Device name : AI Hippocampal Volume

Intended Use: It is used to help clinicians and radiologists to measure the volume of Hippocampus which is the major part of the brain. Diagnosing the size of Hippocampus helps in tracking down the progression of the brain tumors.
Diagnosing manually is very time consuming as each slice of 3D images needs to be carefully observed, hence AI solutions can help automate the process and reduce the manual intervention. Hence the algorithm helps assist the clinicians who will later cross check the results from the algorithm.
The algorithm is deployed in the clinician workflow and the MRI scans will be sent to the model for segmentation. For each volume of the scan, the AI will help to segment the voxels having the hippocampus, and thereafter stack all the volume related to the given scan, and the algorithm can measure the volume of the hippocampus. The hippocampus volume measurement will then be verified by the clinicians.

Data
We used the labelled data form the publicly available dataset called “Hippocampus”. The dataset is stored as the NIFTI file with one volume per file. We didn’t use the full brain images as the data but the cross sectional of the images for ease which has been cropped and we are using the right hippocampus region only.
The labels are the segmented mask corresponding to every volume of the scan. The labels and curated by the experts .

Algorithm
We use popular U-NET segmentation architecture to segment the voxels of the hippocampus.

Performance
We measure the performance of the algorithm by jaccard’s and dice similarity coefficients. The higher the similarity closer to 1, the more is the overlap of the predicted segment and the curated mask label . The less similarity which is towards 0 indicates less intersection between the algorithm predicted segment and label.
While training with the split of 0.8:0.1:0.1 on the train/valid/test dataset, we get the loss of 0.019 on the training dataset and the validation loss of 0.013. On the test data, we get the mean Dice: 0.8512 and mean Jaccard 0.7435.
The above numbers are good enough to satisfy the intended use. The real world performance will be measured and approved after the expert opinions of the clinicians. The predictions will only help fasten the process and will be cost efficient.
In the real world scenario, the algorithm might perform well on the Hippocampus data along with the demographics data . Also the features like age and gender plays an important role in predicting the Hippocampus progression over time.