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Report(Assignment 3)

ML2.

Library (pytorch,sklearn)

Steps:

1.Read images and convert them to Grey scale dataset

2.Split grey dataset into train,test,val with ratio 7:2:1.

3. Load train dataset into batches of size 128 with shuffling.

4.Build class Autoencoder:

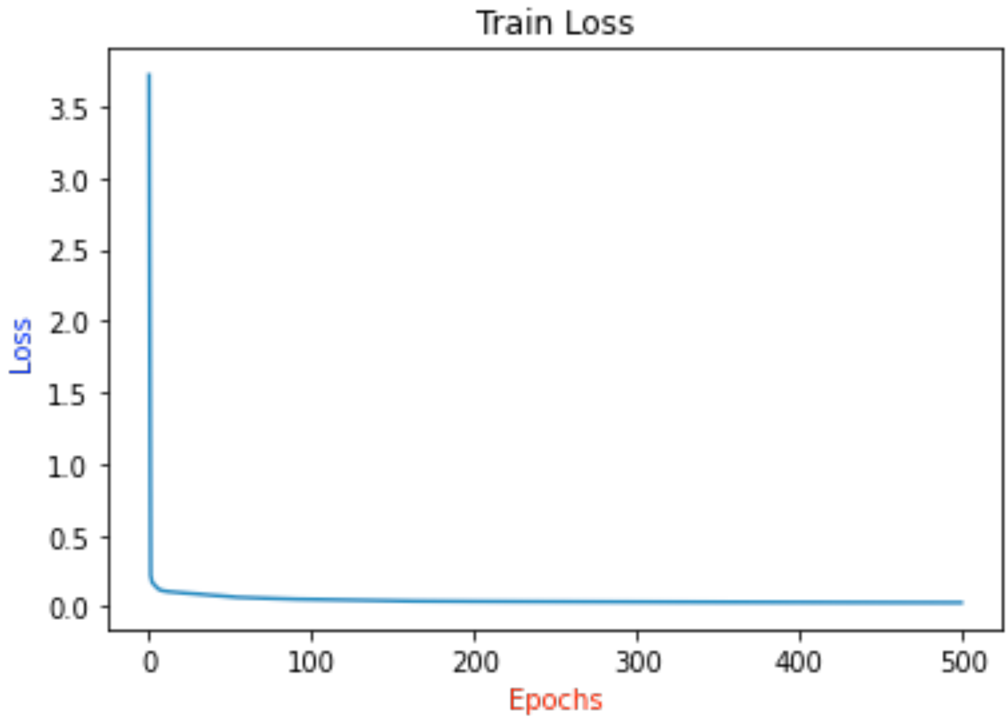
```
self.enc1 = nn.Linear(in_features=62500,
out_features=256)
        self.enc2 = nn.Linear(in_features=256,
out_features=128)
        self.dec1 = nn.Linear(in_features=128,
out_features=256)
        self.dec2 = nn.Linear(in_features=256,
out_features=62500)
```

One hidden layer self.enc2 and self.dec1.

Activation function used :Relu.

5.Evalute validation loss with randomly weight bias parameters .

6.Train the model with 500 epochs



Loss decreases to less than 3 percent i.e. .028 within 500 epochs

7.first batch of Test dataset of size 20 is taken and Find the output dataset or image reconstruction with saved model parameters.

8.Got Loss (MSE)of .0363 on reconstruction with encoding decoding network.

9.Plot the 20 images of original and reconstructed batch.

PCA:

1.from sklearn get the principle components with n=[5,10,20]

2.Top eigen vectors:

-> n=5

Loss : 0.0225

->n=10

Loss : .010

->n=20

Loss is closer to zero i.e. 9.2679e-31

2. Plot principle components of top 5 eigen vector to plot the projected images.

Conclusion :

The images still looks pretty good but the finer details are missing.

PCA's loss less than Autoencoder with one hidden layer.

->Autoencoder loss:

.0363 on That test batch

->

PCA:

When taken 5 top eigen vector got a loss of.0225.

When taken 20 top eigen vector got a loss of Approx near to zero.