Programming Assignment-III

Computer Vision-CAP 5415

Question 2: Nearest Neighbor Classification

Accuracy for different K-values

```
(torch_gpu) E:\UCF\cv\p3\q2>python knn.py
Dataset loaded
K value=  1

Train Accuracy :  1.0

Test Accuracy :  0.988

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K value=  3

Train Accuracy :  0.9930609097918273

Test Accuracy :  0.988

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K value=  5

Train Accuracy :  0.9899768696993061

Test Accuracy :  0.986

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K value=  7

Train Accuracy :  0.9845797995373939

Test Accuracy :  0.986

--------------------------------------------------
```

The accuracy was the highest for the k value =1 and it reduces gradually with the increase in k value. As K increases, the KNN fits a smoother curve to the data. This is because a higher value of K reduces the edginess by taking more data into account, thus reducing the overall complexity and flexibility of the model

For this particular dataset, the best accuracy is obtained for low k values.

Question 1: Autoencoder

Designing two AEs, one using a fully connected (FC) layers and another one using convolutions neural networks (CNNs). The objective is to implement the two AEs on the MNIST dataset and to compare their performance.

Fully Connected Autoencoder

The encoder consists of 2 layers (with 256, and 128neurons) and the decoder will also have two layers (with 256 and 784 neurons).The network is trained with MSE loss function for 10 epochs with a learning rate of 0.001.

Output

Original Images

Decoded Images

Original Images

Decoded Images

ConvNet Autoencoder

The encoder consists of two convolutional layers with 3x3 kernel size, padding of 1 and ReLU activation function. Each convolutional layer is followed by a maxpool layer. The decoder consists of three convolutional layers with 3x3 kernels, paddingof 1 and ReLU activation function. The first two layers are followed by a upsampling function that upsamples by a factor of 2. The last covolutional layer is followed by a sigmoid function .The encoder and decoder each have a total of 233472 parameters

Output

Original Images

Decoded Images

Original Images

Decoded Images