Odysseas Papakyriakou

TRAIN: AMS_SING

```
trainer.fit(model=model, datamodule=train_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
INFO:pytorch_lightning.callbacks.model_summary:
   | Name             | Type       | Params | In sizes                                  | Out sizes
-------------------------------------------------------------------------------------------------------------
0  | final_activation | Softmax2d  | 0      | ?                                         | ?
1  | loss_function    | DiceLoss   | 0      | ?                                         | ?
2  | layers           | ModuleList | 1.9 M  | ?                                         | ?
3  | layers.0         | DoubleConv | 2.7 K  | [1, 2, 240, 240]                          | [1, 16, 240, 240]
4  | layers.1         | DownBlock  | 14.0 K | [1, 16, 240, 240]                         | [1, 32, 120, 120]
5  | layers.2         | DownBlock  | 55.6 K | [1, 32, 120, 120]                         | [1, 64, 60, 60]
6  | layers.3         | DownBlock  | 221 K  | [1, 64, 60, 60]                           | [1, 128, 30, 30]
7  | layers.4         | DownBlock  | 885 K  | [1, 128, 30, 30]                          | [1, 256, 15, 15]
8  | layers.5         | UpBlock    | 574 K  | [[1, 256, 15, 15], [1, 128, 30, 30]]      | [1, 128, 30, 30]
9  | layers.6         | UpBlock    | 143 K  | [[1, 128, 30, 30], [1, 64, 60, 60]]       | [1, 64, 60, 60]
10 | layers.7         | UpBlock    | 36.0 K | [[1, 64, 60, 60], [1, 32, 120, 120]]      | [1, 32, 120, 120]
11 | layers.8         | UpBlock    | 9.0 K  | [[1, 32, 120, 120], [1, 16, 240, 240]]    | [1, 16, 240, 240]
12 | layers.9         | Conv2d     | 51     | [1, 16, 240, 240]                         | [1, 3, 240, 240]
-------------------------------------------------------------------------------------------------------------
1.9 M     Trainable params
0         Non-trainable params
1.9 M     Total params
3.885     Total estimated model params size (MB)
Prefetching dataset: 100% 166/166 [01:30<00:00, 2.71it/s]
/content/drive/MyDrive/Colab_Notebooks/MRI_WMH_project/code/dataset_dataloading.py:35: RuntimeWarning: invalid value encountered in true_divide
  return (x - min_val) / (max_val - min_val)
/usr/local/lib/python3.8/dist-packages/torch/utils/data/dataloader.py:554: UserWarning: This DataLoader will create 16 worker processes in total. Our suggested max numbe
  warnings.warn(_create_warning_msg(
Prefetching dataset: 100% 882/882 [11:05<00:00, 4.15it/s]
Epoch 99: 100% 98/98 [00:11<00:00, 8.29it/s, loss=0.144, v_num=g_15, loss_step=0.162, val_loss=0.0755, loss_epoch=0.128]
```

TEST:

- AMS_SING

```
[12] #define test parameters
     test_subset = "Ams_Sing"
```

```
[13] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[14] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 262/262 [00:45<00:00, 4.45it/s]
Testing DataLoader 0: 100% 66/66 [00:01<00:00, 50.03it/s]
──────────────────────────────────────────────────────────────────────────────
       Test metric             DataLoader 0
──────────────────────────────────────────────────────────────────────────────
        test_loss           0.1357346922159195
──────────────────────────────────────────────────────────────────────────────
[{'test_loss': 0.1357346922159195}]
```

- AMS

```
[15] #define test parameters
     test_subset = "Amsterdam"
```

```
[16] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[17] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 332/332 [00:55<00:00, 4.26it/s]
Testing DataLoader 0: 100% 83/83 [00:01<00:00, 48.65it/s]
──────────────────────────────────────────────────────────────────────────────
       Test metric             DataLoader 0
──────────────────────────────────────────────────────────────────────────────
        test_loss           0.08326103538274765
──────────────────────────────────────────────────────────────────────────────
[{'test_loss': 0.08326103538274765}]
```

- SING

```
[18] #define test parameters
     test_subset = "Singapore"
```

```
[19] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[20] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 192/192 [00:35<00:00, 4.17it/s]
Testing DataLoader 0: 100% 48/48 [00:00<00:00, 51.19it/s]
──────────────────────────────────────────────────────────────────────────────
       Test metric             DataLoader 0
──────────────────────────────────────────────────────────────────────────────
        test_loss           0.18038572371006012
──────────────────────────────────────────────────────────────────────────────
[{'test_loss': 0.18038572371006012}]
```

- UTR_AMS

```
[21] #define test parameters
     test_subset = "Utr_Ams"
```

```
[22] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[23] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 262/262 [00:44<00:00, 5.07it/s]
Testing DataLoader 0: 100% 66/66 [00:01<00:00, 51.62it/s]
──────────────────────────────────────────────────────────────────────────────
       Test metric             DataLoader 0
──────────────────────────────────────────────────────────────────────────────
        test_loss           0.11563857644796371
──────────────────────────────────────────────────────────────────────────────
[{'test_loss': 0.11563857644796371}]
```

- UTR_AMS_SING

```
[24] #define test parameters
     test_subset = "Utr_Ams_Sing"
```

```
[25] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[26] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 179/179 [00:29<00:00, 4.83it/s]
Testing DataLoader 0: 100% 45/45 [00:00<00:00, 50.19it/s]
──────────────────────────────────────────────────────────────────────────────
       Test metric             DataLoader 0
──────────────────────────────────────────────────────────────────────────────
        test_loss           0.12882362306118011
──────────────────────────────────────────────────────────────────────────────
[{'test_loss': 0.12882362306118011}]
```

- UTR_SING

```
[27] #define test parameters
     test_subset = "Utr_Sing"
```

```
[28] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[29] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 192/192 [00:33<00:00, 4.40it/s]
Testing DataLoader 0: 100% 48/48 [00:00<00:00, 51.41it/s]
──────────────────────────────────────────────────────────────────────────────
       Test metric             DataLoader 0
──────────────────────────────────────────────────────────────────────────────
        test_loss           0.22342294454574585
──────────────────────────────────────────────────────────────────────────────
[{'test_loss': 0.22342294454574585}]
```

- UTR

```
[33] #define test parameters
     test_subset = "Utrecht"
```

```
[34] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[35] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 192/192 [00:33<00:00, 3.34it/s]
Testing DataLoader 0: 100% 48/48 [00:00<00:00, 49.94it/s]
──────────────────────────────────────────────────────────────────────────────
       Test metric             DataLoader 0
──────────────────────────────────────────────────────────────────────────────
        test_loss           0.26666465401649475
──────────────────────────────────────────────────────────────────────────────
[{'test_loss': 0.26666465401649475}]
```

TRAIN: UTR_AMS

```
[69] trainer.fit(model=model, datamodule=train_datamodule)
```

```
/usr/local/lib/python3.8/dist-packages/pytorch_lightning/callbacks/model_checkpoint.py:612: UserWarning: Checkpoint directory /content/drive/MyDrive/Colab_Notel
  rank_zero_warn(f"Checkpoint directory {dirpath} exists and is not empty.")
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
INFO:pytorch_lightning.callbacks.model_summary:
   | Name             | Type       | Params | In sizes                                  | Out sizes
-------------------------------------------------------------------------------------------------------------
0  | final_activation | Softmax2d  | 0      | ?                                         | ?
1  | loss_function    | DiceLoss   | 0      | ?                                         | ?
2  | layers           | ModuleList | 1.9 M  | ?                                         | ?
3  | layers.0         | DoubleConv | 2.7 K  | [1, 2, 240, 240]                          | [1, 16, 240, 240]
4  | layers.1         | DownBlock  | 14.0 K | [1, 16, 240, 240]                         | [1, 32, 120, 120]
5  | layers.2         | DownBlock  | 55.6 K | [1, 32, 120, 120]                         | [1, 64, 60, 60]
6  | layers.3         | DownBlock  | 221 K  | [1, 64, 60, 60]                           | [1, 128, 30, 30]
7  | layers.4         | DownBlock  | 885 K  | [1, 128, 30, 30]                          | [1, 256, 15, 15]
8  | layers.5         | UpBlock    | 574 K  | [[1, 256, 15, 15], [1, 128, 30, 30]]      | [1, 128, 30, 30]
9  | layers.6         | UpBlock    | 143 K  | [[1, 128, 30, 30], [1, 64, 60, 60]]       | [1, 64, 60, 60]
10 | layers.7         | UpBlock    | 36.0 K | [[1, 64, 60, 60], [1, 32, 120, 120]]      | [1, 32, 120, 120]
11 | layers.8         | UpBlock    | 9.0 K  | [[1, 32, 120, 120], [1, 16, 240, 240]]    | [1, 16, 240, 240]
12 | layers.9         | Conv2d     | 51     | [1, 16, 240, 240]                         | [1, 3, 240, 240]
-------------------------------------------------------------------------------------------------------------
1.9 M     Trainable params
0         Non-trainable params
1.9 M     Total params
3.885     Total estimated model params size (MB)
Prefetching dataset: 100% 131/131 [00:57<00:00, 4.63it/s]
Prefetching dataset: 100% 917/917 [10:30<00:00, 4.29it/s]
Epoch 96: 100% 91/91 [00:12<00:00, 7.22it/s, loss=0.112, v_num=s_15, loss_step=0.132, val_loss=0.136, loss_epoch=0.127]
```

TEST:

- AMS_SING

```
[72] #define test parameters
     test_subset = "Ams_Sing"
```

```
[73] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[74] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 262/262 [00:44<00:00, 4.36it/s]
Testing DataLoader 0: 100% 66/66 [00:01<00:00, 50.28it/s]
```

Test metric	DataLoader 0
test_loss	0.13575883209705353

```
[{'test_loss': 0.13575883209705353}]
```

- AMS

```
[75] #define test parameters
     test_subset = "Amsterdam"
```

```
[76] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[77] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 332/332 [00:55<00:00, 4.37it/s]
Testing DataLoader 0: 100% 83/83 [00:01<00:00, 48.83it/s]
```

Test metric	DataLoader 0
test_loss	0.0832882821559906

```
[{'test_loss': 0.0832882821559906}]
```

- SING

```
[78] #define test parameters
     test_subset = "Singapore"
```

```
[79] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[80] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 192/192 [00:34<00:00, 4.30it/s]
Testing DataLoader 0: 100% 48/48 [00:00<00:00, 51.35it/s]
```

Test metric	DataLoader 0
test_loss	0.18040549755096436

```
[{'test_loss': 0.18040549755096436}]
```

- UTR_AMS

```
[81] #define test parameters
     test_subset = "Utr_Ams"
```

```
[82] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[83] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 262/262 [00:43<00:00, 4.90it/s]
Testing DataLoader 0: 100% 66/66 [00:01<00:00, 50.60it/s]
```

Test metric	DataLoader 0
test_loss	0.11566479504108429

```
[{'test_loss': 0.11566479504108429}]
```

- UTR_AMS_SING

```
#define test parameters
test_subset = "Utr_Ams_Sing"
```

```
[85] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[86] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 179/179 [00:29<00:00, 4.92it/s]
Testing DataLoader 0: 100% 45/45 [00:00<00:00, 53.76it/s]
```

Test metric	DataLoader 0
test_loss	0.1288483887910843

```
[{'test_loss': 0.1288483887910843}]
```

- UTR_SING

```
[88] #define test parameters
     test_subset = "Utr_Sing"
```

```
[89] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[90] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 192/192 [00:34<00:00, 4.46it/s]
Testing DataLoader 0: 100% 48/48 [00:00<00:00, 50.95it/s]
```

Test metric	DataLoader 0
test_loss	0.22344303131103516

```
[{'test_loss': 0.22344303131103516}]
```

- UTR

```
[91] #define test parameters
     test_subset = "Utrecht"
```

```
[92] test_datamodule = WMHTestDataModule(
         test_dataset_directory = dataset_path,
         selected_test_subset = test_subset,
         batch_size=16,
         # If you're getting errors in training, set
         # num_workers to 0 for clearer error messages.
         num_workers=16,
         # This setting will spend a few more minutes longer at startup
         # but will also run much faster when the training starts.
         # Set to False if you don't have enough memory for this.
         use_prefetch=True
     )
```

```
[93] trainer.test(model=model, datamodule=test_datamodule)
```

```
INFO:pytorch_lightning.accelerators.cuda:LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0]
Prefetching dataset: 100% 192/192 [00:31<00:00, 4.78it/s]
Testing DataLoader 0: 100% 48/48 [00:00<00:00, 52.44it/s]
```

Test metric	DataLoader 0
test_loss	0.26668331027030945

```
[{'test_loss': 0.26668331027030945}]
```