I also taught myself how to use the Qt5 framework for C++ to create GUI. Furthermore, I learned how to use OpenCV in both C++ and Python for pixel mapping and 3D reconstruction of objects from a set of 2D images using epipolar geometry. Finally, I have also expanded upon my familiarity of Keras.

b) Tasks to be accomplished before next report. (Not required if this is the last progress report)

By the next report, I would like to complete the UNet/ResNet implementation to recreate 3D structures from medical images.

I would like to identify between 5-10 most useful deep learning architectures/implementations for medical image segmentation. In accordance with the project deliverables, the goal here would be to identify at least 2 of these implementations per medical imaging modality (such as MRI or ultrasound) and provide easy to understand instructions for non-data scientists to implement these with their own data. Likely, these instructions will primarily use Python and Keras as they are both high-level enough that they could be easily grasped by the newcomer with only basic programing ability. This would include things like environment setup, an introduction to AI, machine learning and deep learning and other supplementary material.

It is also important to identify a wide range of datasets or dataset resources to link to from my website so that users can find the training material they need.

I would also like to learn how to implement deep learning as a federated

learning model which could solve huge barriers in gaining access to datasets as a result of the strict privacy requirements present in healthcare related fields.

c) Any unforeseen obstacles/delays (complete only if applicable)

*NOTE: You may attach additional pages, if necessary.