

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 identified a number of deep learning architectures/implementations which could be very useful for medical image segmentation. I was not able to try to train or segment images using all of them. Specifically, it had been a lot more difficult than anticipated to recreate 3D structure from medical images. I will continue trying but will focus on 2D segmentation for the interim. I have begun working on a guide document which explains the basics of image segmentation and image segmentation using deep learning which I hope to add to my repo with relevant deep learning code to analyze images, and also instructions about how to setup an appropriate environment for newcomers to the field.

I have also learned a great deal about federated learning as I chose to dedicate my network security project to this topic in order to learn more for and supplement this project.

I have identified some datasets to use for image segmentation but will continue growing the list so that I may offer as many as possible.

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

I would like to complete the UNet/ResNet implementation to recreate 3D structures from medical images but will focus on completing the repo with relevant code and guiding resources as per the project scope. I will complete the project deliverables as detailed in the project scope with hope to complete the website for my project so as a means to provide a user friendly UI as per the final optional deliverable in my project scope.

I strongly believe that federated learning approaches hold value in facilitating deep learning with patient data because it seems to have great potential to solve issues surrounding the acquisition and use of sensitive data to train these models. A decentralized model would be able to tap into a vast dataset across numerous healthcare organizations while also maintaining patient privacy and leading to more well-trained models. As such, I would very much like to add an optional deliverable of providing methods to decentralize learning, if possible.

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

Implementing UNet/ResNet to recreate 3D structures was far more difficult than anticipated.

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