BIOF 510 Final Project

Topic: Automated Magnetic Resonance Image Segmentation for Human Placentas using Deep Learning

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**Instructions for Implement of the Codes**

1. Folders:

(1) Python\_Codes: This contains all the python functions.

(2) Data\_Placenta: This contains the raw T2-weighted human placenta images (fetus\_\*\_ana.nii.gz) and manually segmented placenta images (fetus\_\*\_mask.nii.gz)

(3) Data\_Placenta\_Crop: These are the cropped images, which contain mainly placenta and exclude other abdominal tissues, for the input of U-Net DL model training and the its output.

x\_\*.nii: cropped T2-weighted images for DL input

y\_\*.nii: cropped manual segmentation images for DL input

y\_pred\_\*.nii: Output of DL model of predicted placenta segmentation in the cropped space

(4) Data\_Placenta\_Pred: Output of DL model of predicted placenta segmentation transformed back to the T2-weighted image space, which is the final result.

For (2), due to the large sample size (total 1.32 GB), I uploaded the first 84 samples (84 T2 images; 84 segmentation images). For (3) and (4), also due to the large sample size (each > 2GB), I only uploaded the first 10 samples. Please let me know if you need to access all data for full evaluation.

2. The main code is called “Main\_dp.py”. This main code will call other Python functions in the same folder.

I used my lab server at Children’s National Hospital to run the codes, with Python 3.6.0, TensorFlow 1.14.0, and Keras 2.3.1. I used a sbatch script (“dp.sh”) to call “Main\_dp.py”.

These python functions were written based on these TensorFlow and Keras versions. Please let me know if there are any compatible issues.

3. The trained U-Net model is called “mymodel\_weights.h5”. Unfortunately, “mymodel\_weights.h5” is not able to upload to Github due to the large file size (700 MB). (I provided a result log file (“run.log”) for your reference. This log file is based on Adam optimizer and “binary\_crossentropy” loss function with 50 epochs. It also contains the metrics results (Dice, precision, sensitivity, and specificity) for Training Data, Validation Data, and Testing Data.