Image data :

The AD cases are less in number- due to the early formation of tissue distortion and no discomfort with pain is not seen in the major of the cases of early developmet of AD. Due to this the availablity is less in the cases segmentation approach is considered for this as it involves with the intuitation of the negative images ,Thus the main reason for the choosing the model of the segmentation/.

The few sample of postive data are oversampled with the augementation for the better segmenation.

Network Design :

For the AD architeccutre is divided into two separate architectures which includes one for the region of the detection and folowed by roi classification. For the region detection an unet segmentation model is considered cause due to the simpler design in adding the negative images during the training process. The unet segmentation model is of x layers with downsampling and upsampling layer with a droput of x range,

The filter used in the model are x,x,x filter with the downsampling and using the same with x filter of upsampling the features. For the downsampling the maxpool is used with x kernal size, With all this together the architecture has x traniable parameters and x non trainable paramaters .

For each filter of the relu activation is used in the hidden layers for the last layer the activation is sigmoid. The segmatation model is of consider the image size of x is fed to the model, the output is a region of the AD segmentation. For the model the whole image is resized and fed to the model instead of patches which is addressed in the classification model.

The model is trained on the different vendors data and including the public data, which is fed to the model. The data is annotated with the radiologists for suspicious regions of AD of x cases , iimages are filtered and fed to the segmentation model

Image and mask

Bounding Box - Region of Mask :

The Mask played a cruial role in the detection of AD with the bounding region , During the Initial development the The mask is free hand annotation which resulted in the resultation in FP, FN higer in number due to incorrect region detection and gradular tissue visiblity in the type 3, type 4 tissue more. So in order to avoid the gradular tissue and also increase the region of the detection, the bounding box is considered for the better implementation. The unet model is choosen instead of the object detection due to the availablity of image data .

After using the bounding box segmentation approach the FN is reduced drastically with a greater number, the number of the FP suspicious region of AD is not affected still the model showed the regions in the type 3 and type4 for the speculations, for the Improvement of the further a approach is considered with an addition to the above

Classification Model

The segmentation model output roi of orgnial images is taken as a input and resized to x fed to the model. The model is developed on the basis of autoencoder architecture with the adding the previous weight sof the classification model.

Encoder and decoder model.

The autoencoder first trained for the achieving segmenation task with the same layer and weights are used for the encoder architecture and few layers added for the better feature detection, the model is trained on the few images of the with the segmentation layer weights in the encoder architecture for the grater accracy once, the encoder architecure is connected with the x Dense layer and Dropout for the classification task, the outpiut layer activation is softmax is used

The model is trained on the patches of the ROI and FP regions detected from the segmentation model, thus the model improved over the stage. In the later stage the encoder architecure with dense layers is taken and trained on the FP, TP regions for the better activation which resulted in the improvement of the accuracy

The classification improved in the eliminating the FP regions more effectively and also considereing the regions of TP accurately, the patch ROI approach resulted in the improvement of the detection

Image data :

The pachtes of images roi of the segmentation training images is taken for the TP, FP regions found during the tesst and validation over the training data which resulted the suitable rgions same are used for the training the model.

Hyper parameters :

Both models trained on the loss function of binary\_crossentropy with the learning rate of 1e-3 for the segmentation.

Each model is trained for 300 epochs and results of epoch weights iis tested on the few images for considered of the equalvent perfect pair in the detection and classification of AD

The auc of the model detection under the radiologists evaluation is as follows

X cases are evalued these are FPx, FN x, TPx, TNx with the live data the results of the confustion matrix is below