Validation Plan

Intended Use:

This algorithm is intended to assist radiologists to locate the position of hippocampus and estimate the volume of it in order to keep track the progression of Alzheimer disease.

Training Data Collection:

The "Hippocampus" dataset is from Medical Decathlon competition and in form of NIFTI files with one file per volume, and one file per corresponding segmentation mask. The original images are T2 MRI scans of the full brain.

This dataset including the brain images of male and female adult patients. The radiologist cropped volumes where only the region around the hippocampus has been cut out. And we remove the outliers of this dataset, which means, those data with no responding labels or those which has abnormal dimension of slice.

Labels of Training Data:

Labels were generated by marking of the hippocampal area of each slice. This dataset is from Vanderbilt University Medical Center. And it's shown in the website 'Medical Decathlon competition', that all data has been labeled and verified by expert radiologists, and with the best effort to mimic the accuracy required for clinical use. Each has 3 values, 0 for background, 1 for anterior and 2 for posterior.

Performances:
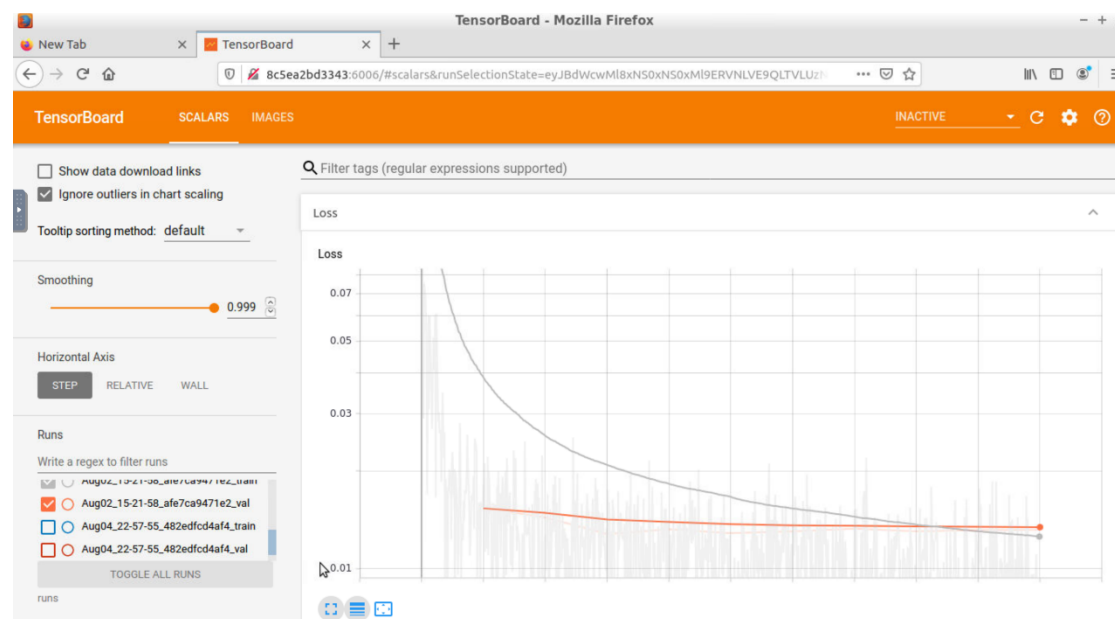
As the figure above shows, the training and validation loss is under 0.03 after 10 epochs. The mean dice similarity coefficient and jaccard similarity coefficient are respectively around 0.9 and 0.8 .

The performance of this algorithm in real word can be estimated by using of test dataset which is not exist in train and validation dataset. The doctors can mark the volumes of hippocampus in test image and use the similar way of estimation of training dataset to estimate different metrics such as Dice Similarity Coefficient and Jaccard Similarity Coefficient.

Algorithm Performances:

According to EDA this algorithm will perform well for the data of male and female patients with modality of MRI. The scanned images must be cropped to the area of hippocampus.

This algorithm is intended to estimate the progress of Alzheimer. Therefore it's

meaningful to train this algorithm by using of the dataset based on adult's brain image, especially those of the patients older than 50 years old.

And this algorithm will perform not well if the scanned brain image was not cropped. And the modality is not MRI. This algorithm is also not suitable for children and young people.