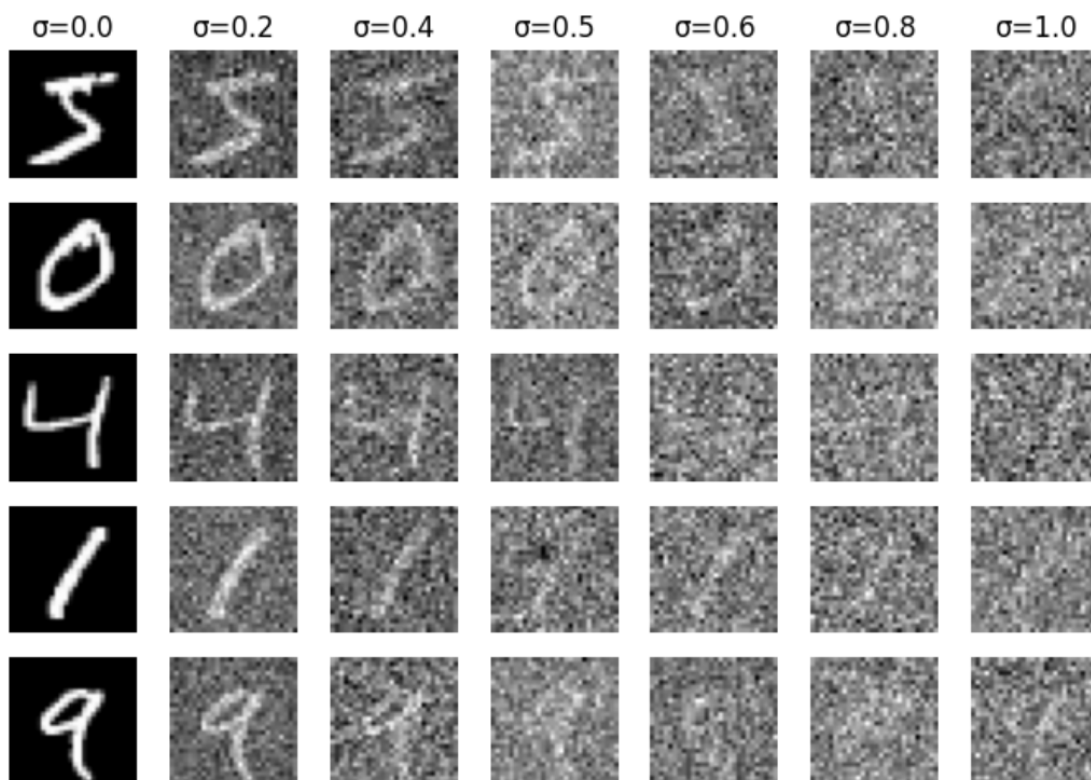# Assignment 5: Diffusion Models

Name(s): Ruichao Chen
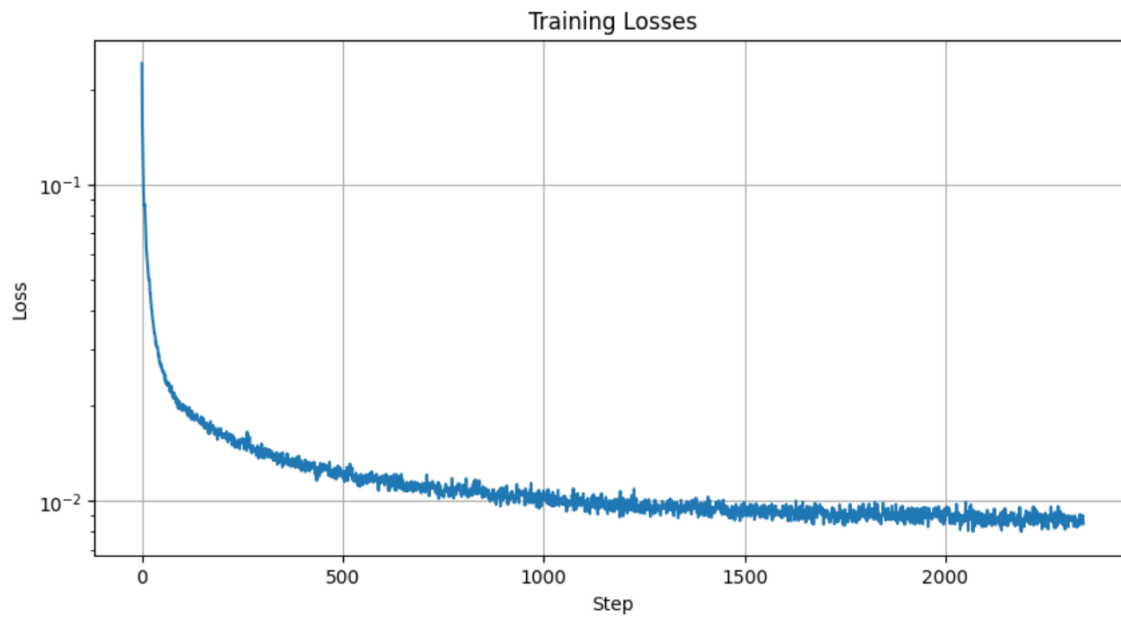
NetID(s): rc38

Part 1: Single-Step Denoising UNet

1.A visualization of the noising process using σ = [0.0, 0.2, 0.4, 0.5, 0.6, 0.8, 1.0] (Figure 3)
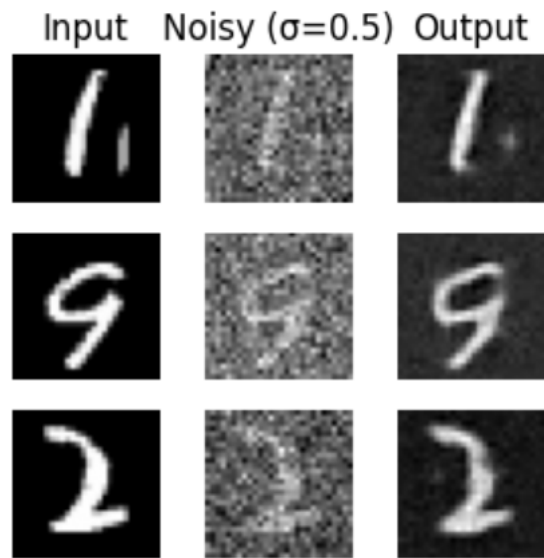
2.A training loss curve plot every few iterations during the whole training process (Figure 4)
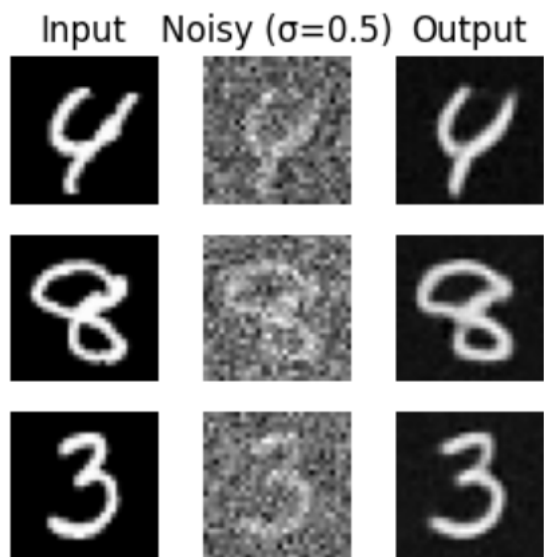

3.Sample results on the test set after the first and the 5th epoch. (Figures 5 and 6)
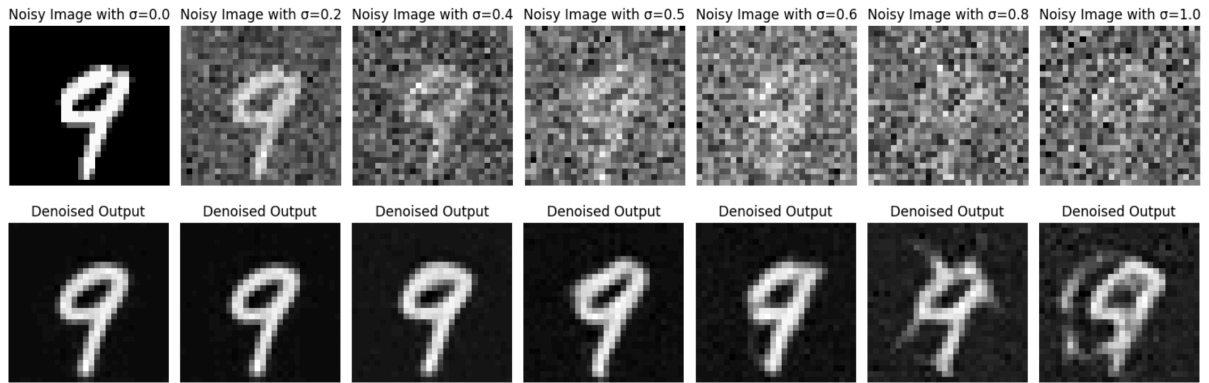
Epoch 1/5 completed. Average Loss: 0.019975

Input   Noisy (σ=0.5) Output

Epoch 5/5 completed. Average Loss: 0.009783
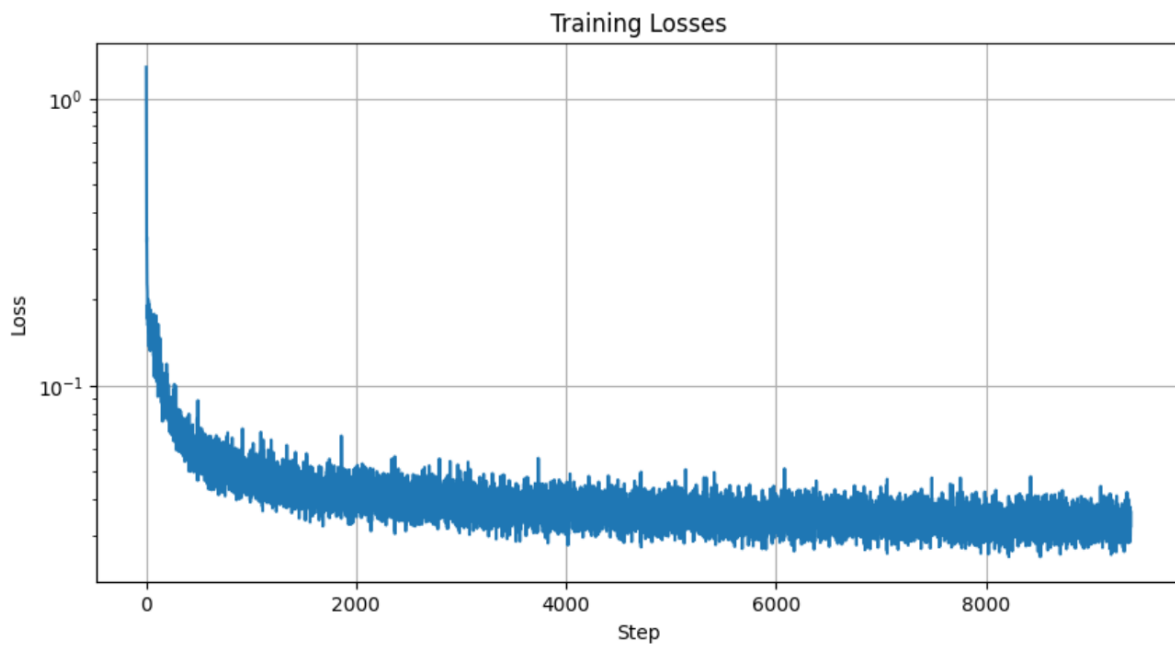
Input   Noisy (σ=0.5) Output

4.Sample results on the test set with out-of-distribution noise levels after the model is trained. Keep the same image and vary σ = [0.0, 0.2, 0.4, 0.5, 0.6, 0.8, 1.0] (Figure 7)
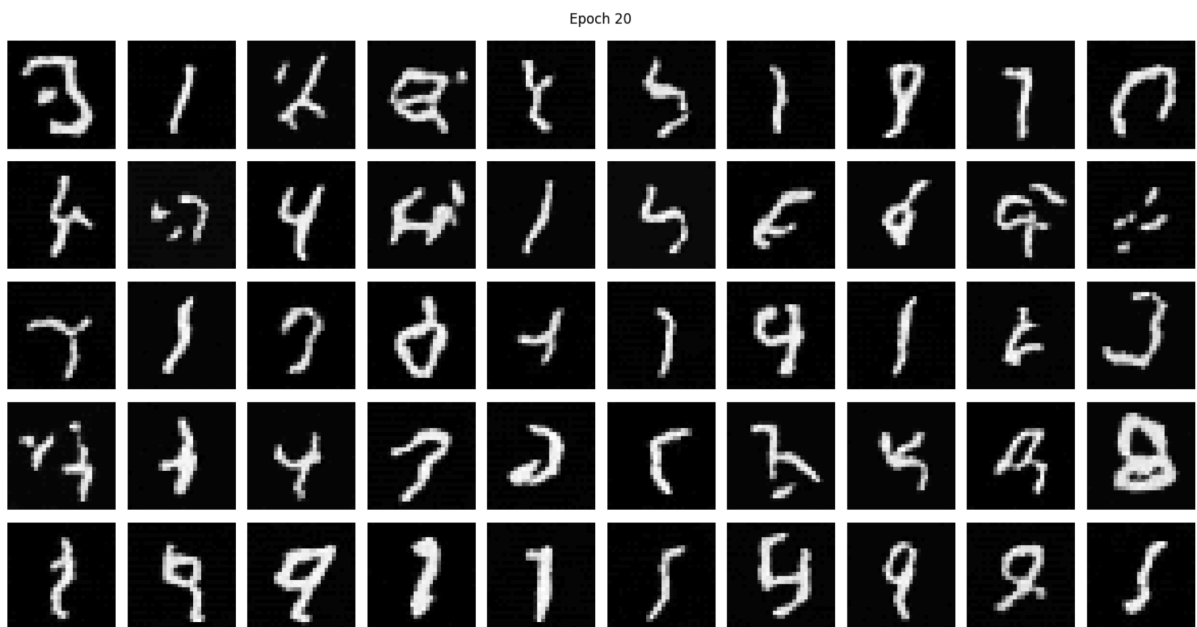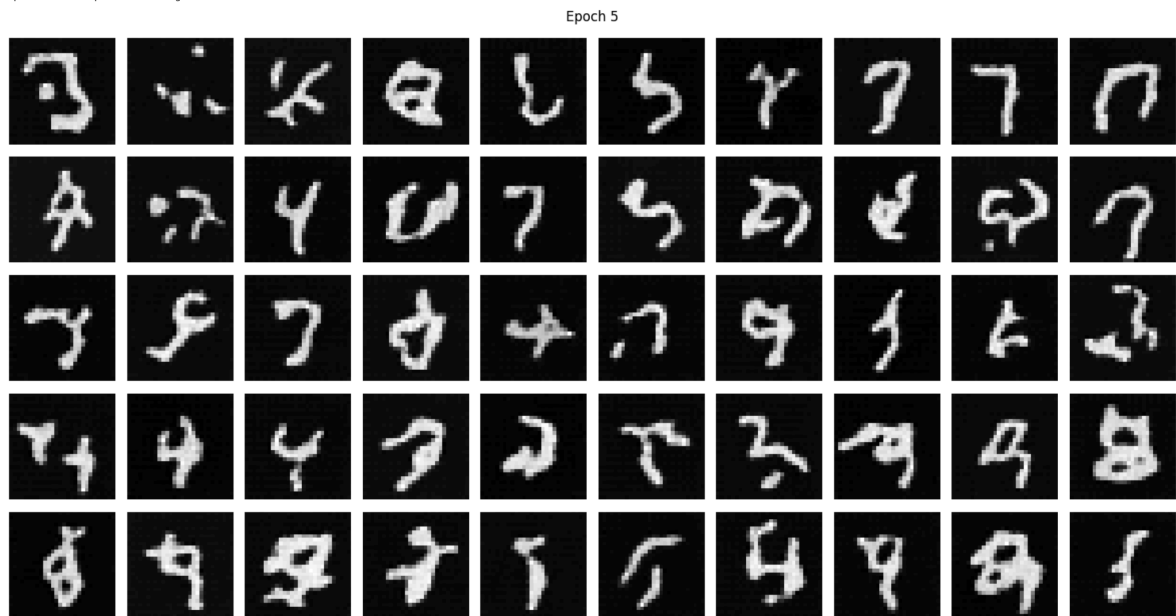
Part 2.1-2.3: Time-conditioned UNet

1.A training loss curve plot for the time-conditioned UNet over the whole training process (Figure 10).

2.Sampling results for the class-conditioned UNet after the 5th and the 20th epoch. Providing a GIF is optional and can be done as extra credit.
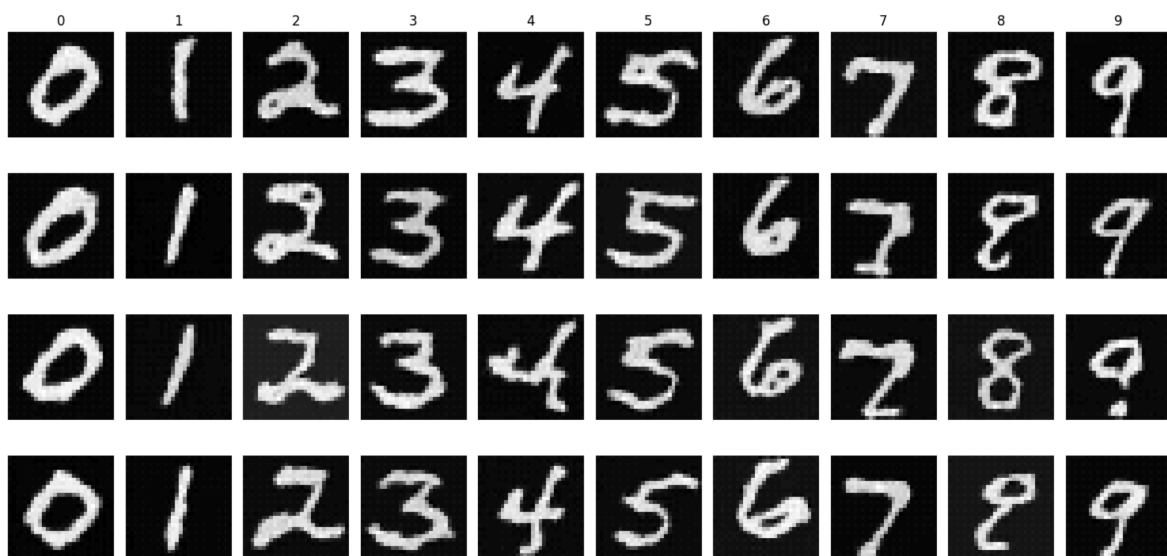

Epoch 5

Epoch 20

Part 2.4-2.5: Class-conditioned UNet

1.A training loss curve plot for the class-conditioned UNet over the whole training process.

Training Losses
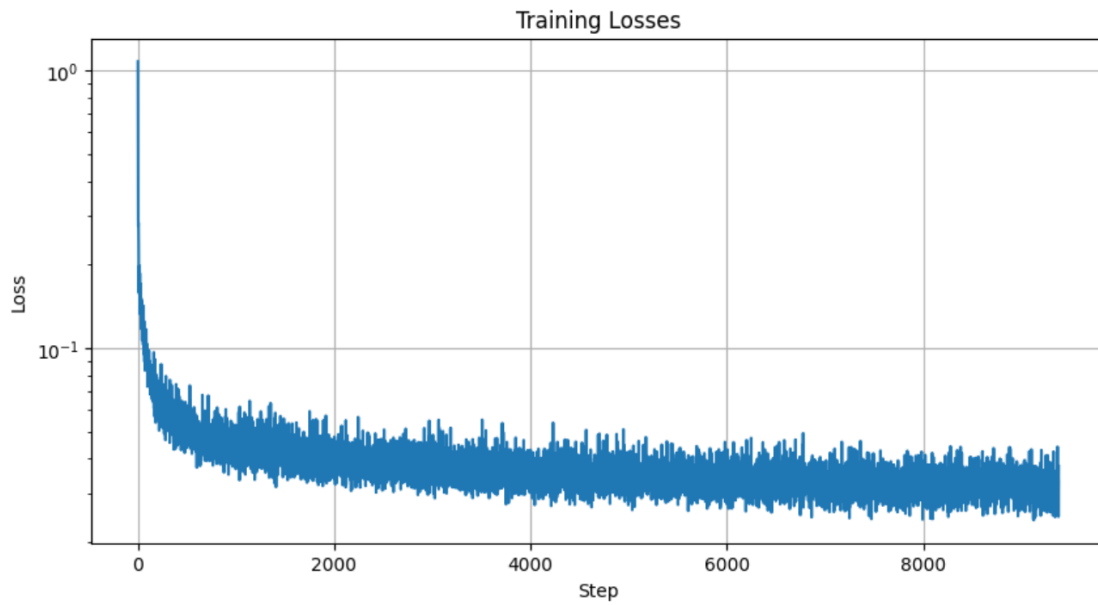
2.Sampling results for the class-conditioned UNet after the 5th and the 20th epoch. Generate 4 instances of each digit as shown on the assignment page. Providing a GIF is optional and can be done as extra credit.

Epoch 5

Epoch 20