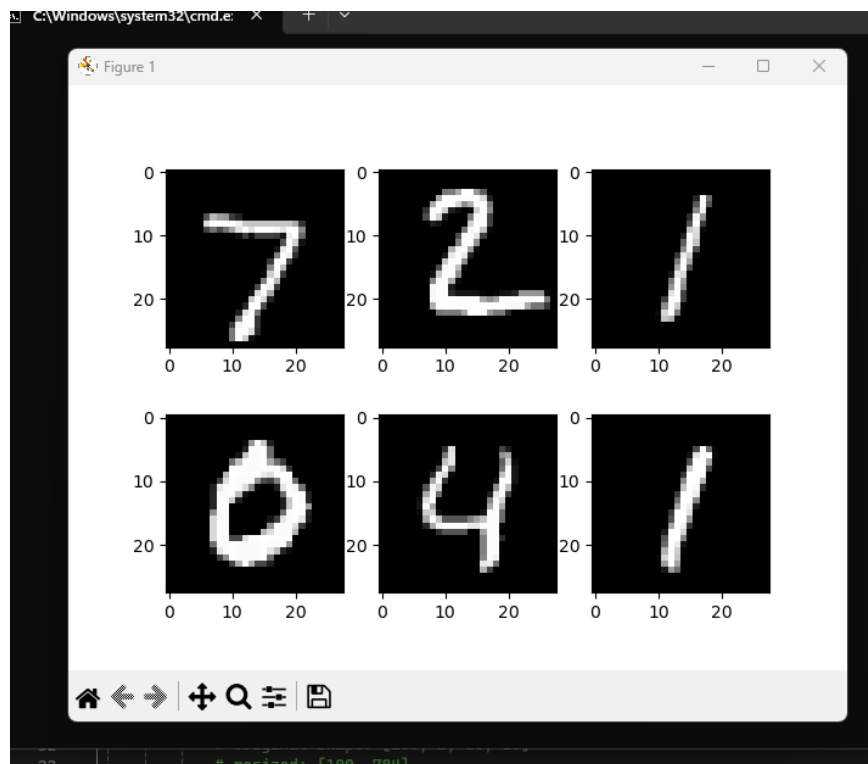


ASSIGNMENT #09

PROBLEM 01 OUTPUT - pytorch1.py

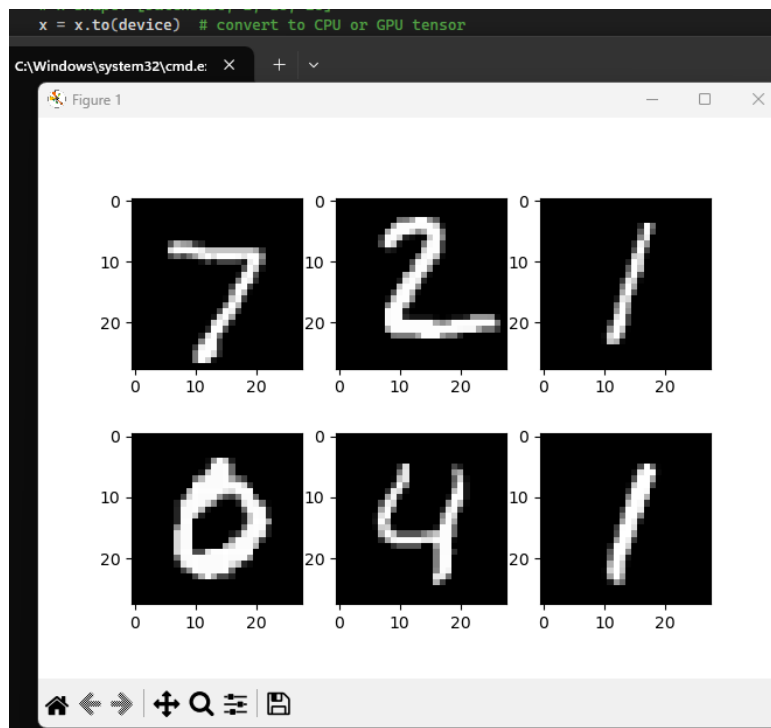
```
C:\Windows\system32\cmd.e. X + v
OrderedDict([('w', tensor([1.9679], device='cuda:0')), ('b', tensor([0.5022], device='cuda:0'))])
epoch86 validation loss = tensor(0.0117, device='cuda:0')
OrderedDict([('w', tensor([1.9686], device='cuda:0')), ('b', tensor([0.4977], device='cuda:0'))])
epoch87 validation loss = tensor(0.0112, device='cuda:0')
OrderedDict([('w', tensor([1.9693], device='cuda:0')), ('b', tensor([0.4933], device='cuda:0'))])
epoch88 validation loss = tensor(0.0107, device='cuda:0')
OrderedDict([('w', tensor([1.9700], device='cuda:0')), ('b', tensor([0.4890], device='cuda:0'))])
epoch89 validation loss = tensor(0.0102, device='cuda:0')
OrderedDict([('w', tensor([1.9707], device='cuda:0')), ('b', tensor([0.4848], device='cuda:0'))])
epoch90 validation loss = tensor(0.0098, device='cuda:0')
OrderedDict([('w', tensor([1.9714], device='cuda:0')), ('b', tensor([0.4806], device='cuda:0'))])
epoch91 validation loss = tensor(0.0094, device='cuda:0')
OrderedDict([('w', tensor([1.9720], device='cuda:0')), ('b', tensor([0.4766], device='cuda:0'))])
epoch92 validation loss = tensor(0.0089, device='cuda:0')
OrderedDict([('w', tensor([1.9726], device='cuda:0')), ('b', tensor([0.4727], device='cuda:0'))])
epoch93 validation loss = tensor(0.0085, device='cuda:0')
OrderedDict([('w', tensor([1.9732], device='cuda:0')), ('b', tensor([0.4688], device='cuda:0'))])
epoch94 validation loss = tensor(0.0082, device='cuda:0')
OrderedDict([('w', tensor([1.9738], device='cuda:0')), ('b', tensor([0.4650], device='cuda:0'))])
epoch95 validation loss = tensor(0.0078, device='cuda:0')
OrderedDict([('w', tensor([1.9744], device='cuda:0')), ('b', tensor([0.4614], device='cuda:0'))])
epoch96 validation loss = tensor(0.0075, device='cuda:0')
OrderedDict([('w', tensor([1.9750], device='cuda:0')), ('b', tensor([0.4578], device='cuda:0'))])
epoch97 validation loss = tensor(0.0071, device='cuda:0')
OrderedDict([('w', tensor([1.9755], device='cuda:0')), ('b', tensor([0.4542], device='cuda:0'))])
epoch98 validation loss = tensor(0.0068, device='cuda:0')
OrderedDict([('w', tensor([1.9761], device='cuda:0')), ('b', tensor([0.4508], device='cuda:0'))])
epoch99 validation loss = tensor(0.0065, device='cuda:0')
OrderedDict([('w', tensor([1.9766], device='cuda:0')), ('b', tensor([0.4474], device='cuda:0'))])
Press any key to continue . . .
```

PROBLEM 02 OUTPUT 1- Without Convolutions, LinearMNISTTrain.py



```
C:\Windows\system32\cmd.e: X + v
Epoch [6/10], Step[300/600], Loss: 1.5167
Epoch [6/10], Step[400/600], Loss: 1.5053
Epoch [6/10], Step[500/600], Loss: 1.4799
Epoch [6/10], Step[600/600], Loss: 1.5136
Epoch [7/10], Step[100/600], Loss: 1.4906
Epoch [7/10], Step[200/600], Loss: 1.4821
Epoch [7/10], Step[300/600], Loss: 1.5094
Epoch [7/10], Step[400/600], Loss: 1.4627
Epoch [7/10], Step[500/600], Loss: 1.4735
Epoch [7/10], Step[600/600], Loss: 1.4669
Epoch [8/10], Step[100/600], Loss: 1.4796
Epoch [8/10], Step[200/600], Loss: 1.5026
Epoch [8/10], Step[300/600], Loss: 1.4925
Epoch [8/10], Step[400/600], Loss: 1.4628
Epoch [8/10], Step[500/600], Loss: 1.5027
Epoch [8/10], Step[600/600], Loss: 1.4871
Epoch [9/10], Step[100/600], Loss: 1.4713
Epoch [9/10], Step[200/600], Loss: 1.4902
Epoch [9/10], Step[300/600], Loss: 1.4768
Epoch [9/10], Step[400/600], Loss: 1.4759
Epoch [9/10], Step[500/600], Loss: 1.5005
Epoch [9/10], Step[600/600], Loss: 1.4935
Epoch [10/10], Step[100/600], Loss: 1.4722
Epoch [10/10], Step[200/600], Loss: 1.4816
Epoch [10/10], Step[300/600], Loss: 1.4630
Epoch [10/10], Step[400/600], Loss: 1.4748
Epoch [10/10], Step[500/600], Loss: 1.4973
Epoch [10/10], Step[600/600], Loss: 1.4772
Accuracy of the network on the 10000 test images: 96.79999542236328 %
Press any key to continue . . . |
33 # resized: [100, 784]
24 images = images.reshape(-1, 784).to(device)
```

PROBLEM 02 OUTPUT 2- With Convolutions, CNNMNISTTrain.py



```
x = x.to(device) # convert to CPU or GPU tensor
```

C:\Windows\system32\cmd.e: X + v

Epoch	Step	Loss
Epoch [6/10]	Step[300/600]	Loss: 1.4915
Epoch [6/10]	Step[400/600]	Loss: 1.4820
Epoch [6/10]	Step[500/600]	Loss: 1.4728
Epoch [6/10]	Step[600/600]	Loss: 1.4773
Epoch [7/10]	Step[100/600]	Loss: 1.4618
Epoch [7/10]	Step[200/600]	Loss: 1.4727
Epoch [7/10]	Step[300/600]	Loss: 1.4640
Epoch [7/10]	Step[400/600]	Loss: 1.4657
Epoch [7/10]	Step[500/600]	Loss: 1.4947
Epoch [7/10]	Step[600/600]	Loss: 1.4755
Epoch [8/10]	Step[100/600]	Loss: 1.4661
Epoch [8/10]	Step[200/600]	Loss: 1.4924
Epoch [8/10]	Step[300/600]	Loss: 1.4618
Epoch [8/10]	Step[400/600]	Loss: 1.4862
Epoch [8/10]	Step[500/600]	Loss: 1.5036
Epoch [8/10]	Step[600/600]	Loss: 1.4913
Epoch [9/10]	Step[100/600]	Loss: 1.4999
Epoch [9/10]	Step[200/600]	Loss: 1.4792
Epoch [9/10]	Step[300/600]	Loss: 1.4810
Epoch [9/10]	Step[400/600]	Loss: 1.4739
Epoch [9/10]	Step[500/600]	Loss: 1.4741
Epoch [9/10]	Step[600/600]	Loss: 1.4783
Epoch [10/10]	Step[100/600]	Loss: 1.4715
Epoch [10/10]	Step[200/600]	Loss: 1.4827
Epoch [10/10]	Step[300/600]	Loss: 1.4613
Epoch [10/10]	Step[400/600]	Loss: 1.4783
Epoch [10/10]	Step[500/600]	Loss: 1.4707
Epoch [10/10]	Step[600/600]	Loss: 1.4787

Accuracy of the network on the 10000 test images: 98.47000122070312 %
Press any key to continue . . . |

PROBLEM 03 OUTPUT – CancerClassification.py using 6 feature maps

```
Accuracy of the network on the test set: 43.333335876464844 %
Epoch [9/10], Step[10/66], Loss: 1.5048
Epoch [9/10], Step[20/66], Loss: 1.5048
Epoch [9/10], Step[30/66], Loss: 1.5048
Epoch [9/10], Step[40/66], Loss: 1.8048
Epoch [9/10], Step[50/66], Loss: 1.5048
Epoch [9/10], Step[60/66], Loss: 1.6048
Accuracy of the network on the test set: 43.333335876464844 %
Epoch [10/10], Step[10/66], Loss: 1.5048
Epoch [10/10], Step[20/66], Loss: 1.5048
Epoch [10/10], Step[30/66], Loss: 1.5048
Epoch [10/10], Step[40/66], Loss: 1.8048
Epoch [10/10], Step[50/66], Loss: 1.5048
Epoch [10/10], Step[60/66], Loss: 1.6048
Accuracy of the network on the test set: 43.333335876464844 %
Press any key to continue . . .
```

PROBLEM 03 OUTPUT – CancerClassification.py using 16 feature maps, with 15X1 CNN1 and 18X1 CNN2

```
by a with one hidden layer classifier
C:\Windows\system32\cmd.e: X + v
Accuracy of the network on the test set: 90.66667175292969 %
Epoch [7/10], Step[10/66], Loss: 0.9061
Epoch [7/10], Step[20/66], Loss: 1.0994
Epoch [7/10], Step[30/66], Loss: 1.3045
Epoch [7/10], Step[40/66], Loss: 0.9049
Epoch [7/10], Step[50/66], Loss: 1.0008
Epoch [7/10], Step[60/66], Loss: 1.1859
Accuracy of the network on the test set: 90.66667175292969 %
Epoch [8/10], Step[10/66], Loss: 0.9053
Epoch [8/10], Step[20/66], Loss: 0.9050
Epoch [8/10], Step[30/66], Loss: 0.9050
Epoch [8/10], Step[40/66], Loss: 1.0007
Epoch [8/10], Step[50/66], Loss: 1.1935
Epoch [8/10], Step[60/66], Loss: 1.2717
Accuracy of the network on the test set: 84.0 %
Epoch [9/10], Step[10/66], Loss: 1.1570
Epoch [9/10], Step[20/66], Loss: 0.9092
Epoch [9/10], Step[30/66], Loss: 0.9050
Epoch [9/10], Step[40/66], Loss: 1.0008
Epoch [9/10], Step[50/66], Loss: 1.0928
Epoch [9/10], Step[60/66], Loss: 0.9976
Accuracy of the network on the test set: 84.0 %
Epoch [10/10], Step[10/66], Loss: 1.0921
Epoch [10/10], Step[20/66], Loss: 0.9060
Epoch [10/10], Step[30/66], Loss: 0.9056
Epoch [10/10], Step[40/66], Loss: 0.9533
Epoch [10/10], Step[50/66], Loss: 0.9059
Epoch [10/10], Step[60/66], Loss: 0.9052
Accuracy of the network on the test set: 100.0 %
```