Code Write-up

Project team members:

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Project Abstract:

Alzheimer's disease is the most common cause for dementia (loss of memory and other cognitive abilities). Alzheimer's disease is caused when some part of the brain cells is not working well. This is mainly by plaques and tangles. Plaques are deposits of a protein called "beta-amyloid" in spaces between nerve cells and tangles are twisted fibers of protein called "tau" that build inside neurons. These deposits can be seen in MRI scans but in the early stages it is very difficult to see them with naked eye. We propose a comparative study between attention models like Vision Transformer and Compact Convolutional transformer and state-of-the-art models like VGGNet, ResNet, and AlexNet to classify MRI images into 4 categories. Compact Convolutional Transformer gives better testing accuracy than vision transformers which show that convolutions work better than image patching. Out of all the models, VGGNet gives the highest accuracy of 74.59%. Attention models require a lot of data. We had limitations of data for this project and hence, attention models are not performing to their optimum.

Files:

1. cv_vit.ipynb :- Notebook for the ViT model
2. cv_cct.ipynb :- Notebook for the CCT model
3. cv_cnn_vggpret.ipynb :- Notebook for the 5 layered CNN network and VGG pretrained on Imagenet weights model
4. cv_vgg.ipynb :- Notebook for the VGG model trained from scratch
5. cv_alex.ipynb :- Notebook for the Alexnet model trained from scratch
6. cv_resnet.ipynb :- Notebook for the pretrained Resnet on Imagenet weights model
7. mymodel_vgg, mymodel_vit :- models for models trained from scratch
8. cct_model.h5 :- weights from CCT model

How to Run the files:

Steps:
1. Replace/remove the mention of the colab/google drive

2. Place the folder path to the dataset in your local systems. NOTE: Some places we are using separate images for the purpose of visualization so please change the path there also.
3. All the notebooks are ready to run on a single command and not much changes are required

About the data:

- The data is divided into 3 folders.
- First is the training set where we have made changes so as to generate more data for the minority class and another is train2 folder which has duplicate images as examples for 2 classes which have the least examples to try and cover the lack of data. What we observed is that although there is redundancy in information available the models learn pretty well in presence of duplicate data.
- Google docs link: https://drive.google.com/drive/folders/1YtYy1_8hGx24O8ZkyyrCqec9Qf3KisxK?usp=sharing