Deep Learning - Lab 8 Exercise

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Exercise 1

Exercise 1.1:Systematically sample a VAE.
The following figure shows the Systematically sampling of the 2D latent space of a Variational Autoencoder (VAE).

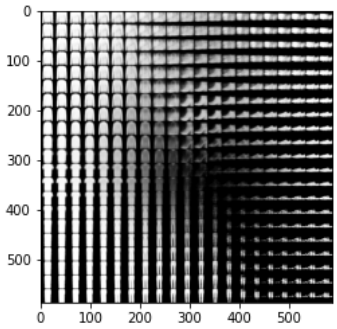

Figure 1: Sample of VAE

Exercise 2

Exercise 2.1:Systematically sample an Autoencoder.
The following figure shows the Systematically sampling of the 2D latent space of an Autoencoder (AE).

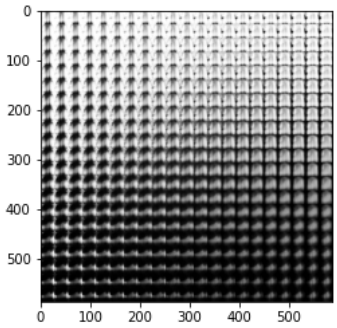

Figure 2: Sample of AE

Exercise 2.2:Compare the latent spaces of the VAE and autoencoder
It can be seen from Figure 1 that the VAE model shows the 4 kinds of items in fashion MINST, including 2 kinds of shoes, clothes, and pants which are located in 4 directions. In the middle x=0, y=0, some transition pictures appear, and those images are not in the original fashion MINST. It is a transition picture generated by VAE. The items surrounding the middle of the image are very distorted since it wants to generate all the features of those 4 items. It's hard to recognize those items. This is because the VAE has a smooth transition between samples that are close to the latent space, and the VAE generates the distribution of the samples and then generates them through the decoder.

In contrast, in Figure 2, the items of the AE model are almost in the original fashion MINST, and this usually leads to a large difference between items. AE tries to do the best reconstruction so that it can not generate the transition picture and has a certain mapping from the input image to its reconstructed image.

The difference between AE and VAE is that AE wants to find a single-valued mapping of data X to latent space for compression dimensionality reduction while VAE attempts to find a mapping of data X to some normal distribution, which is more likely data generation.