Harijan Ritik Roll No-17 Deep Learning(CSE(DE)) Exp_No:5

```
#
import keras
from keras import layers
from keras.datasets import mnist
import numpy as np
```

```
(x_train ,_),(x_test,_)=mnist.load_data()
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
11490434/11490434 [==============================] - 1s 0us/step
```

```
x_train=x_train.astype('float32')/255.
x_test=x_test.astype('float32')/255.
x_train=x_train.reshape((len(x_train),np.prod(x_train.shape[1:])))
x_test=x_test.reshape((len(x_test),np.prod(x_test.shape[1:])))
print(x_train.shape)
print(x_test.shape)
```

```
(60000, 784)
(10000, 784)
```

```
encoding_dim=32

input_img=keras.Input(shape=(784,))

encoded =layers.Dense(encoding_dim,activation='relu')(input_img)
decoded =layers.Dense(784,activation='sigmoid')(encoded)
autoencoder=keras.Model(input_img,decoded)


encoder=keras.Model(input_img,encoded)


encoded_input=keras.Input(shape=(encoding_dim,))

decoder_layer=autoencoder.layers[-1]
decoder=keras.Model(encoded_input,decoder_layer(encoded_input))


autoencoder.compile(optimizer='adam',loss='binary_crossentropy')
```

```
autoencoder.fit(x_train,x_train ,epochs=20 ,batch_size=64 ,shuffle=True,validation_data=(x_test,x_test))
```

```
Epoch 1/20
938/938 [==============================] - 8s 8ms/step - loss: 0.1912 - val_loss: 0.1327
Epoch 2/20
938/938 [==============================] - 6s 6ms/step - loss: 0.1195 - val_loss: 0.1080
Epoch 3/20
938/938 [==============================] - 7s 7ms/step - loss: 0.1040 - val_loss: 0.0981
Epoch 4/20
938/938 [==============================] - 6s 6ms/step - loss: 0.0976 - val_loss: 0.0947
Epoch 5/20
938/938 [==============================] - 7s 7ms/step - loss: 0.0955 - val_loss: 0.0936
Epoch 6/20
938/938 [==============================] - 6s 6ms/step - loss: 0.0948 - val_loss: 0.0931
Epoch 7/20
938/938 [==============================] - 7s 8ms/step - loss: 0.0944 - val_loss: 0.0930
Epoch 8/20
938/938 [==============================] - 6s 6ms/step - loss: 0.0941 - val_loss: 0.0926
Epoch 9/20
938/938 [==============================] - 8s 8ms/step - loss: 0.0939 - val_loss: 0.0925
Epoch 10/20
938/938 [==============================] - 10s 10ms/step - loss: 0.0938 - val_loss: 0.0924
Epoch 11/20
938/938 [==============================] - 8s 9ms/step - loss: 0.0937 - val_loss: 0.0926
Epoch 12/20
938/938 [==============================] - 11s 12ms/step - loss: 0.0936 - val_loss: 0.0924
Epoch 13/20
938/938 [==============================] - 8s 8ms/step - loss: 0.0935 - val_loss: 0.0923
Epoch 14/20
938/938 [==============================] - 6s 6ms/step - loss: 0.0934 - val_loss: 0.0923
Epoch 15/20
```

```
938/938 [==============================] - 7s 7ms/step - loss: 0.0934 - val_loss: 0.0922
Epoch 16/20
938/938 [==============================] - 6s 6ms/step - loss: 0.0933 - val_loss: 0.0921
Epoch 17/20
938/938 [==============================] - 7s 7ms/step - loss: 0.0933 - val_loss: 0.0922
Epoch 18/20
938/938 [==============================] - 6s 6ms/step - loss: 0.0932 - val_loss: 0.0922
Epoch 19/20
938/938 [==============================] - 7s 7ms/step - loss: 0.0932 - val_loss: 0.0921
Epoch 20/20
938/938 [==============================] - 6s 6ms/step - loss: 0.0932 - val_loss: 0.0921
<keras.callbacks.History at 0x7e2ebf4332b0>
```

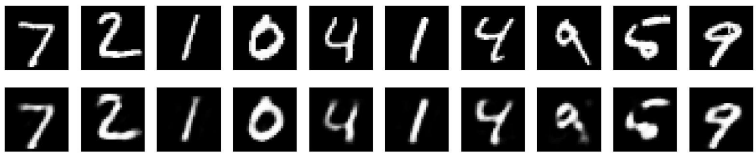
```
encoded_imgs = encoder.predict(x_test)
decoded_imgs = decoder.predict(encoded_imgs)
```

```
313/313 [==============================] - 1s 2ms/step
313/313 [==============================] - 1s 2ms/step
```

```
# Use Matplotlib (don't ask)
import matplotlib.pyplot as plt

n = 10  # How many digits we will display
plt.figure(figsize=(20, 4))
for i in range(n):
    # Display original
    ax = plt.subplot(2, n, i + 1)
    plt.imshow(x_test[i].reshape(28, 28))
    plt.gray()
    ax.get_xaxis().set_visible(False)
    ax.get_yaxis().set_visible(False)

    # Display reconstruction
    ax = plt.subplot(2, n, i + 1 + n)
    plt.imshow(decoded_imgs[i].reshape(28, 28))
    plt.gray()
    ax.get_xaxis().set_visible(False)
    ax.get_yaxis().set_visible(False)
plt.show()
```



✓ 1s completed at 10:04 AM