ML2022-2023 Spring HW08 Report

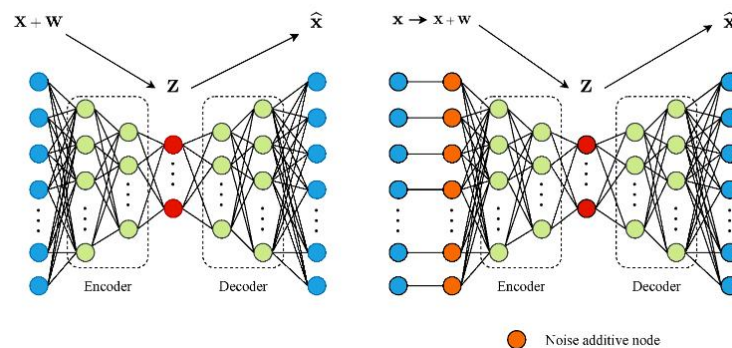| Public Score	Private Score
0.79269	0.79153

Report Questions

Q1

Choose a variation of autoencoder. Show an image of the model architecture. Then, list an advantage and a disadvantage comparing with vanilla autoencoder. Also, put on the paper link as reference. Eg, denoising autoencoder, variational autoencoder, etc.

Answer:
Denoising Autoencoder

Denoising Autoencoder vs. Vanilla Autoencoder
Advantage:
Robustness to Noise:
Denoising autoencoders are specifically designed to handle noisy data. By training the model to reconstruct the original input from a corrupted version, denoising autoencoders learn more robust features, which can improve the model's generalization ability and performance on unseen noisy data. This robustness is particularly beneficial in real-world applications where data often contains noise and corruption.

**Disadvantage:**
Increased Computational Complexity:
Training a denoising autoencoder typically requires additional computational resources compared to a vanilla autoencoder. The process of adding noise to the input data and then learning to denoise it can increase the training time and computational cost. This added complexity might not be justified for tasks where the data is relatively clean and noise-free, making the vanilla autoencoder a simpler and more efficient choice.

Reference:

Vincent, P., Larochelle, H., Bengio, Y., & Manzagol, P. A. (2008). Extracting and composing robust features with denoising autoencoders. In Proceedings of the 25th international conference on Machine learning (pp. 1096-1103).

Q2

Train a fully connected autoencoder and adjust at least two different element of the latent representation. Show your model architecture, plot out the original image, the reconstructed images for each adjustment and describe the differences.
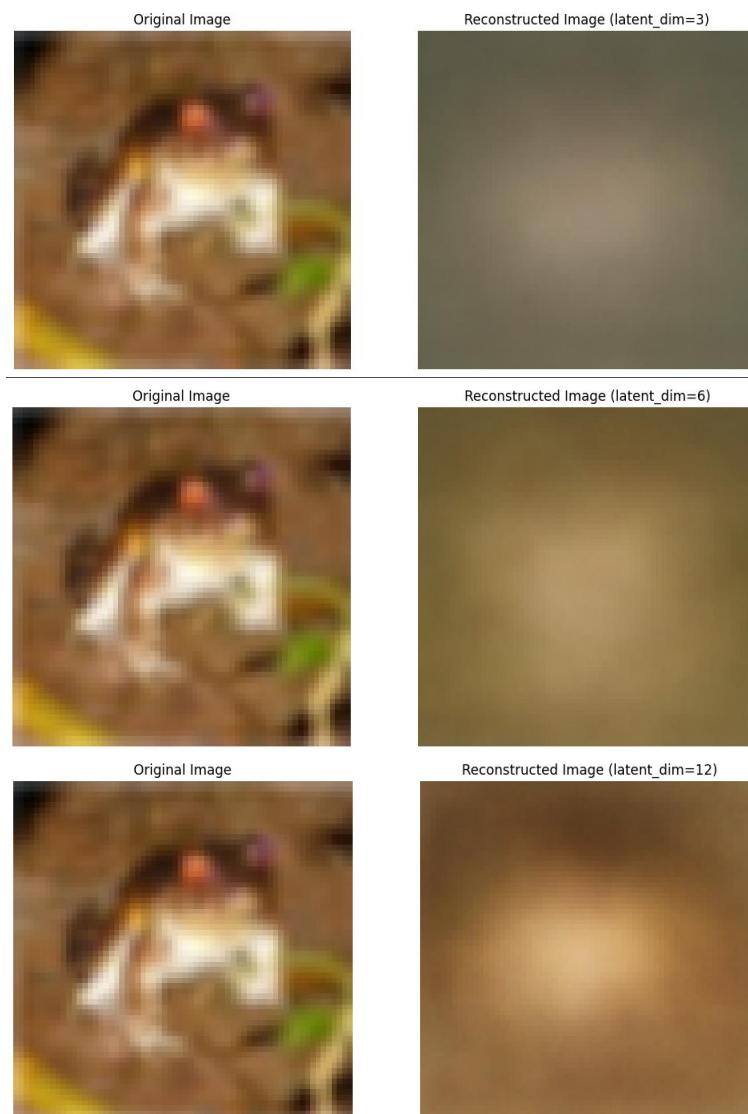
As shown above, we increase the latent dimension from 3 to 6 to 12, we find that the reconstructed picture will learn more features of the original image as the latent dimension increases.