MMI 727 Deep Learning: Methods and Applications Assignment 3
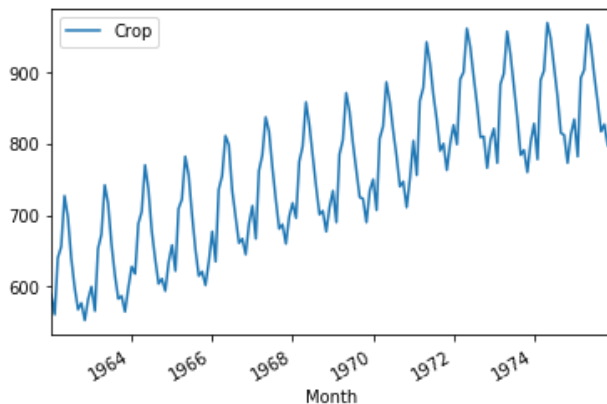
1 Autoencoder

Modify the Lab notebook to implement a Fully Connected Autoencoder for encoding MNIST dataset. Network must have 1 hidden layer with 32 nodes. You can use any optimizer you want.

2 Generative Adversarial Network

Modify the Lab notebook to implement a GAN for generating new digits using MNIST dataset. Both Discriminator and Generator must be Fully Connected Networks with 1 hidden layer. Hidden layer must have 128 nodes and the size of the noise vector must be 100. You can use any optimizer and latent space you want.

3 RNN for Time Series Data

Use the notebook file "time_series.ipynb" and csv file "crop.csv" for this question. "crop.csv" file contains monthly data for 14 years. Our aim is to make a prediction system based on given data to predict future months. Use the last 12 months as test data. Read the instructions in the notebook file carefully, it has everything you need.

Visualization of input data
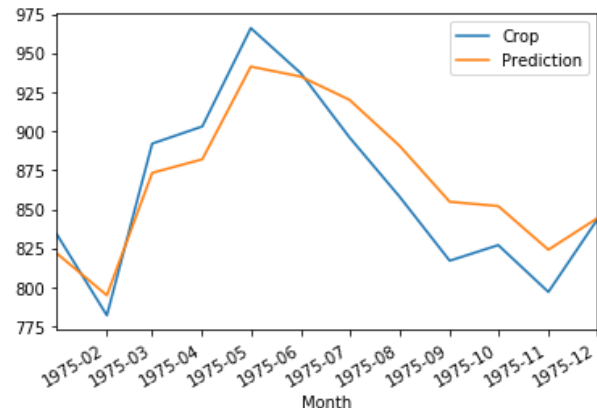
Expected output

Submission

Question 1 :
- Single notebook file (visualize the output as grid of images) (20 pts)
- Report (15 pts) :
  - Explain Autoencoders. Explain different types of Autoencoders.
  - Write all the steps and experiments you make. Explain all failed attempts.
  - Explain optimizer and all hyperparameters you use
  - Plot training and test loss graphs (iteration/loss) until convergence
 - Compare and discuss input and output images by visualizing

Question 2 :
- Single notebook file (visualize the output as grid of images) (20 pts)
- Report (15 pts) :
  - Explain GANs. Explain the loss function you use.
  - Write all the steps and experiments you make. Explain all failed attempts.
  - Explain optimizer and all hyperparameters you use
  - Discuss time and loss graphs.
  - Samples

Question 3:
- Single notebook file (15 pts)
- Report (15 pts) :
  - Explain RNN, GRU, and LSTM. Discuss the differences.
  - Write all the steps and experiments you make. Explain all failed attempts.
  - Explain optimizer and all hyperparameters you use
  - Discuss time and prediction graphs.
  - Try different cells (RNN, LSTM, GRU, etc.) and discuss the differences.

Send a single report file for all questions. You must refer every source you use. We must be able to reproduce your results.
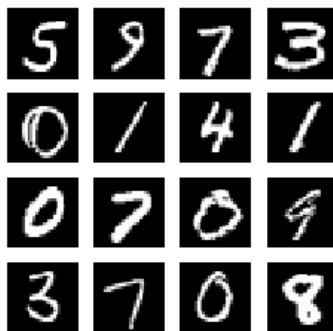
Example output visualization for Question 1 and 2