Medical Image Analysis
Homework III

You can find the source code in hw_3.ipnb.

Pytorch library in Python is used in Google Colab platform. For training part, GPU is used.

AlexNet is pretrained network with input size (224,224,3). Since images in the dataset we'd like to train are size of (256,256,3), they are resized to comply with the input layer. Normalization part is given in the Alexnet PyTorch documentation. You can check it here.

AlexNet in Pytorch has three different components, features, average pool and classification. In classification component, the last layer is replaced with a linear transformation with input size 4096 and output size 3 for our classification purposes. Cross entropy loss function is used in backpropagation. Stochastic gradient descent optimizer is used. Learning rate is 0.001 and momentum is selected as 0.9. The values are selected using the example for transfer learning in PyTorch. You can find the example here. The training takes 25 epochs.
Class imbalance problem is handled with a weighted sampling strategy. Weights are assigned to the classes and sampler get a batch with 4 images concerning the weights for each class.

	Training portion of the training set				Validation portion of the training set				Test set			
	Class I	Class II	Class III	Overall	Class I	Class II	Class III	Overall	Class I	Class II	Class III	Overall
With input normalization and with addressing the class-imbalance problem	1	1	1	1	0.9519	0.9167	0.9894	0.9485	0.9425	0.9587	0.9888	0.963
With input normalization and without addressing the class-imbalance problem	0.898	0.9605	0.7778	0.9477	0.8636	0.8658	0.7353	0.9061	0.8586	0.9044	0.7558	0.9192
Without input normalization and with addressing the class-imbalance problem	0.8235	0.8065	0.6071	0.8758	0.7982	0.7692	0.642	0.8576	0.8317	0.7866	0.6571	0.8721