

Mount google drive

In []:

```
from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

In []:

```
cd drive/MyDrive/
```

/content/drive/MyDrive

In []:

```
cd "CSE472: Computer Vision"/"Assignment 2"
```

/content/drive/MyDrive/CSE472: Computer Vision/Assignment 2

Fine-tuning the model

In []:

```
from main import Trainer
import matplotlib.pyplot as plt
```

In []:

```
epochs = 50
batchSize = 32
learningRate = 1e-6
```

In []:

```
trainer = Trainer(epochs, batchSize, learningRate)
trainer.train()
```

100%|██████████| 2342/2342 [00:09<00:00, 258.95it/s]

100%|██████████| 500/500 [00:02<00:00, 230.84it/s]

Epoch 1:

100%|██████████| 74/74 [01:17<00:00, 1.05s/it]

train loss = 0.000125

100%|██████████| 500/500 [00:08<00:00, 59.83it/s]

valid loss = 0.004955

Test loss decreased, saving the model...

Epoch 2:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000122

100%|██████████| 500/500 [00:08<00:00, 59.34it/s]

valid loss = 0.004886

Test loss decreased, saving the model...

Epoch 3:

100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000121

100%|██████████| 500/500 [00:08<00:00, 59.21it/s]

valid loss = 0.004848

Test loss decreased, saving the model...

Epoch 4:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000121

100%|██████████| 500/500 [00:08<00:00, 59.20it/s]

valid loss = 0.004823

Test loss decreased, saving the model...

Epoch 5:

100%|██████████| 74/74 [01:16<00:00, 1.03s/it]

train loss = 0.000120

100%|██████████| 500/500 [00:08<00:00, 59.29it/s]

valid loss = 0.004811

Test loss decreased, saving the model...

Epoch 6:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000120

100%|██████████| 500/500 [00:08<00:00, 59.22it/s]

valid loss = 0.004795

Test loss decreased, saving the model...

Epoch 7:

100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000120

100%|██████████| 500/500 [00:08<00:00, 59.17it/s]

valid loss = 0.004791

Test loss decreased, saving the model...

Epoch 8:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000119

100%|██████████| 500/500 [00:08<00:00, 59.21it/s]

valid loss = 0.004786

Test loss decreased, saving the model...

Epoch 9:

100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000119

100%|██████████| 500/500 [00:08<00:00, 59.16it/s]

valid loss = 0.004779

Test loss decreased, saving the model...

Epoch 10:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

```
train loss = 0.000119
100%|██████████| 500/500 [00:08<00:00, 59.14it/s]

valid loss = 0.004776
Test loss decreased, saving the model...
-----
Epoch 11:
100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000118
100%|██████████| 500/500 [00:08<00:00, 59.25it/s]

valid loss = 0.004778
-----
Epoch 12:
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000118
100%|██████████| 500/500 [00:08<00:00, 59.11it/s]

valid loss = 0.004772
Test loss decreased, saving the model...
-----
Epoch 13:
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000118
100%|██████████| 500/500 [00:08<00:00, 59.26it/s]

valid loss = 0.004767
Test loss decreased, saving the model...
-----
Epoch 14:
100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000118
100%|██████████| 500/500 [00:08<00:00, 59.23it/s]

valid loss = 0.004779
-----
Epoch 15:
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000118
100%|██████████| 500/500 [00:08<00:00, 59.18it/s]

valid loss = 0.004769
-----
Epoch 16:
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000118
100%|██████████| 500/500 [00:08<00:00, 59.17it/s]

valid loss = 0.004771
-----
Epoch 17:
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000117
100%|██████████| 500/500 [00:08<00:00, 59.19it/s]

valid loss = 0.004765
```

Test loss decreased, saving the model...

Epoch 18:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000117

100%|██████████| 500/500 [00:08<00:00, 59.37it/s]

valid loss = 0.004767

Epoch 19:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000117

100%|██████████| 500/500 [00:08<00:00, 59.26it/s]

valid loss = 0.004767

Epoch 20:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000117

100%|██████████| 500/500 [00:08<00:00, 59.21it/s]

valid loss = 0.004763

Test loss decreased, saving the model...

Epoch 21:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000117

100%|██████████| 500/500 [00:08<00:00, 59.25it/s]

valid loss = 0.004764

Epoch 22:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000117

100%|██████████| 500/500 [00:08<00:00, 59.20it/s]

valid loss = 0.004762

Test loss decreased, saving the model...

Epoch 23:

100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000117

100%|██████████| 500/500 [00:08<00:00, 59.17it/s]

valid loss = 0.004760

Test loss decreased, saving the model...

Epoch 24:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000116

100%|██████████| 500/500 [00:08<00:00, 59.18it/s]

valid loss = 0.004761

Epoch 25:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000116

100%|██████████| 500/500 [00:08<00:00, 59.16it/s]

valid loss = 0.004755

Test loss decreased, saving the model...

Epoch 26:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000116

100%|██████████| 500/500 [00:08<00:00, 59.22it/s]

valid loss = 0.004760

Epoch 27:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000116

100%|██████████| 500/500 [00:08<00:00, 59.20it/s]

valid loss = 0.004760

Epoch 28:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000116

100%|██████████| 500/500 [00:08<00:00, 58.95it/s]

valid loss = 0.004756

Epoch 29:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.17it/s]

valid loss = 0.004756

Epoch 30:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.28it/s]

valid loss = 0.004757

Epoch 31:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.13it/s]

valid loss = 0.004758

Epoch 32:

100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.05it/s]

valid loss = 0.004766

Epoch 33:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.18it/s]

valid loss = 0.004757

Epoch 34:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.17it/s]

valid loss = 0.004758

Epoch 35:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.17it/s]

valid loss = 0.004750

Test loss decreased, saving the model...

Epoch 36:

100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.21it/s]

valid loss = 0.004749

Test loss decreased, saving the model...

Epoch 37:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000115

100%|██████████| 500/500 [00:08<00:00, 59.22it/s]

valid loss = 0.004753

Epoch 38:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.11it/s]

valid loss = 0.004759

Epoch 39:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.22it/s]

valid loss = 0.004749

Epoch 40:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.14it/s]

valid loss = 0.004750

Epoch 41:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.11it/s]

valid loss = 0.004748

Test loss decreased, saving the model...

Epoch 42:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.26it/s]

valid loss = 0.004755

Epoch 43:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.21it/s]

valid loss = 0.004746

Test loss decreased, saving the model...

Epoch 44:

100%|██████████| 74/74 [01:17<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.14it/s]

valid loss = 0.004747

Epoch 45:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000114

100%|██████████| 500/500 [00:08<00:00, 59.15it/s]

valid loss = 0.004752

Epoch 46:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000113

100%|██████████| 500/500 [00:08<00:00, 59.15it/s]

valid loss = 0.004744

Test loss decreased, saving the model...

Epoch 47:

100%|██████████| 74/74 [01:16<00:00, 1.04s/it]

train loss = 0.000113

100%|██████████| 500/500 [00:08<00:00, 59.17it/s]

valid loss = 0.004749

Epoch 48:

```
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]
```

```
train loss = 0.000113
```

```
100%|██████████| 500/500 [00:08<00:00, 59.14it/s]
```

```
valid loss = 0.004748
```

```
-----  
Epoch 49:
```

```
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]
```

```
train loss = 0.000113
```

```
100%|██████████| 500/500 [00:08<00:00, 58.57it/s]
```

```
valid loss = 0.004746
```

```
-----  
Epoch 50:
```

```
100%|██████████| 74/74 [01:16<00:00, 1.04s/it]
```

```
train loss = 0.000113
```

```
100%|██████████| 500/500 [00:08<00:00, 59.30it/s]
```

```
valid loss = 0.004746
```

```
-----  
Finish training.
```

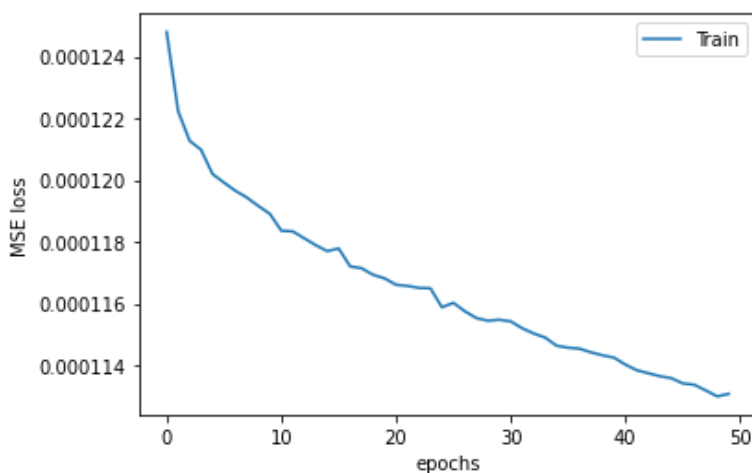
Graph of loss functions

```
In [ ]:
```

```
plt.plot(trainer.losses, label="Train")  
plt.xlabel("epochs")  
plt.ylabel("MSE loss")  
plt.legend(loc="upper right")
```

```
Out [ ]:
```

```
<matplotlib.legend.Legend at 0x7fa3d18eaf90>
```



```
In [ ]:
```

```
plt.plot(trainer.test_losses, label="Test")  
plt.xlabel("epochs")  
plt.ylabel("MSE loss")  
plt.legend(loc="upper right")
```

```
Out [ ]:
```

```
<matplotlib.legend.Legend at 0x7fa3d3333910>
```



