



From my variational autoencoder, I constructed 3 rows based on the latent dimensions 2, 5, and 10 (image displayed on the right). My VAE model was not able to establish the original images of the test dataset. However, I did see a change of the choice of different batch sizes. The image on the left is displayed from the original dataset given.

Clarity:

I tried two different batch sizes, 64 and 128. The one displayed is the batch size of 128. From my training, the batch size of 128 resulted in clearer number shapes and a higher resolution. I was surprised to see that the bigger batch size resulted in a more accurate representation than the smaller batch size which should help with convergence. I also tried the epochs 50, 100, and 150 but was unable to get the given results as my session completed only up to 50 epochs for each latent dimension before timeout. From the epochs it completed, it continued to have increasing total loss as it added higher latent dimensions. Overall, the clarity of some of the constructed images resembles the original dataset but could not achieve matching clarity to the majority of the dataset images.

Distortion:

The top 2 numbers from the latent dimension of 2 are very distorted and challenging to recognize what digits they resemble. Additional epochs may be helpful for the VAE model to train and avoid this distortion. Additionally, numbers such as 8 and 3 are fairly ambiguous and the model might need more training, especially with numbers that have similar features.

Variability:

The digits seem to have a more challenging time displaying on darker backgrounds or when the number is displayed in a color other than white. The module may benefit from more time to train on the dataset to increase consistency due to the amount of variability with the database.

Generalization:

I think this model needs more training time to generate more accurate reconstructions. Overall, digits could be more clear and less distorted, especially due to the diverse examples. While observing training loss, the loss continues to increase which may indicate that the addition of a higher latent dimension may need more training to see a decrease in loss and convergence of the model. This is very evident in the color-coded latent space where there is no clear grouping of colors that are displayed.