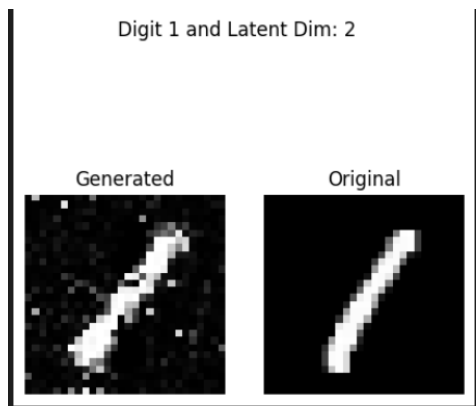


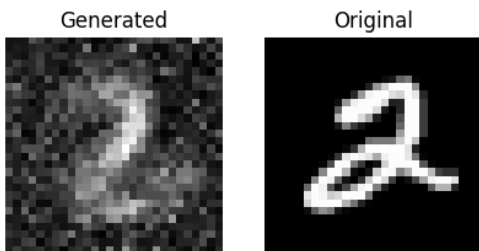
Assignment 2

GAN

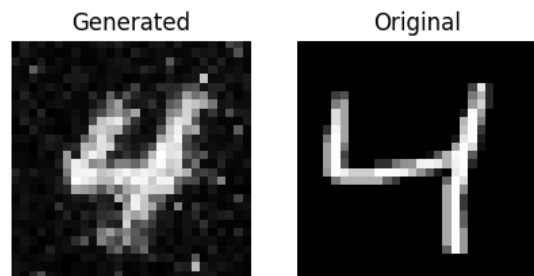
2 dimensions



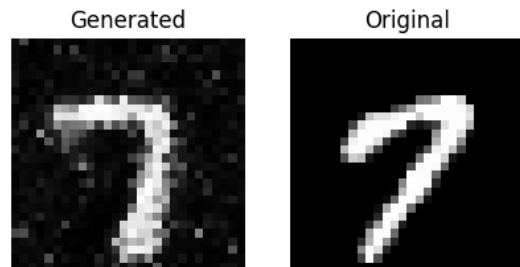
Digit 2 and Latent Dim: 2



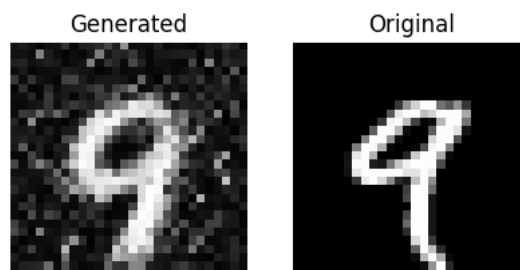
Digit 4 and Latent Dim: 2



Digit 7 and Latent Dim: 2

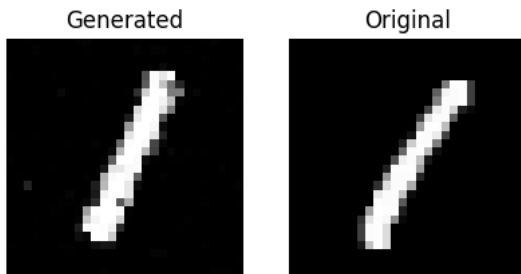


Digit 9 and Latent Dim: 2

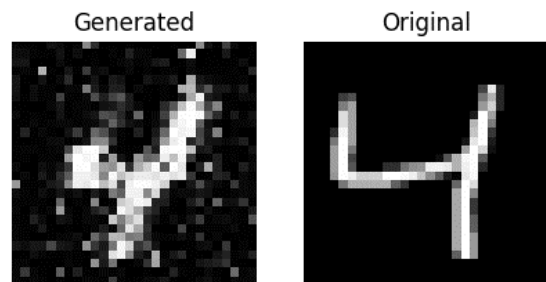


4 dimensions:

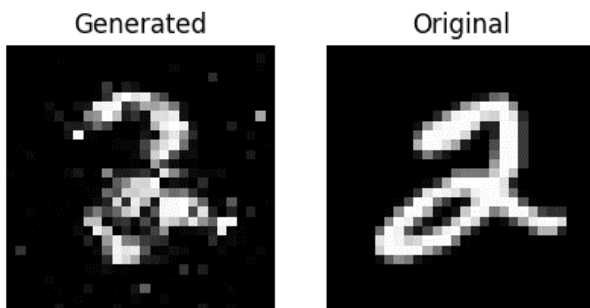
Digit 1 and Latent Dim: 4



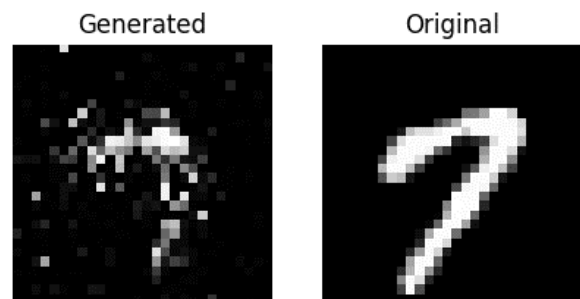
Digit 4 and Latent Dim: 4



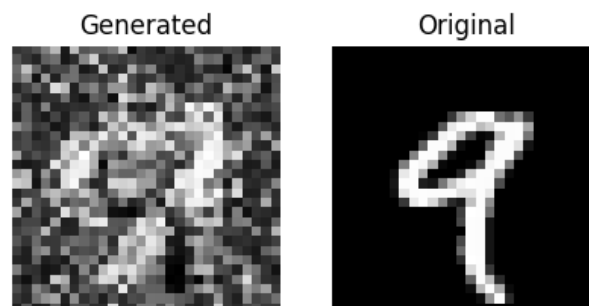
Digit 2 and Latent Dim: 4



Digit 7 and Latent Dim: 4

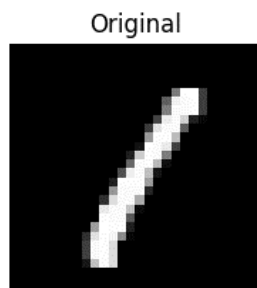
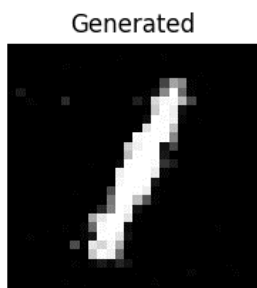


Digit 9 and Latent Dim: 4

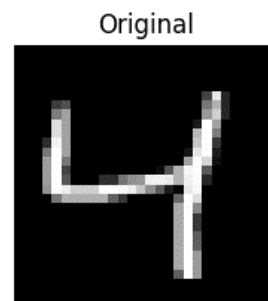
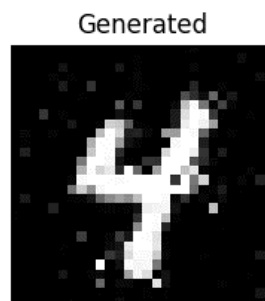


8 dimensions:

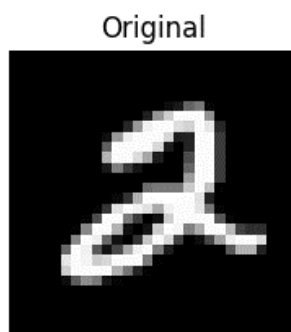
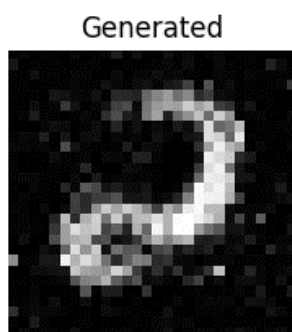
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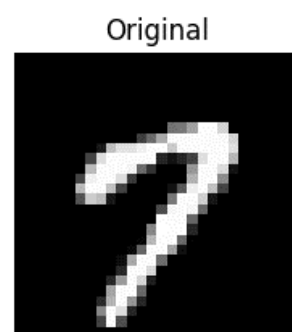
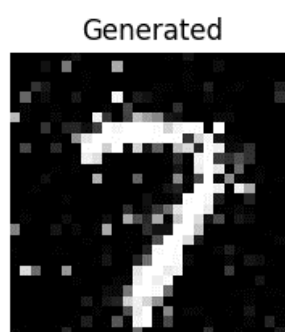
Digit 4 and Latent Dim: 8



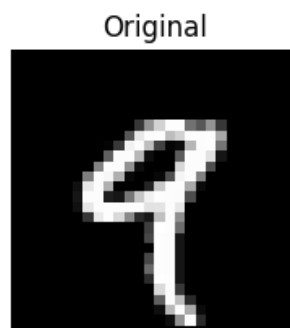
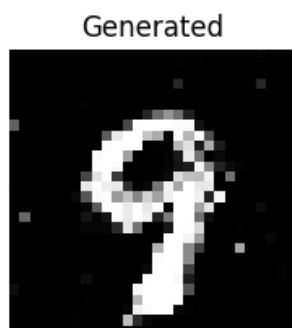
Digit 2 and Latent Dim: 8



Digit 7 and Latent Dim: 8



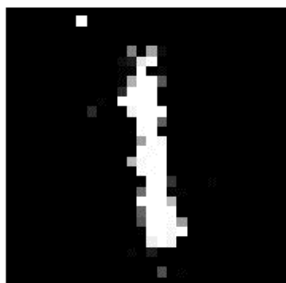
Digit 9 and Latent Dim: 8



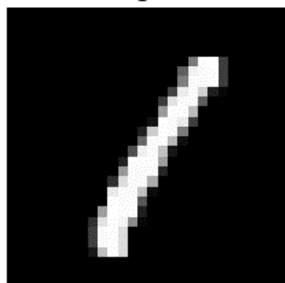
16 dimensions:

Digit 1 and Latent Dim: 16

Generated

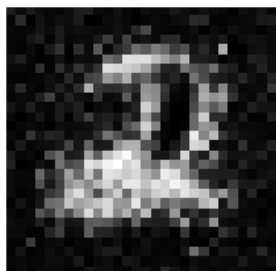


Original

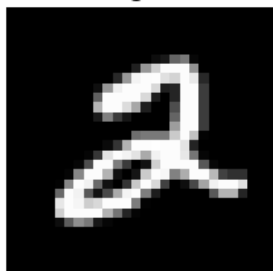


Digit 2 and Latent Dim: 16

Generated



Original

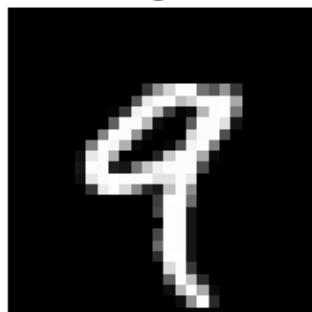


Digit 9 and Latent Dim: 16

Generated

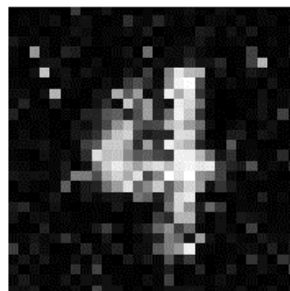


Original

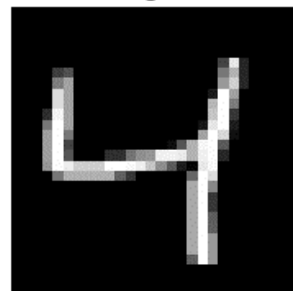


Digit 4 and Latent Dim: 16

Generated

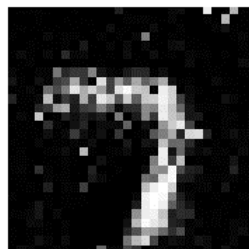


Original

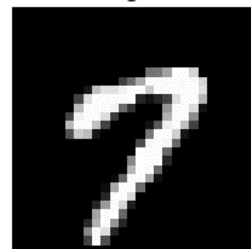


Digit 7 and Latent Dim: 16

Generated

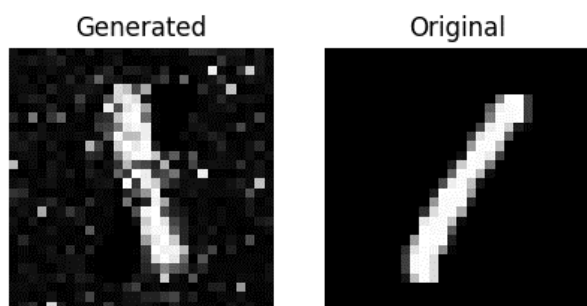


Original

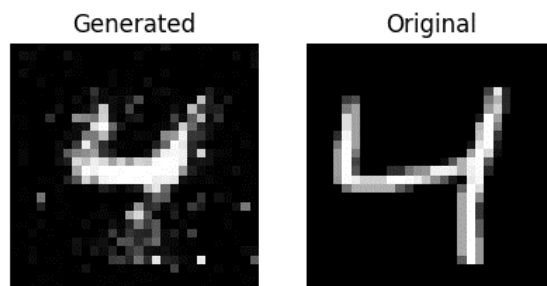


32 dimensions:

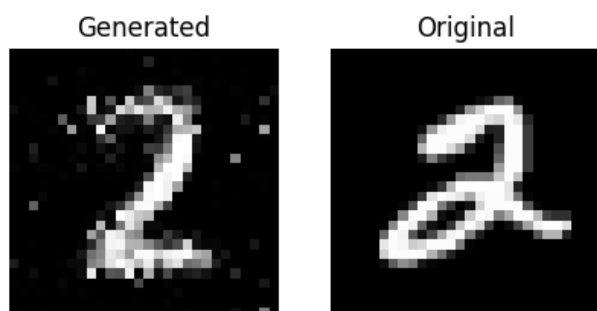
Digit 1 and Latent Dim: 32



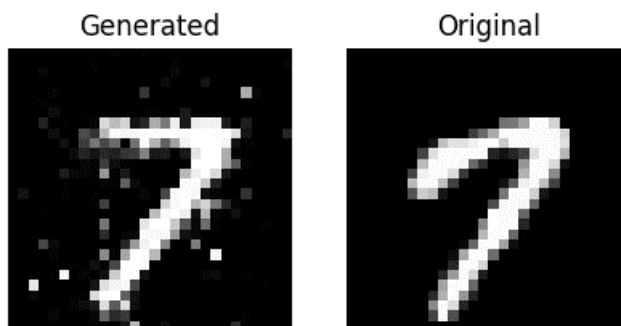
Digit 4 and Latent Dim: 32



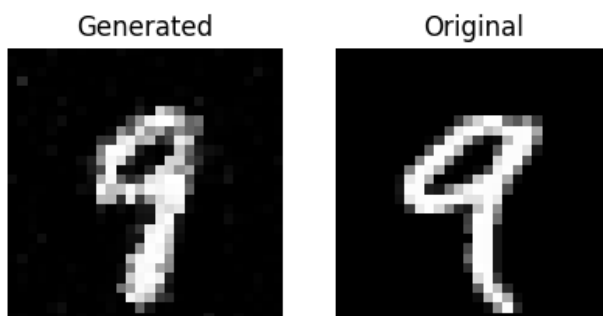
Digit 2 and Latent Dim: 32



Digit 7 and Latent Dim: 32

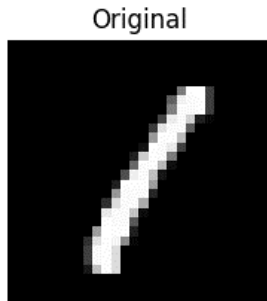
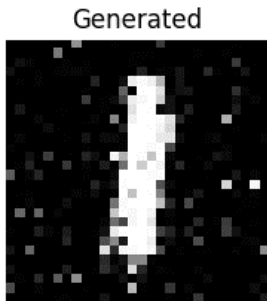


Digit 9 and Latent Dim: 32

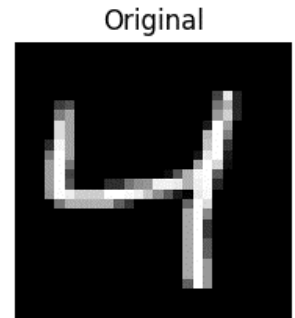
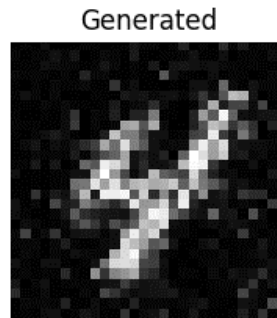


64 dimensions:

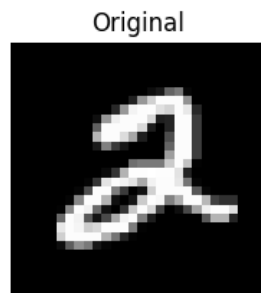
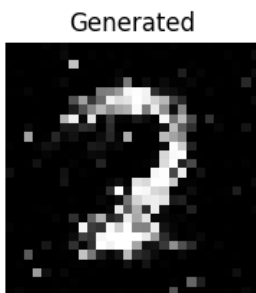
Digit 1 and Latent Dim: 64



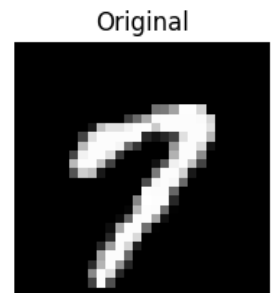
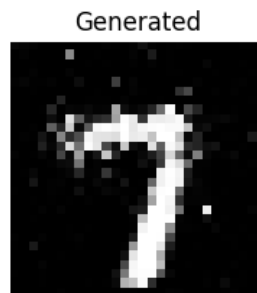
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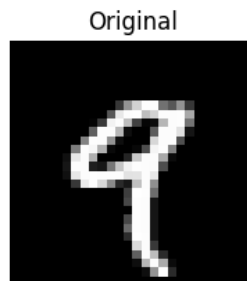
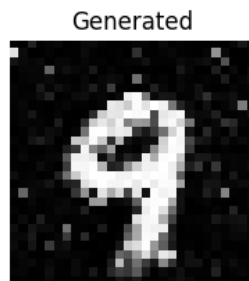
Digit 2 and Latent Dim: 64



Digit 7 and Latent Dim: 64

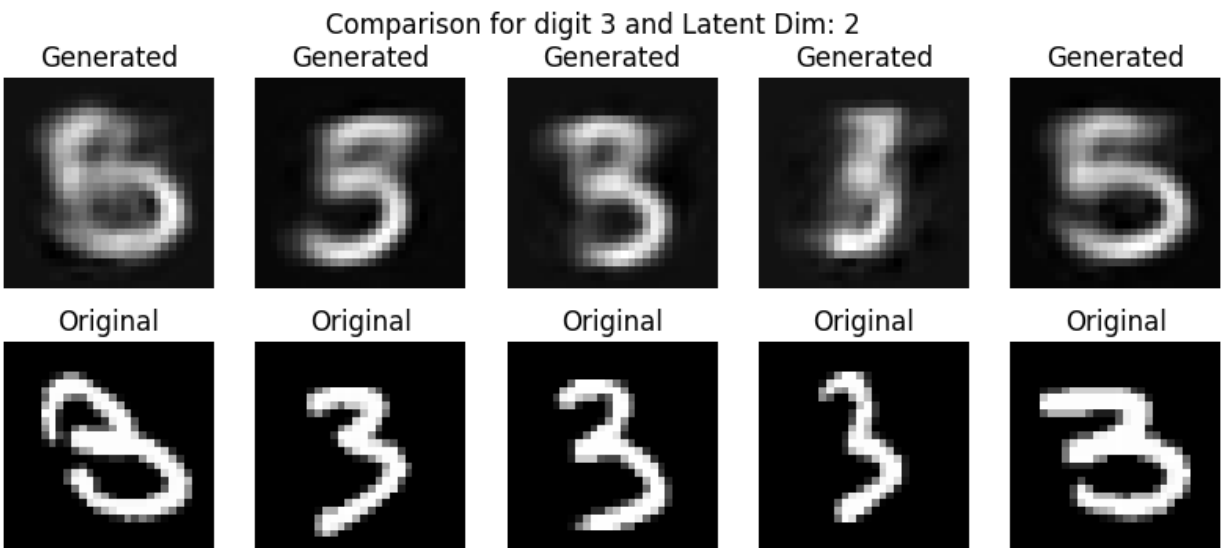
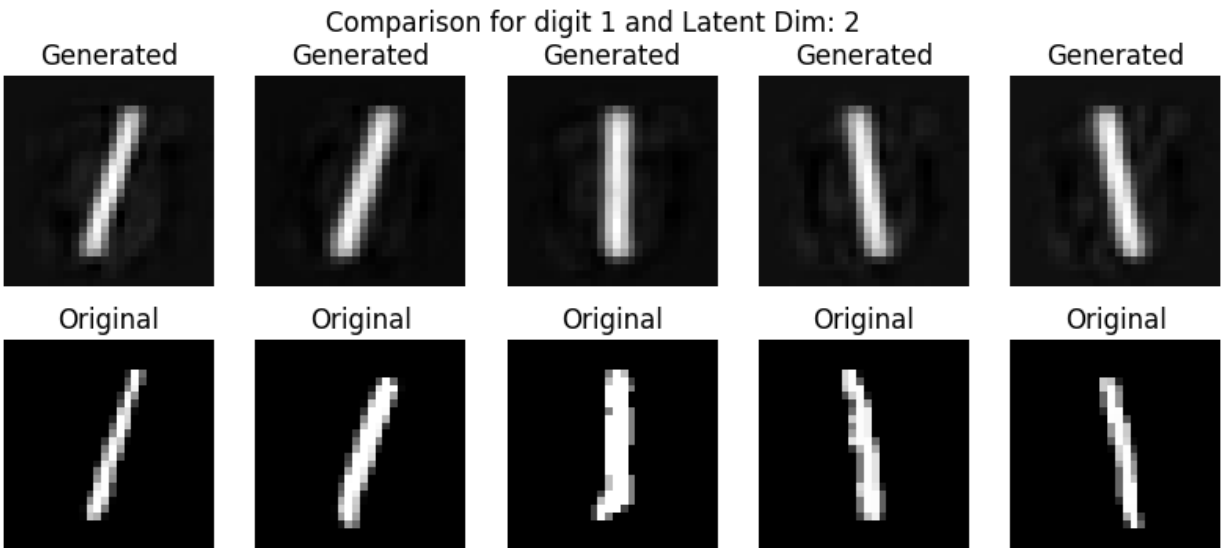


Digit 9 and Latent Dim: 64

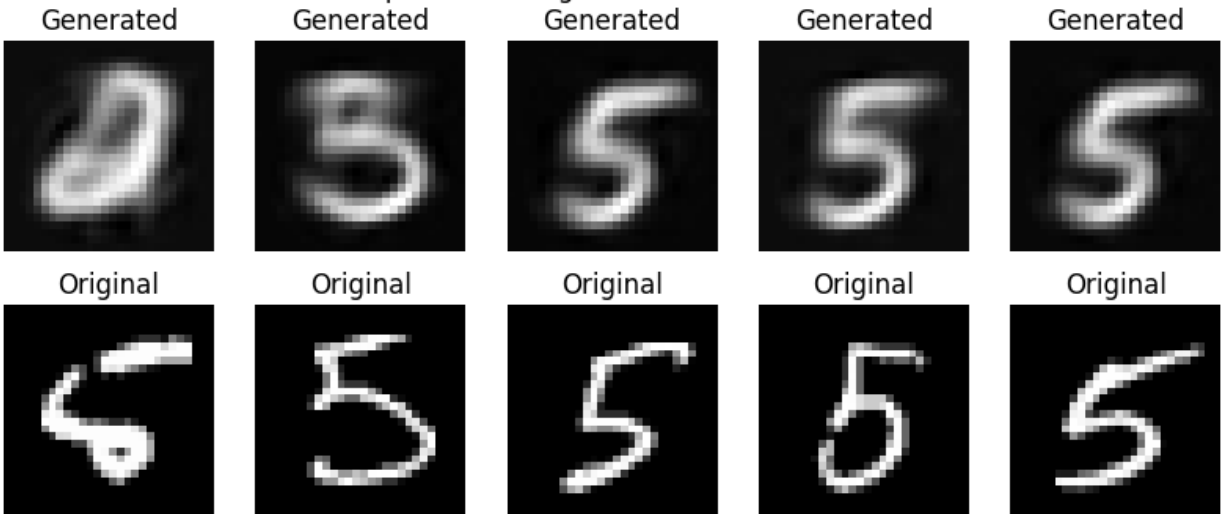


Diffusion Models

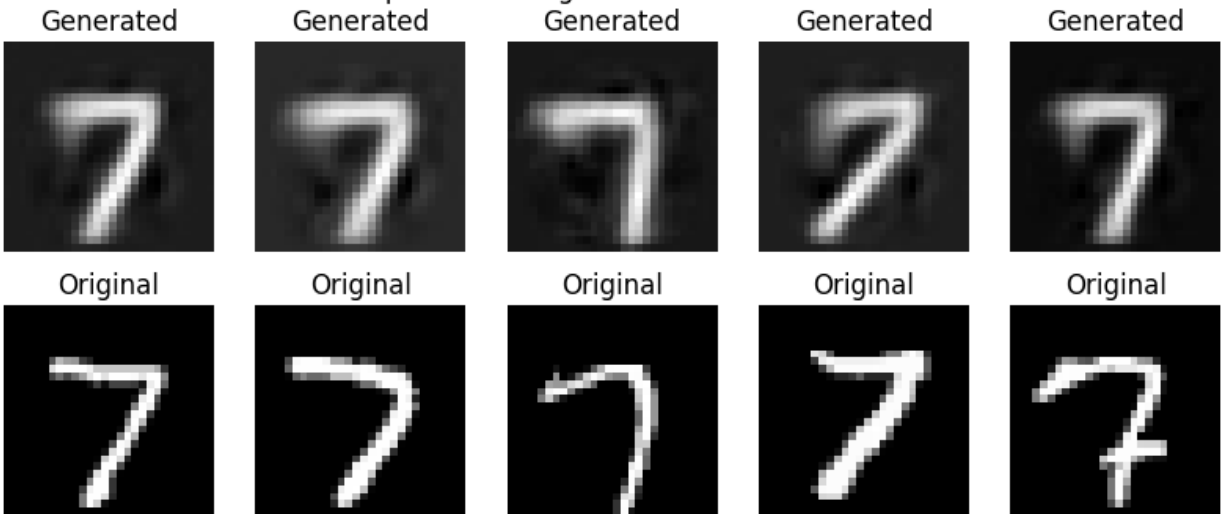
2 dimensions:



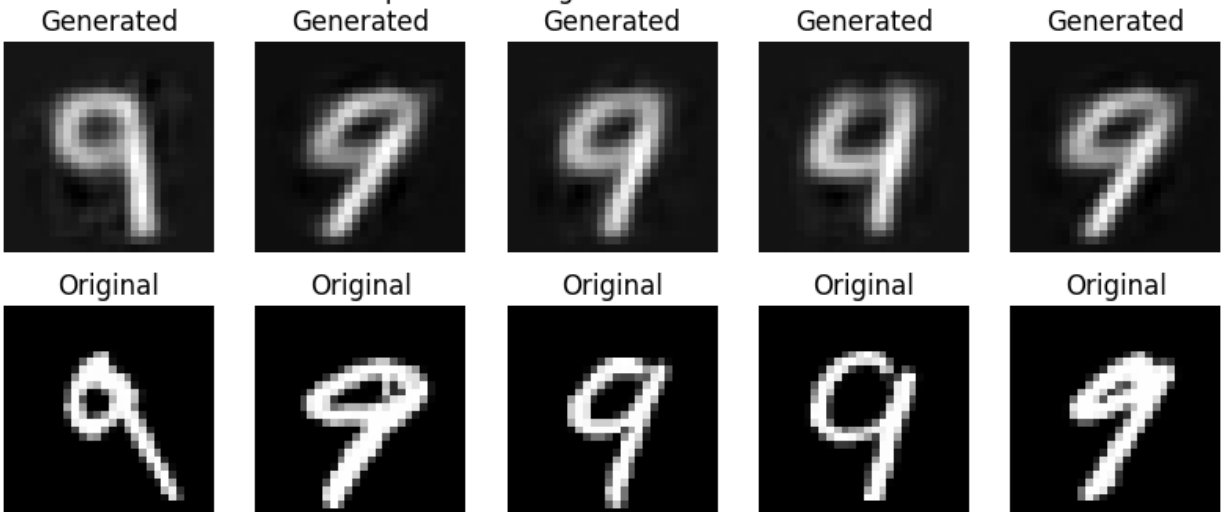
Comparison for digit 5 and Latent Dim: 2



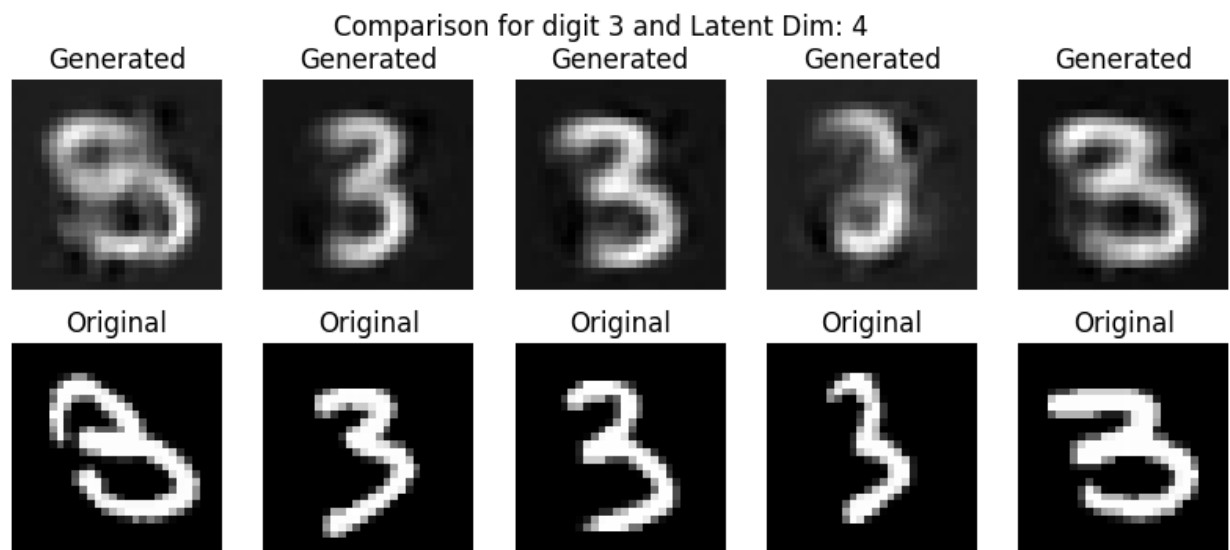
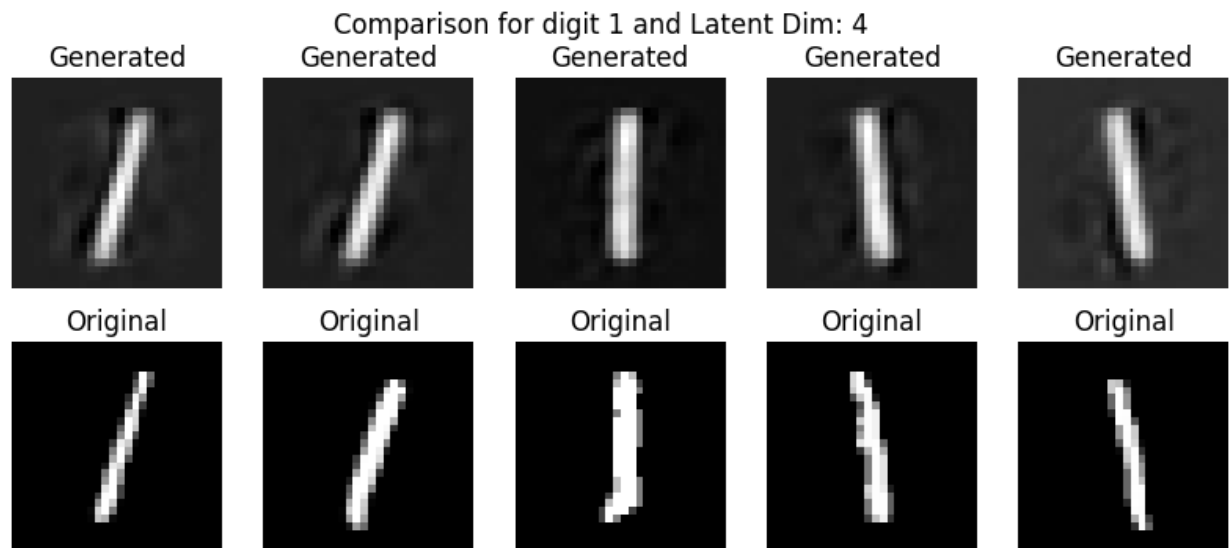
Comparison for digit 7 and Latent Dim: 2



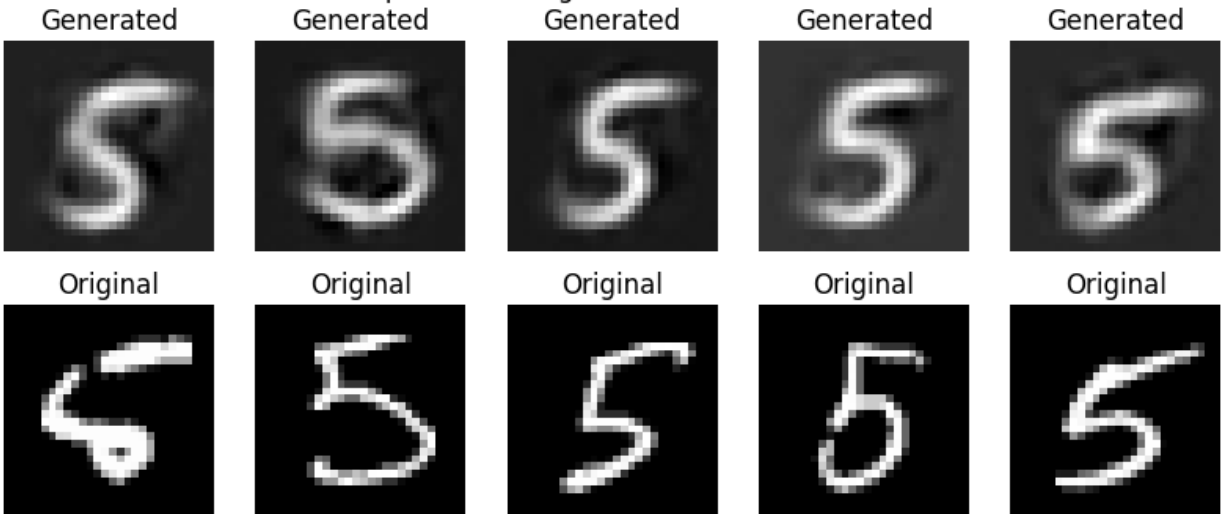
Comparison for digit 9 and Latent Dim: 2



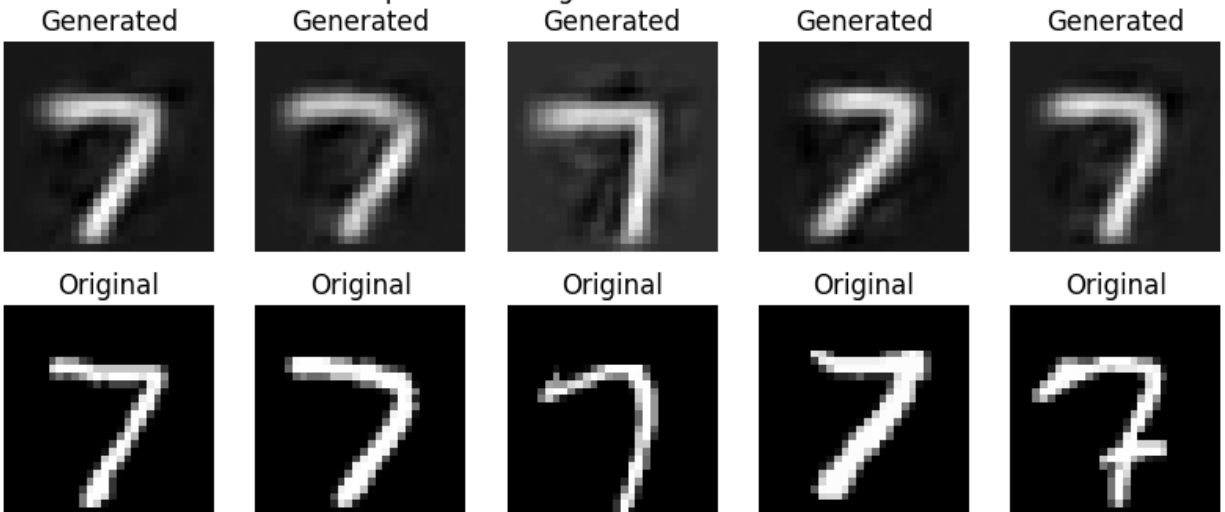
4 dimensions:



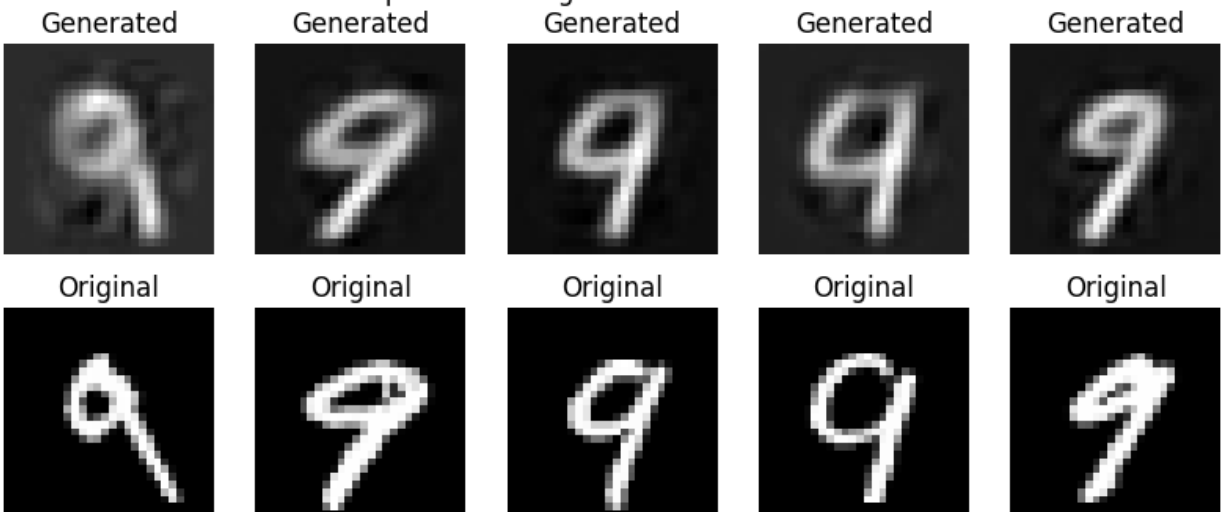
Comparison for digit 5 and Latent Dim: 4



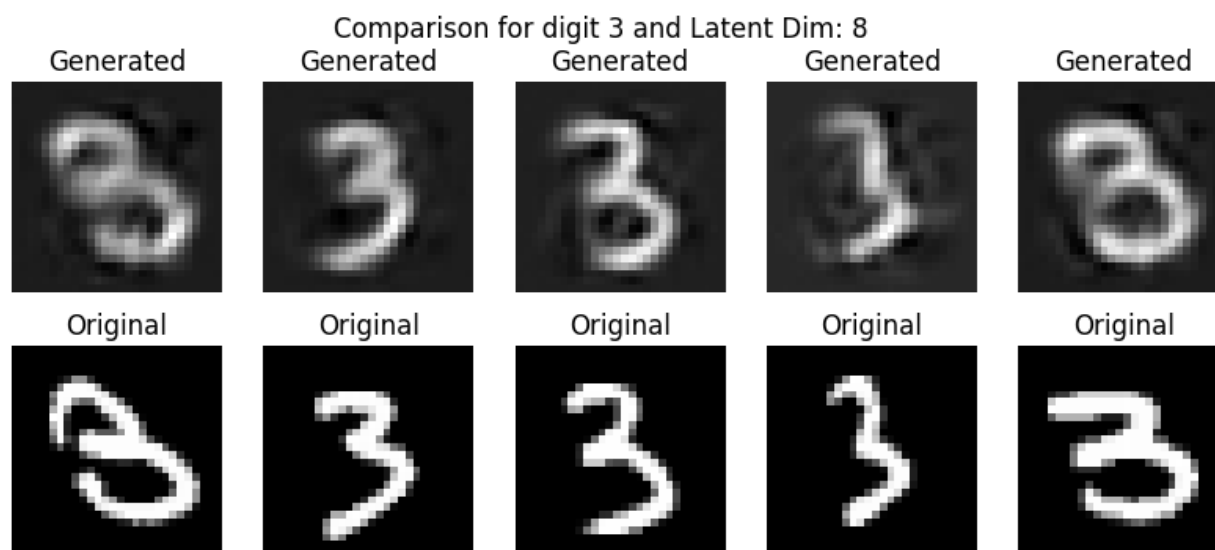
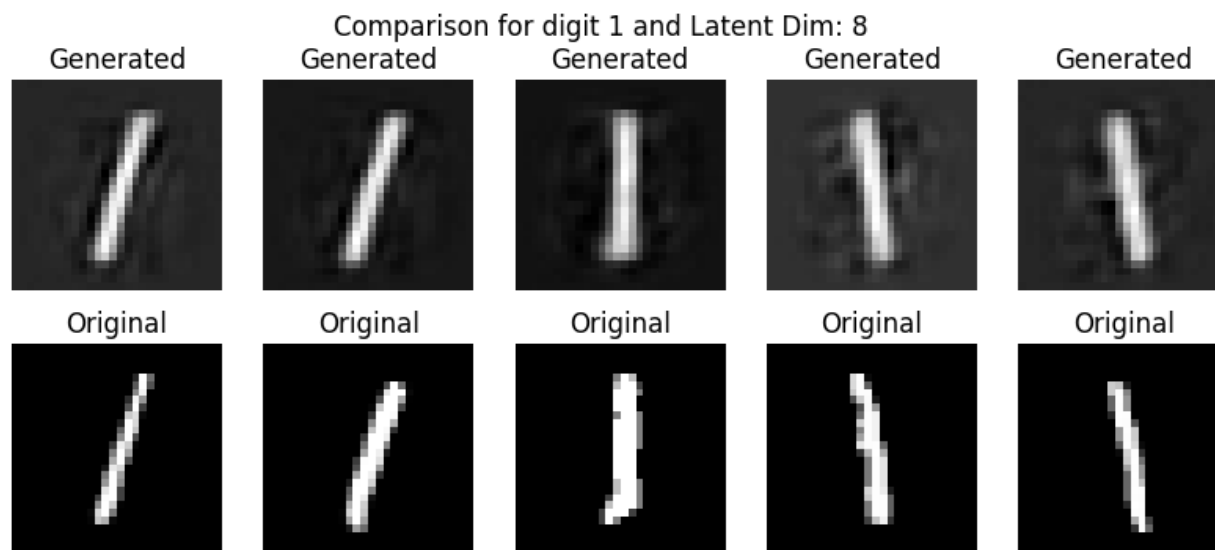
Comparison for digit 7 and Latent Dim: 4



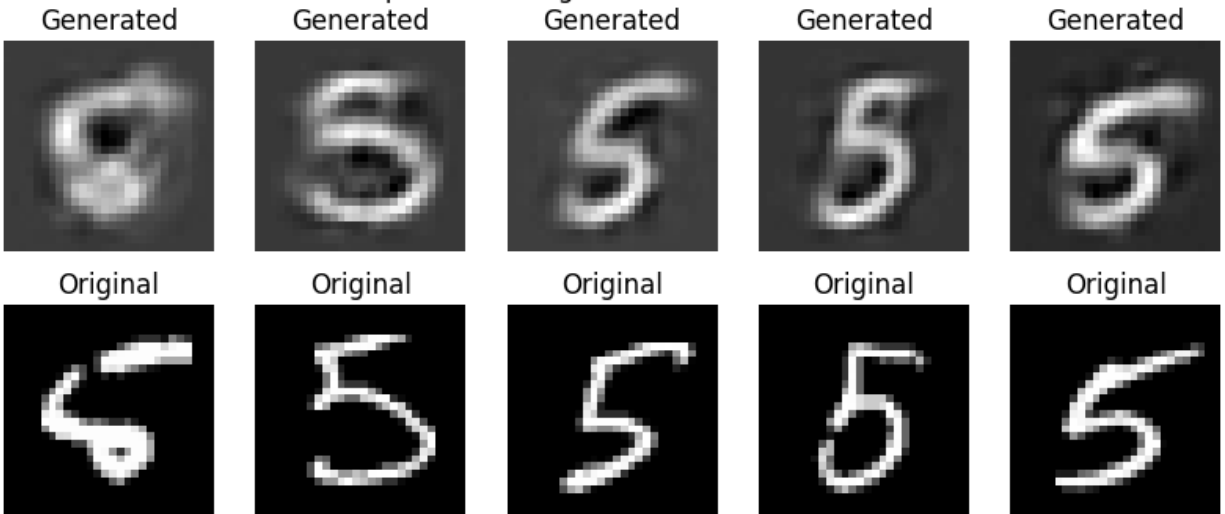
Comparison for digit 9 and Latent Dim: 4



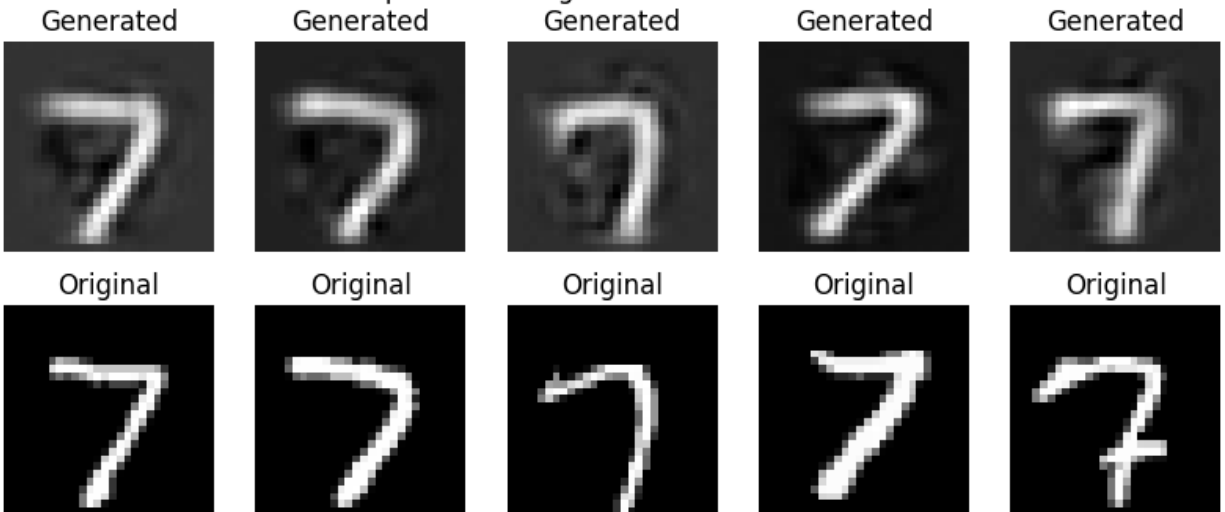
8 dimensions:



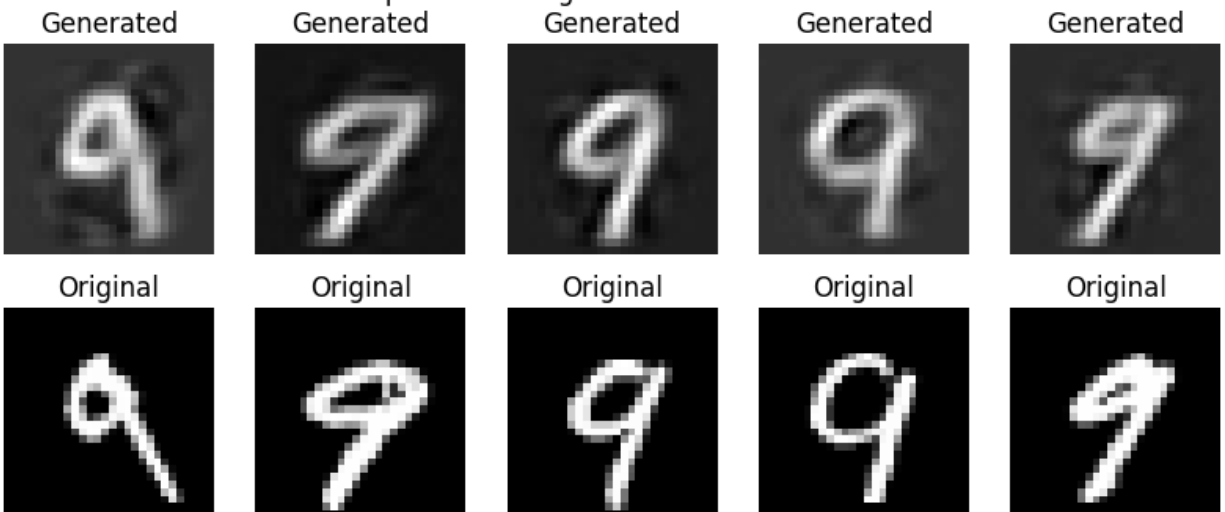
Comparison for digit 5 and Latent Dim: 8



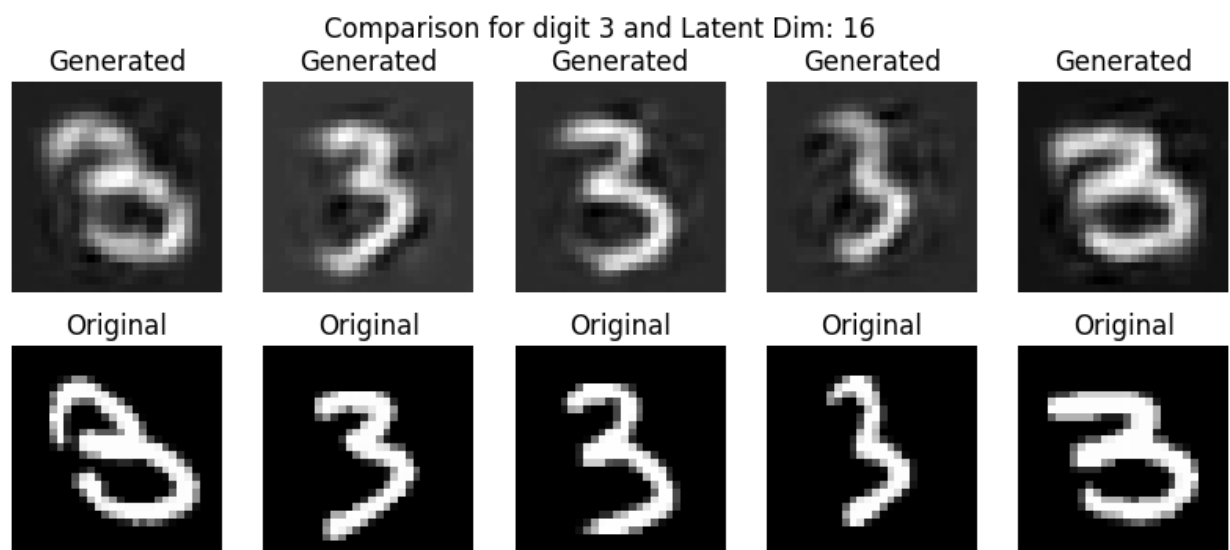
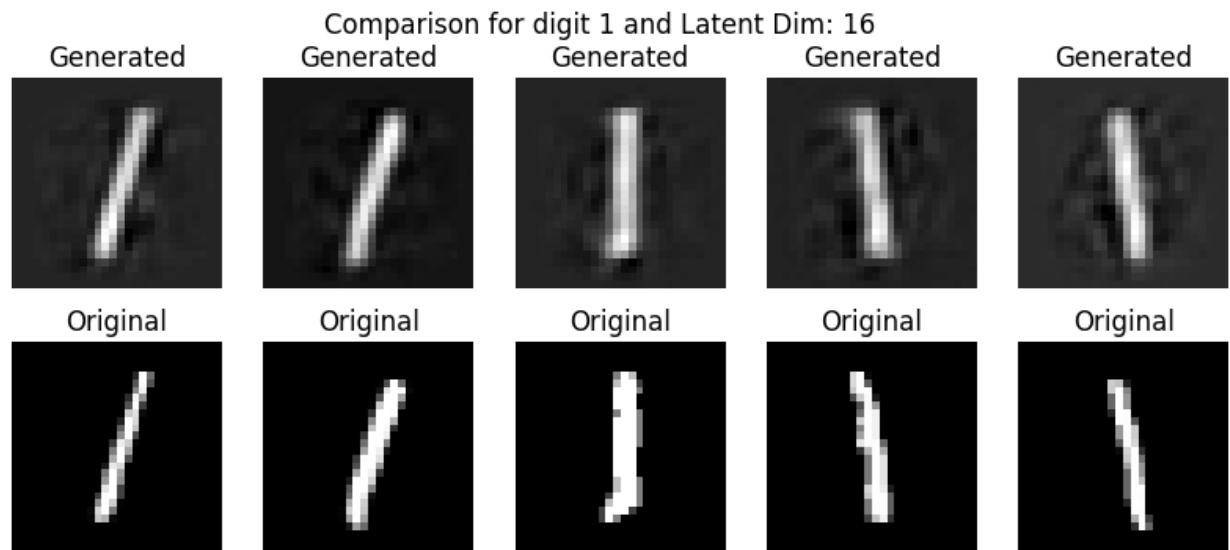
Comparison for digit 7 and Latent Dim: 8



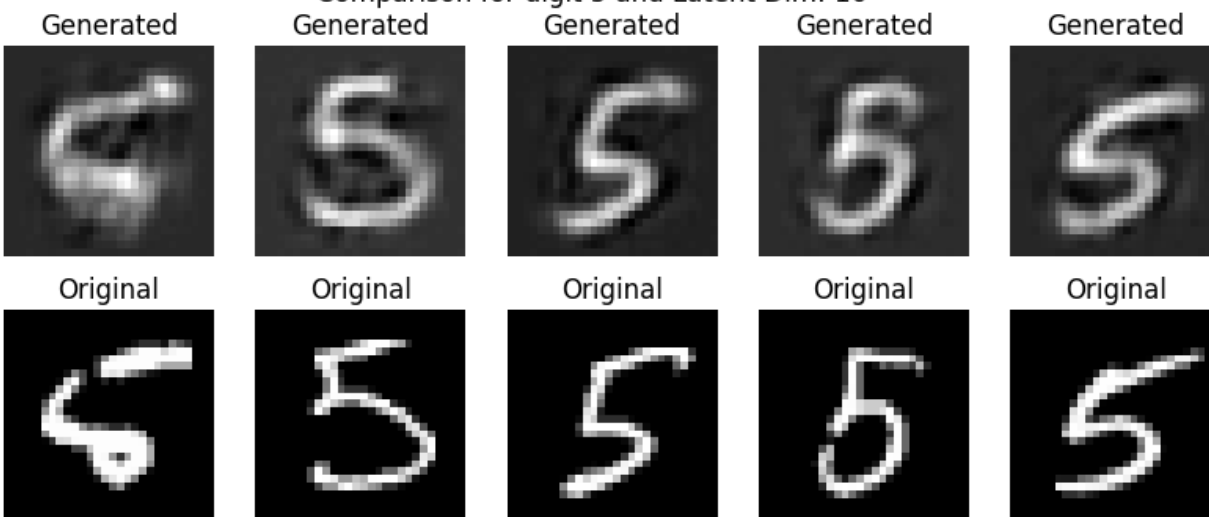
Comparison for digit 9 and Latent Dim: 8



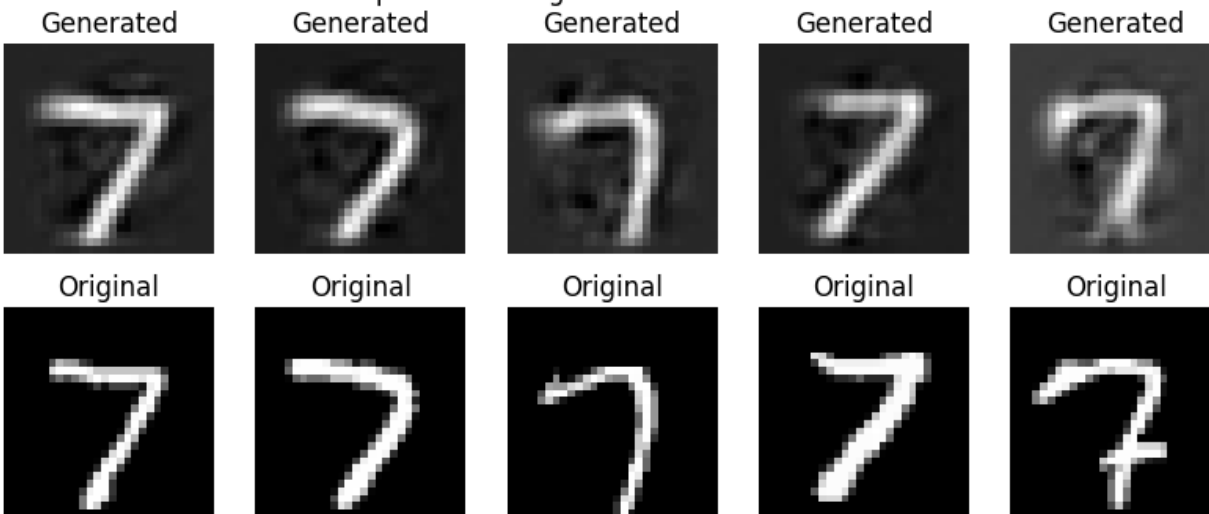
16 dimensions:



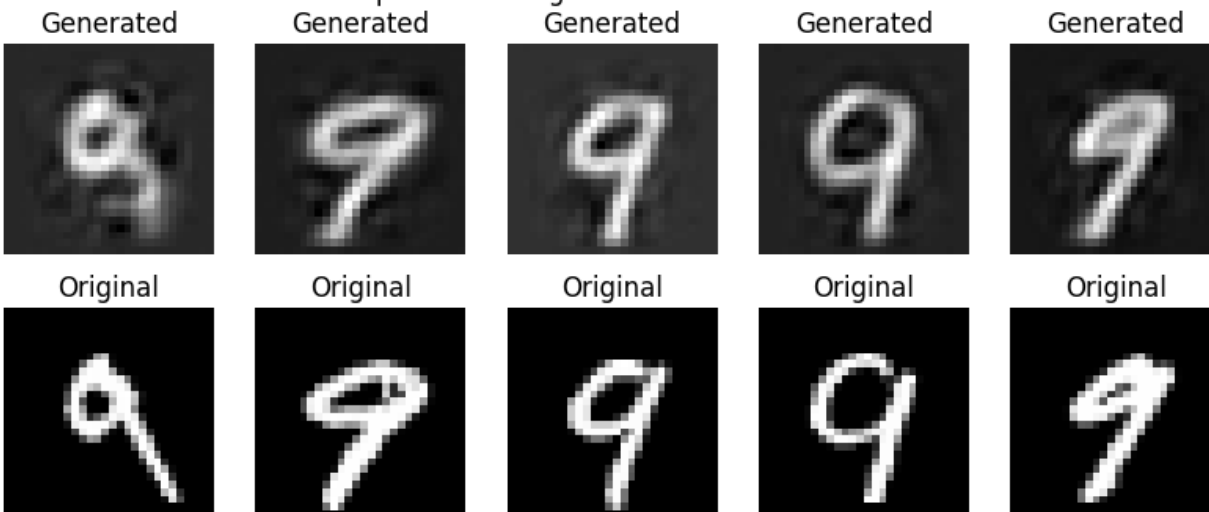
Comparison for digit 5 and Latent Dim: 16



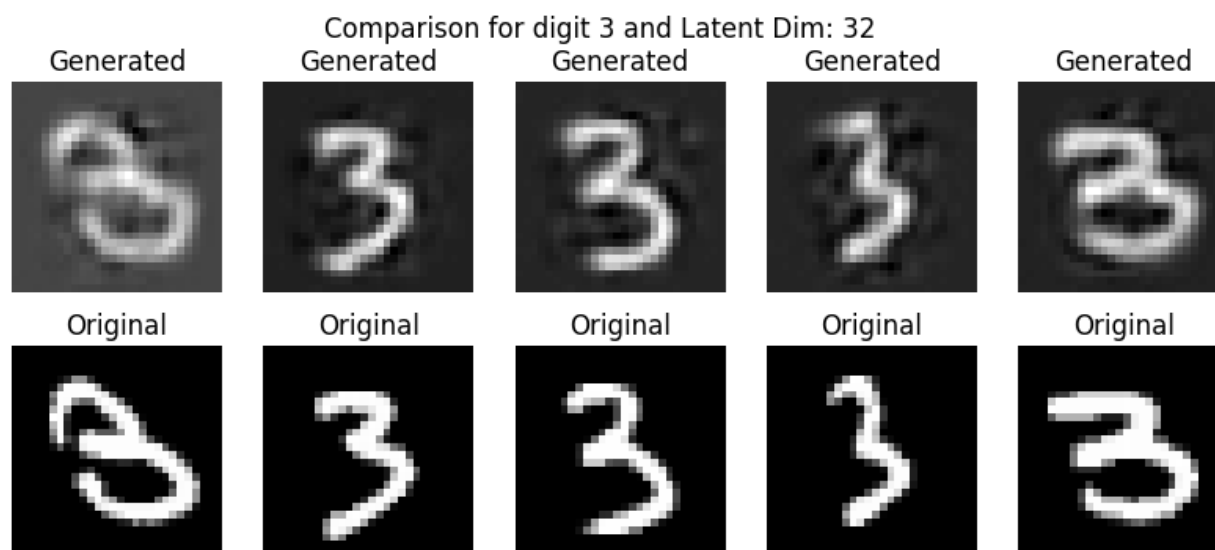
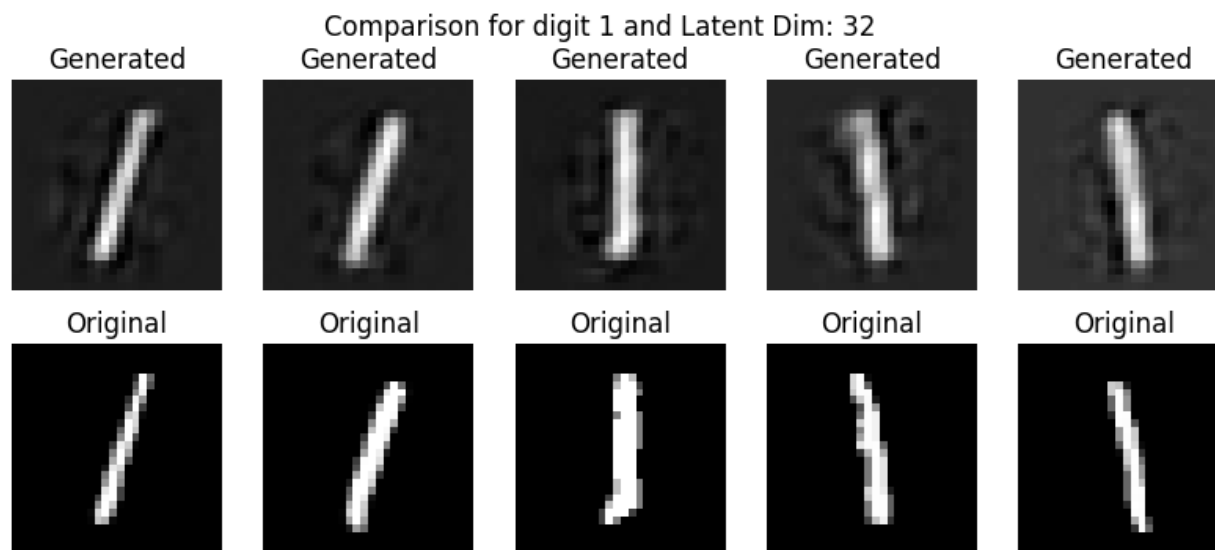
Comparison for digit 7 and Latent Dim: 16



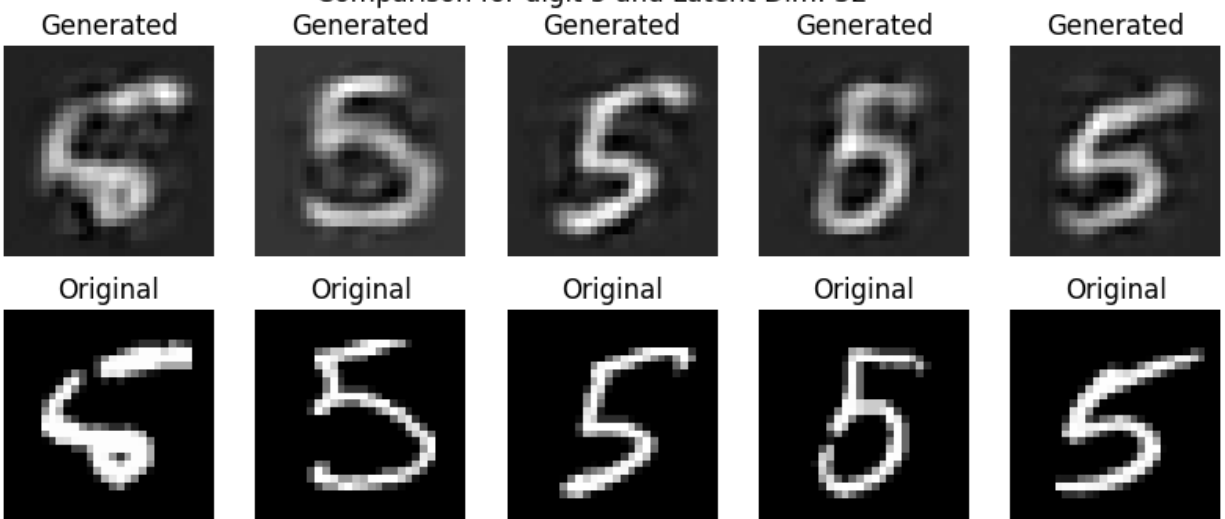
Comparison for digit 9 and Latent Dim: 16



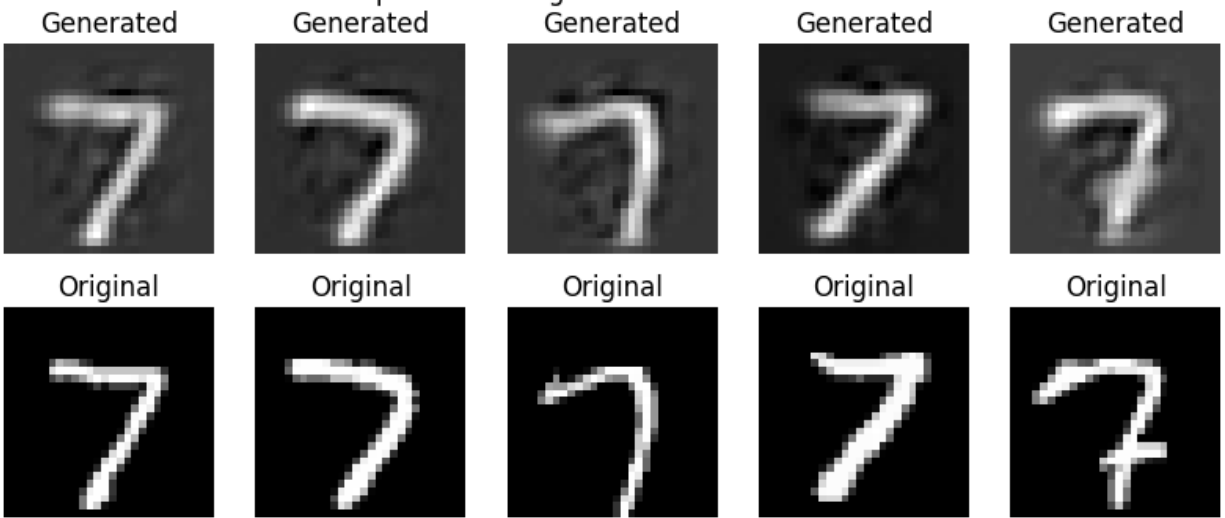
32 dimensions:



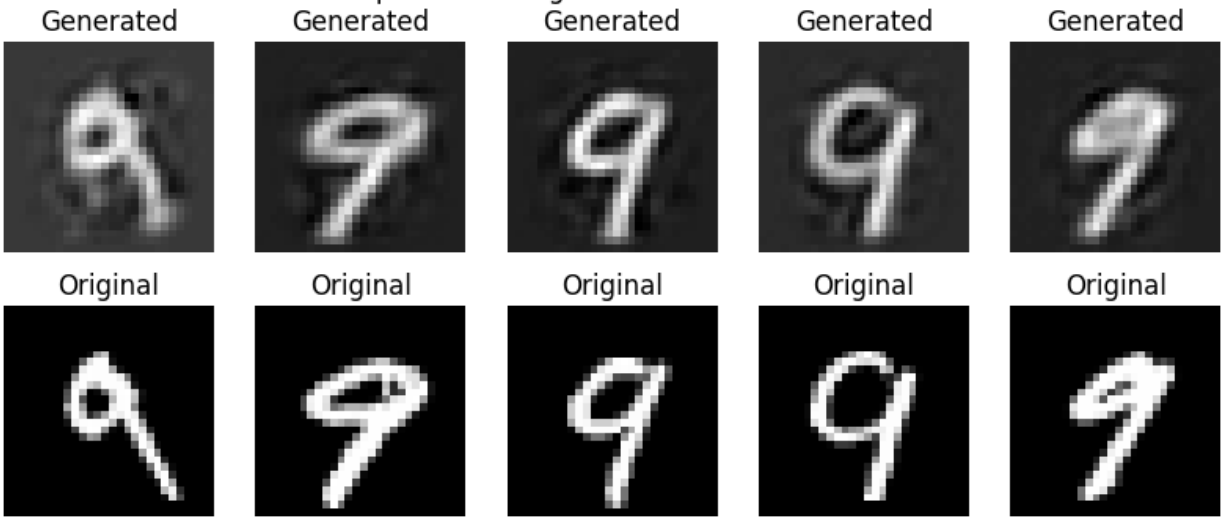
Comparison for digit 5 and Latent Dim: 32



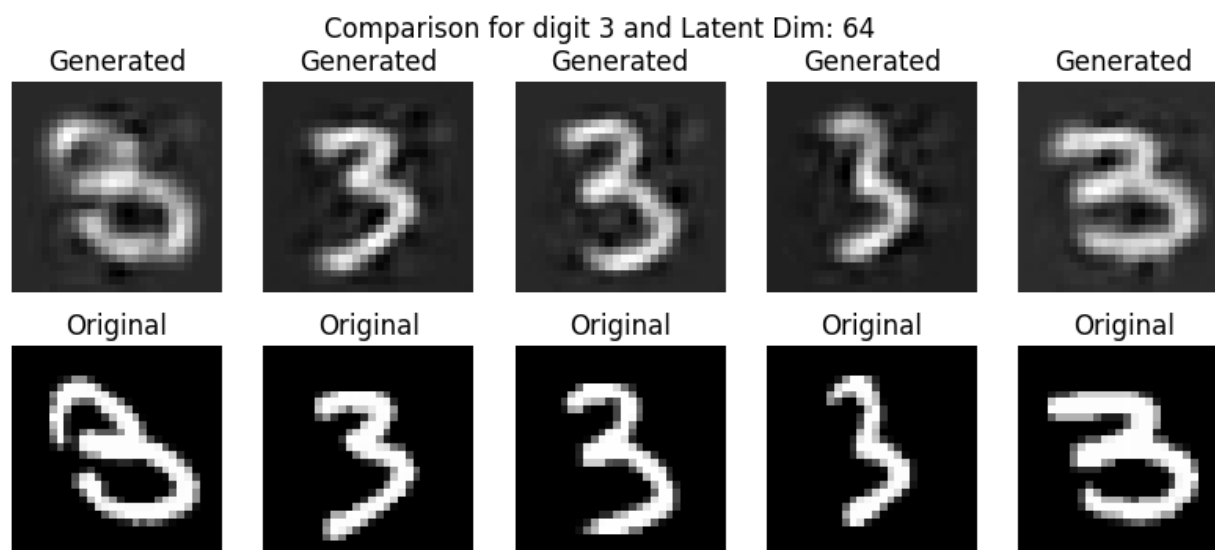
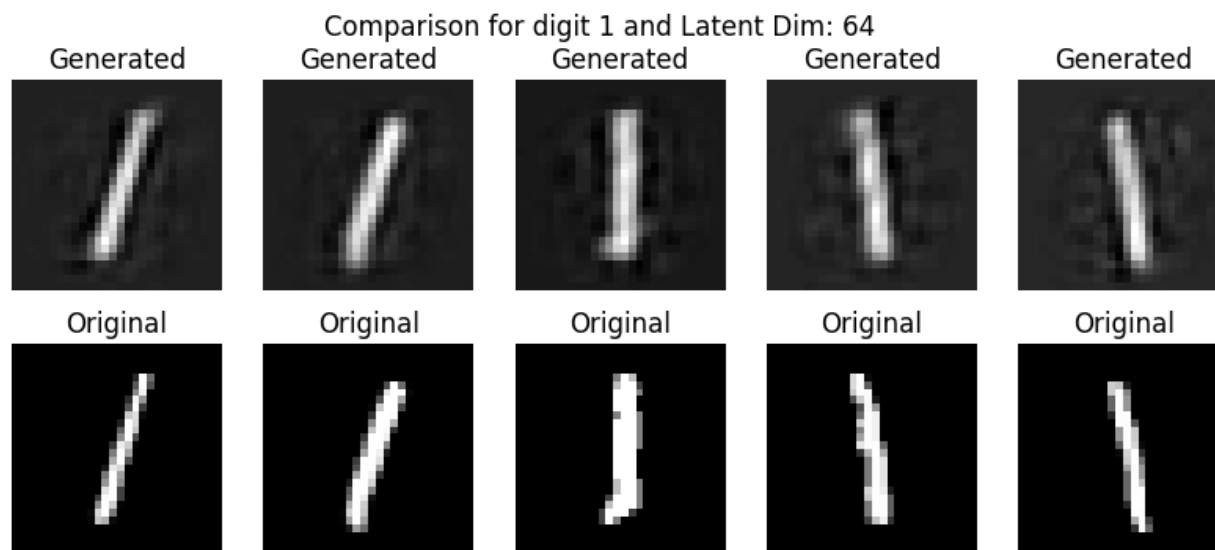
Comparison for digit 7 and Latent Dim: 32



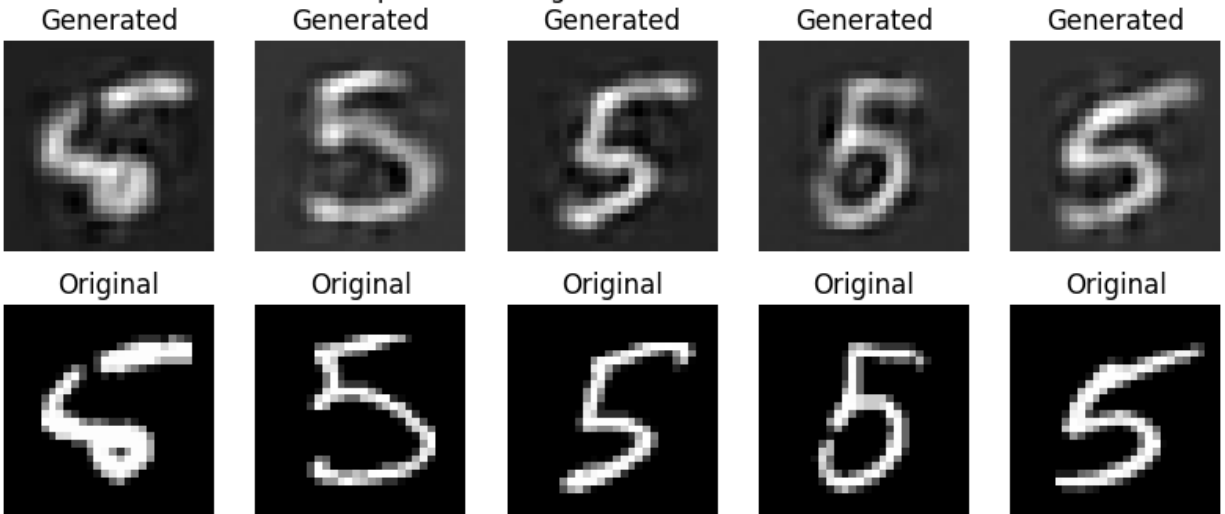
Comparison for digit 9 and Latent Dim: 32



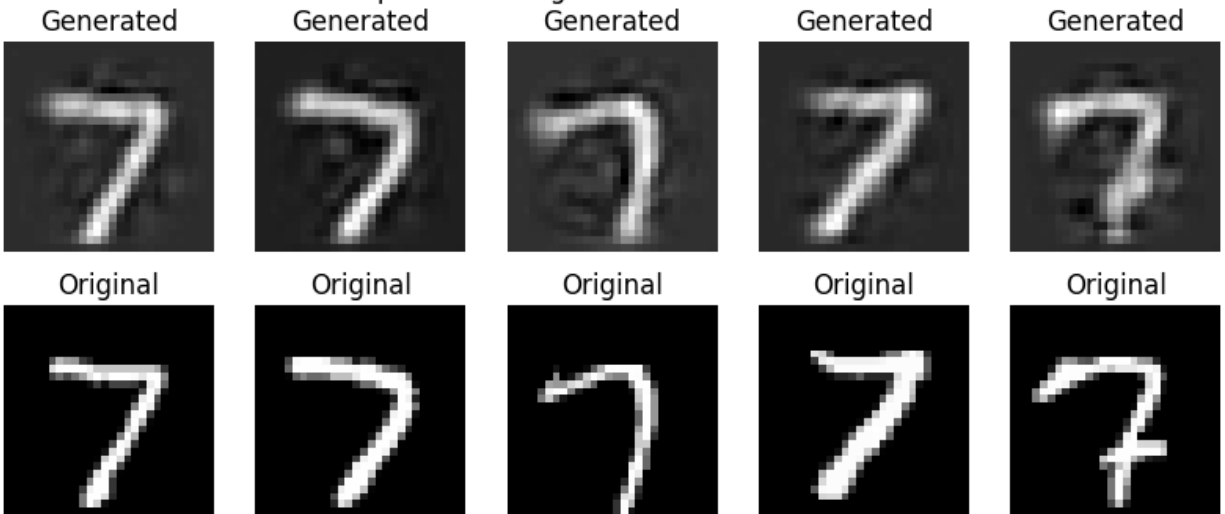
64 dimensions:



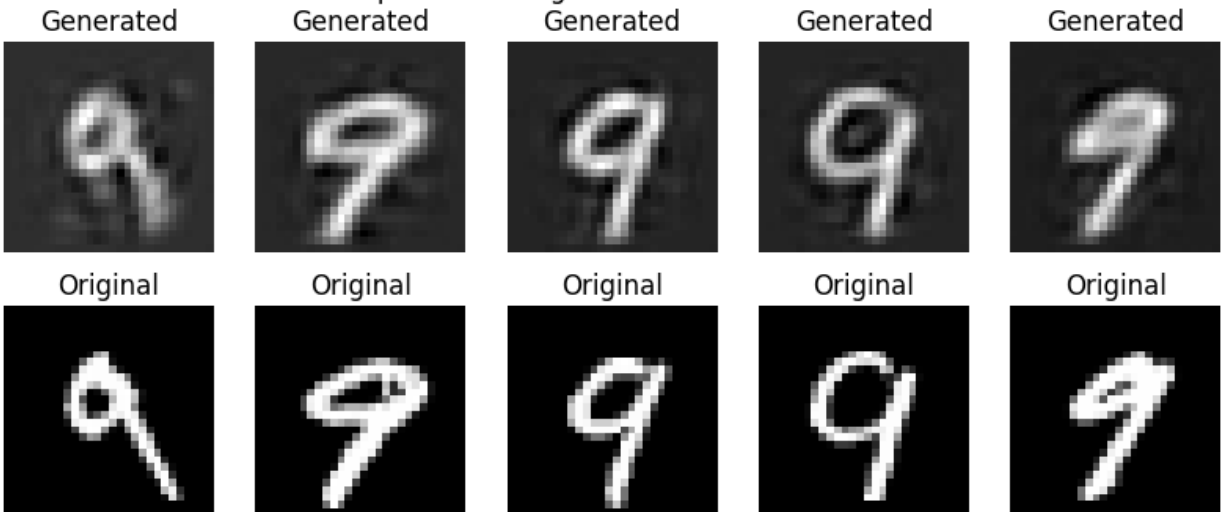
Comparison for digit 5 and Latent Dim: 64



Comparison for digit 7 and Latent Dim: 64

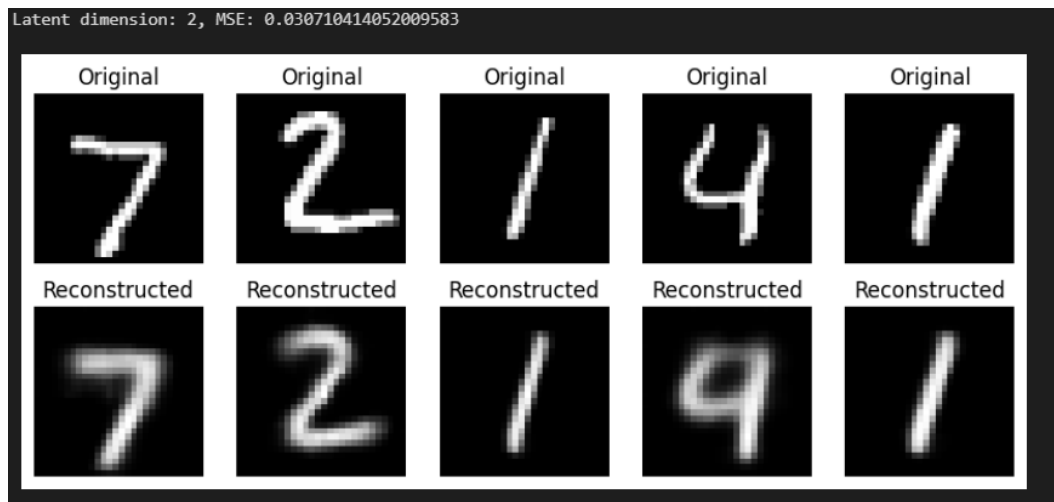


Comparison for digit 9 and Latent Dim: 64

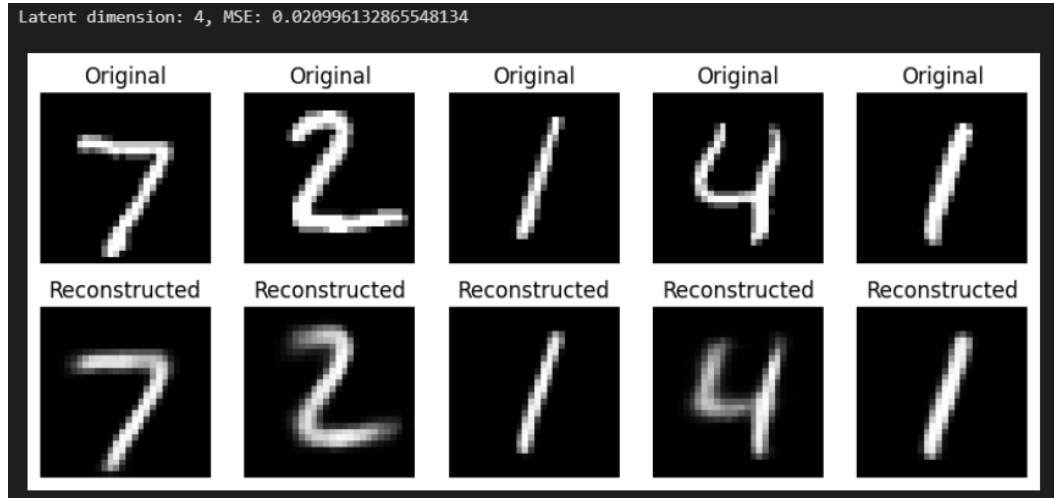


VAE

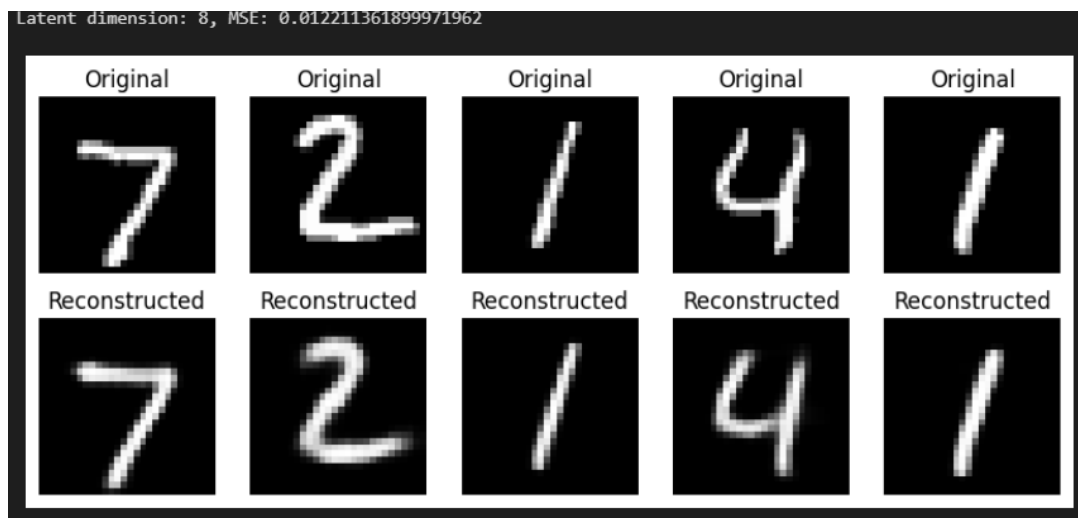
Latent Dim:2



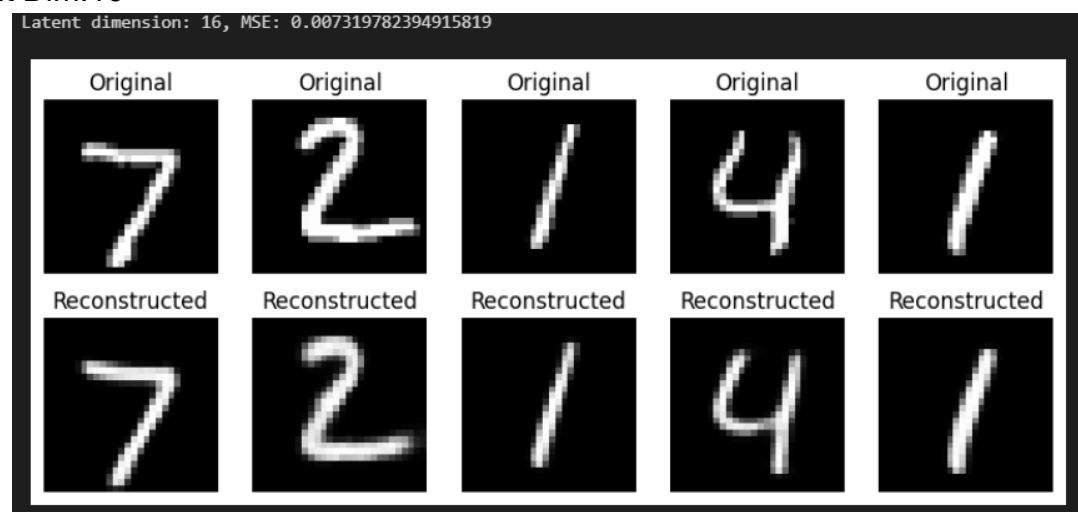
Latent Dim:4



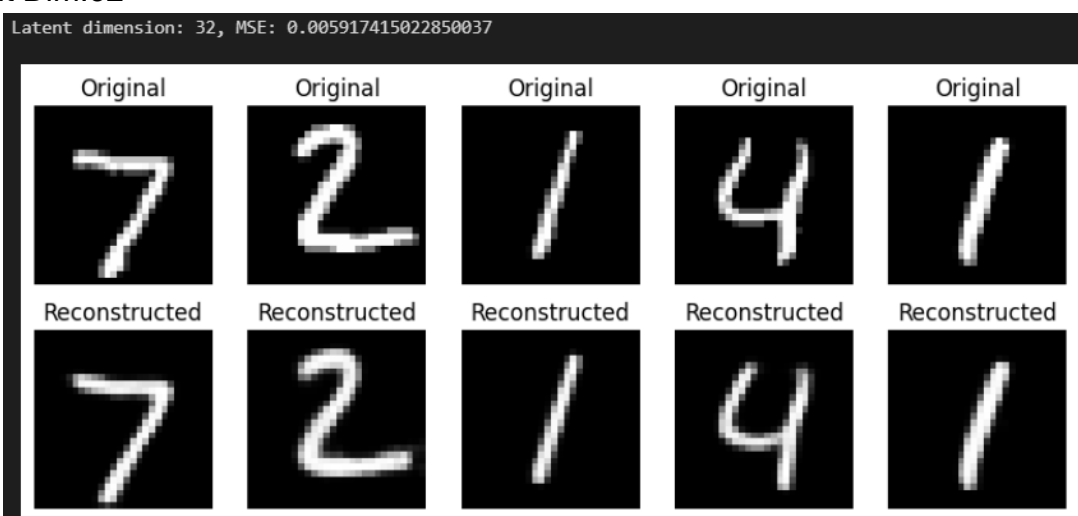
Latent Dim:8



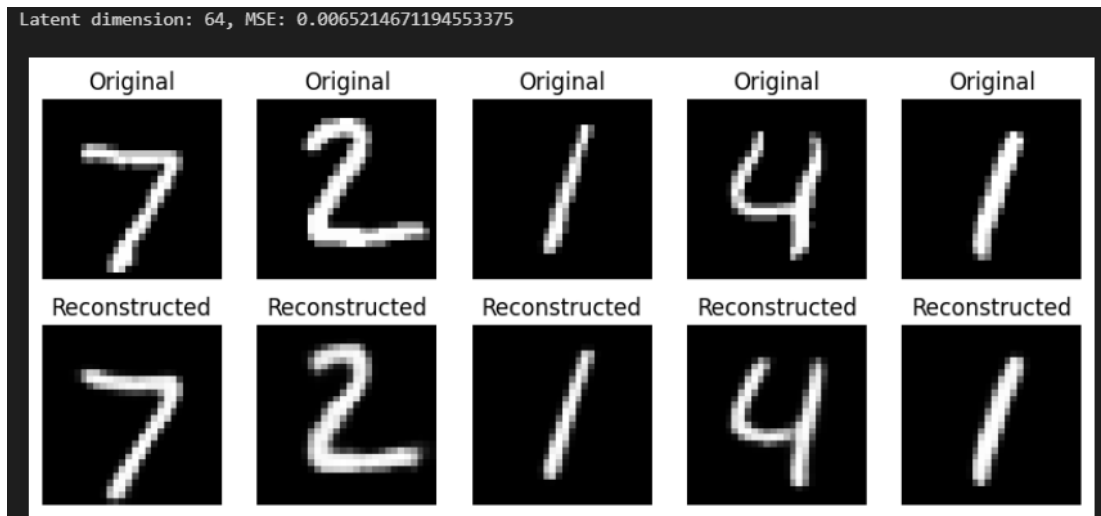
Latent Dim:16



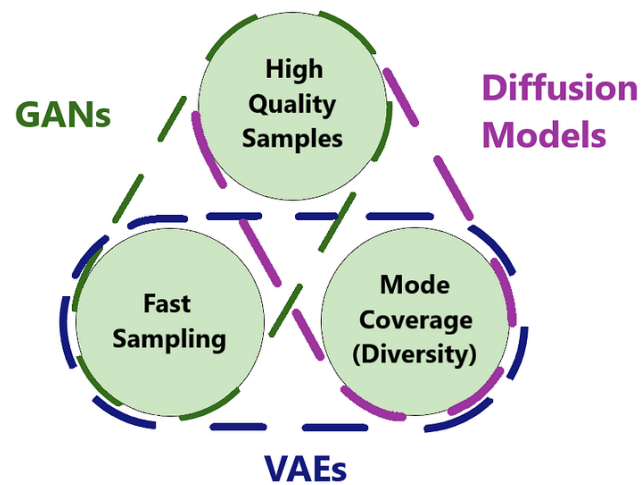
Latent Dim:32



Latent Dim:64

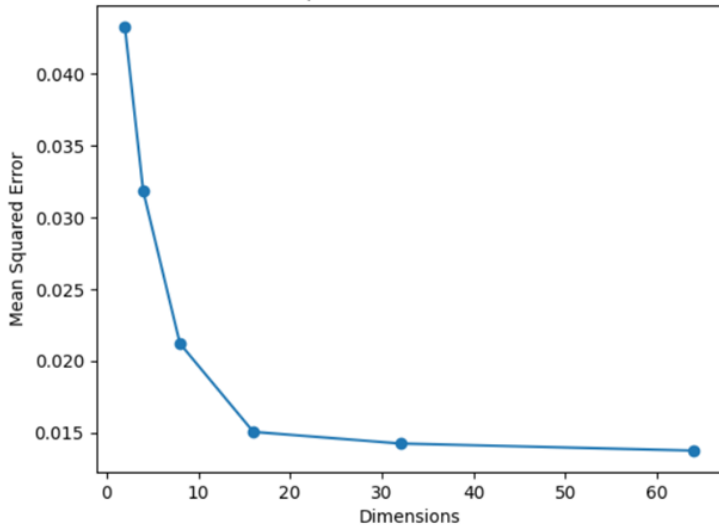


Conclusion:



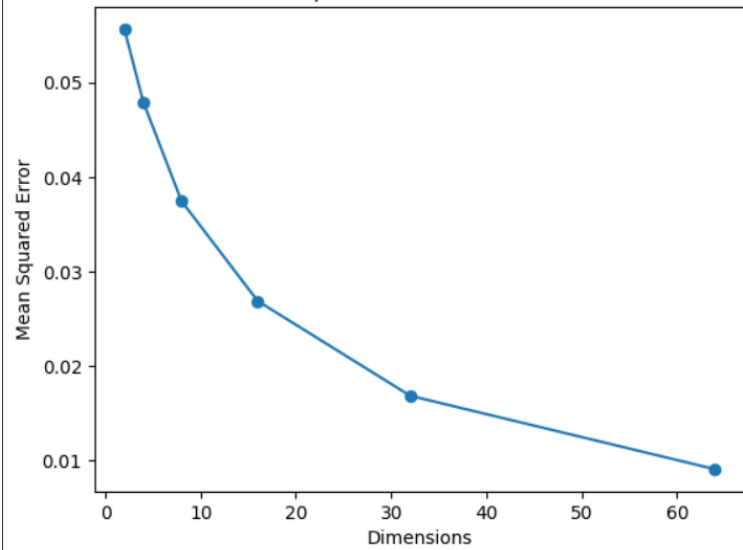
GAN

Mean Squared Error vs. Dimensions



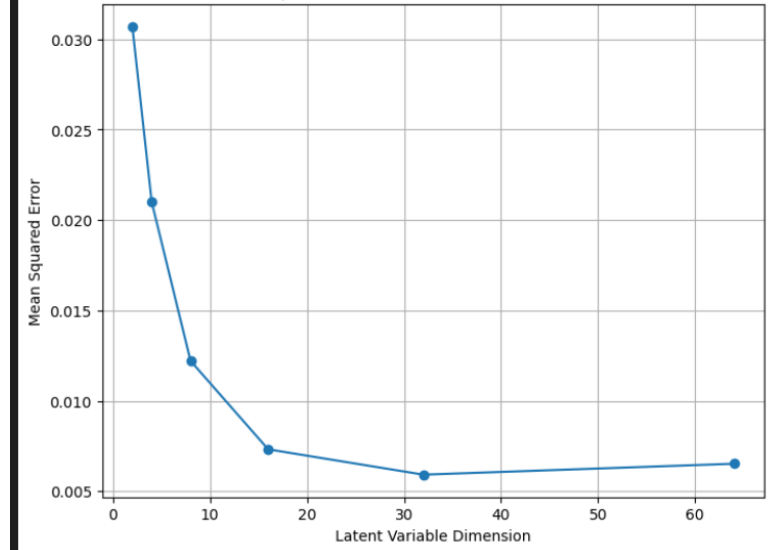
VAE

Mean Squared Error vs. Dimensions



Diffusion

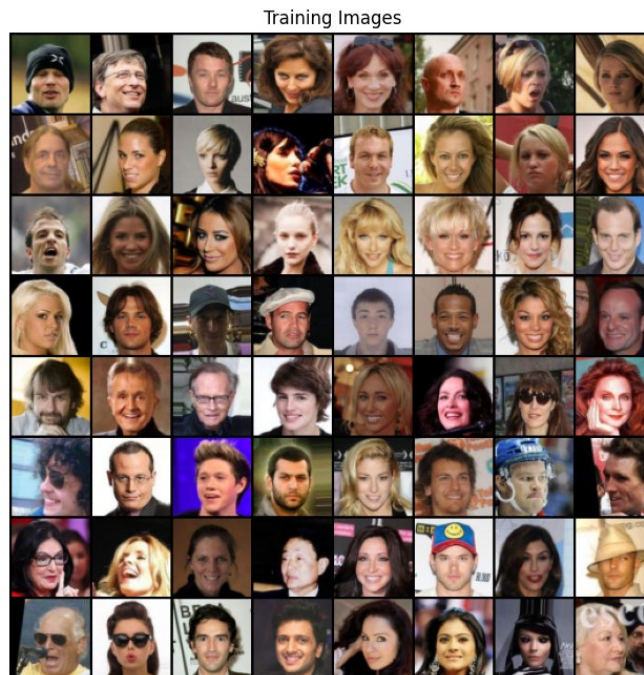
Mean Squared Error vs. Latent Variable Dimension



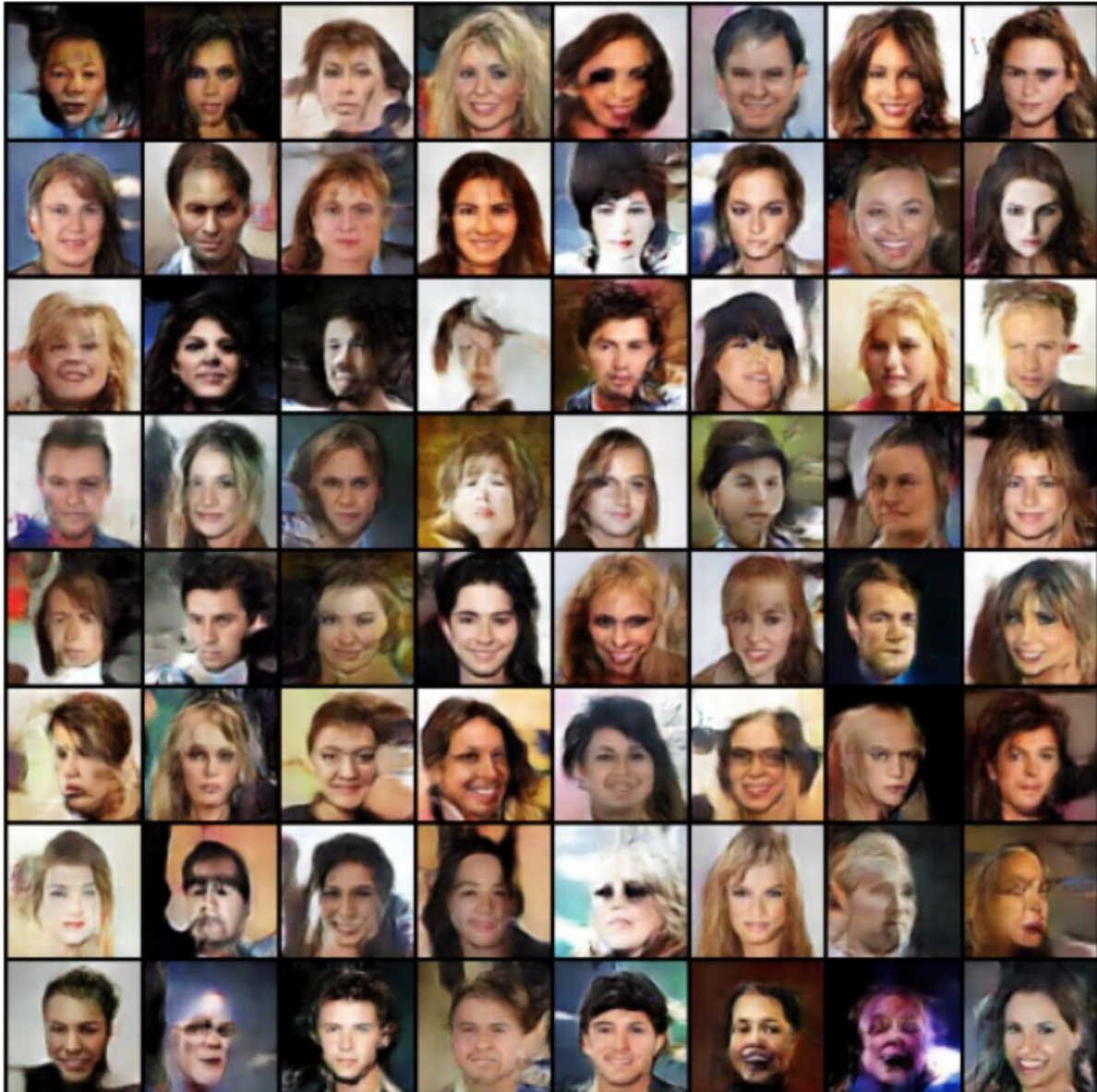
DCGan

DCGAN, or **Deep Convolutional GAN**, is a generative adversarial network architecture. It uses a couple of guidelines, in particular:

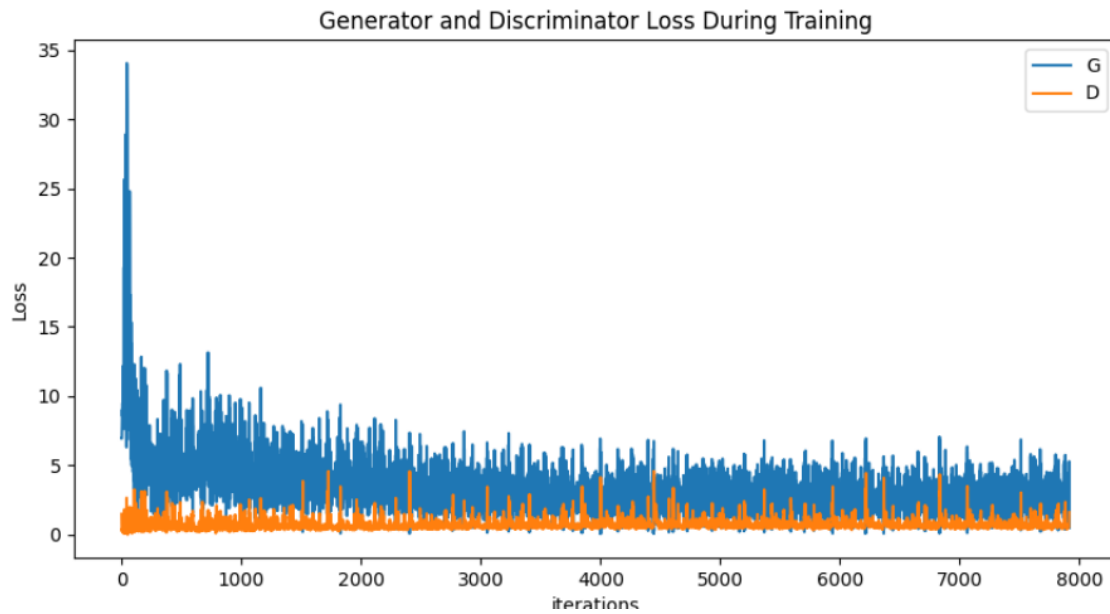
- Replacing any pooling layers with strided convolutions (discriminator) and fractional-strided convolutions (generator).
- Using batchnorm in both the generator and the discriminator.
- Removing fully connected hidden layers for deeper architectures.
- Using [ReLU](#) activation in generator for all layers except for the output, which uses tanh. Using LeakyReLU activation in the discriminator for all layer



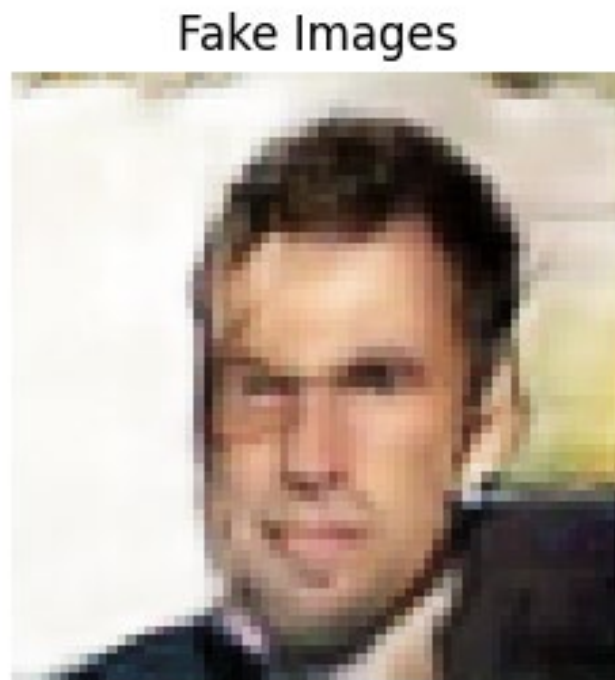
Generated Fake images.



Generator and Discriminator Error:

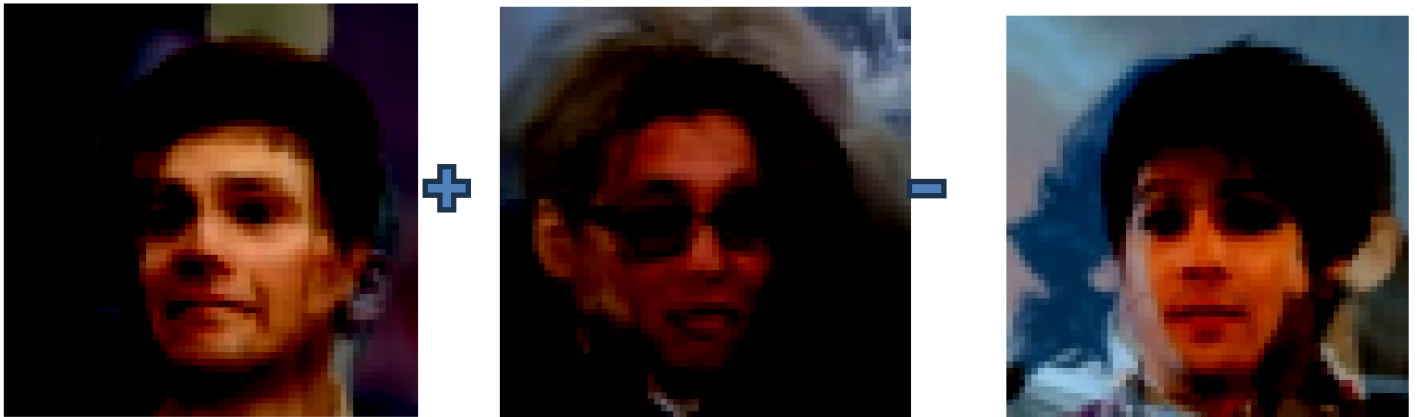


One fake image with random noise:



Vector arithmetic:

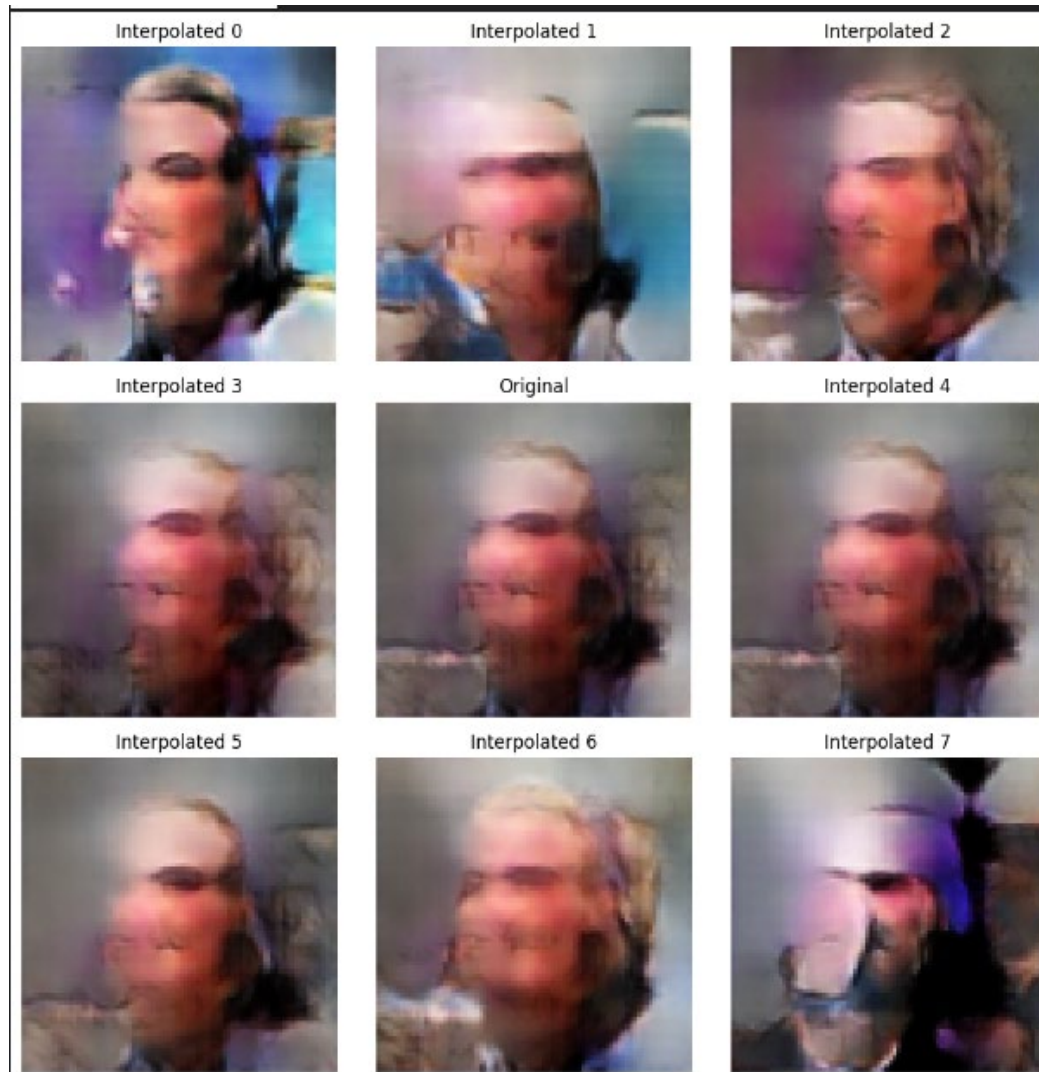
1. Men without glasses + People with glasses - People without glasses



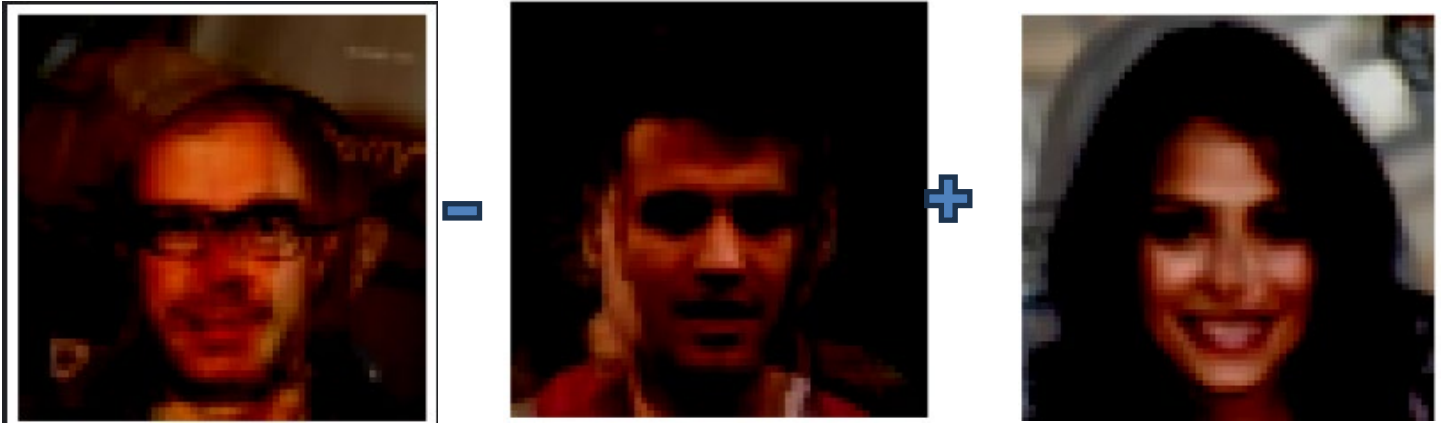
Final :



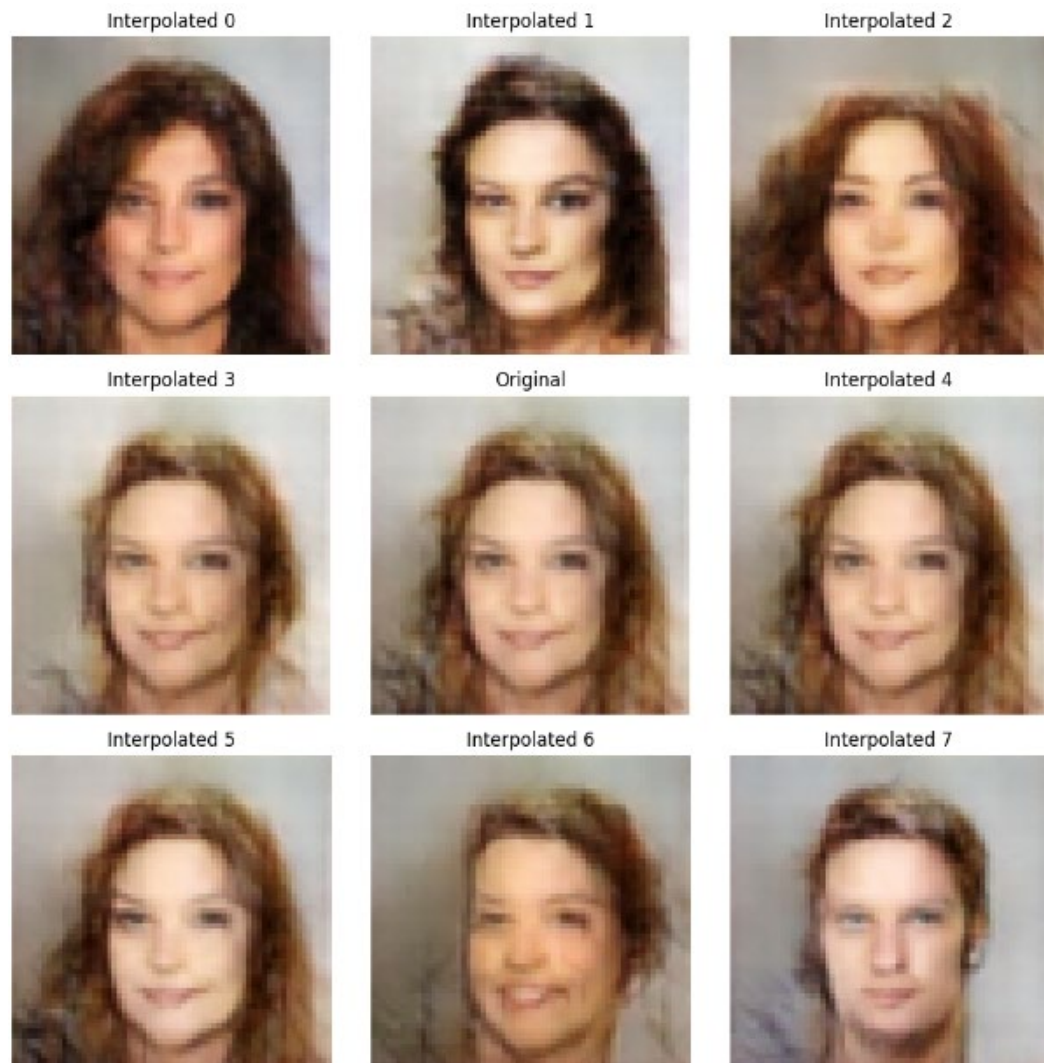
On input space:



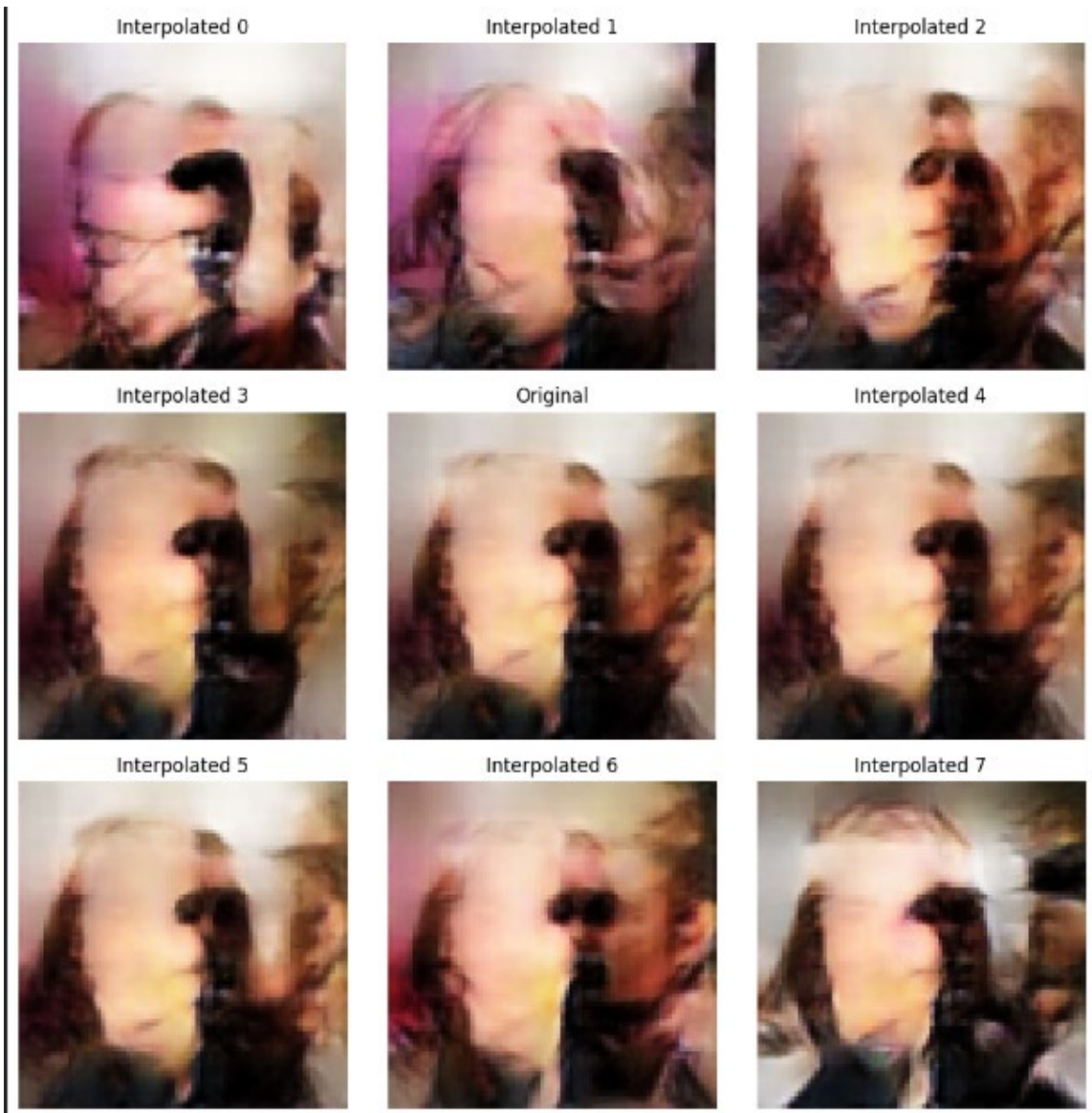
2. men with glasses - Men without glasses + Women without glasses



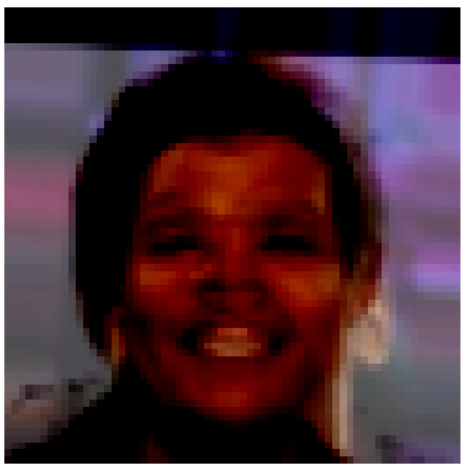
Final:



On input space:



3. Smiling Men + People with Hat - People with Hat + People with Mustache - People without Mustache



+



-



+



-

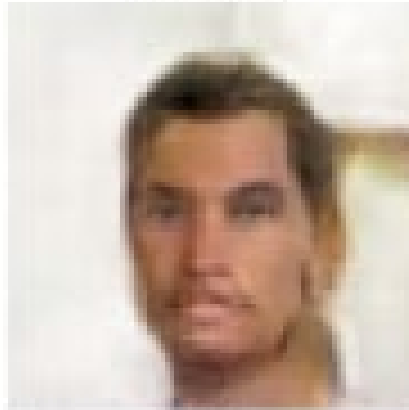


Final :

interpolated 0



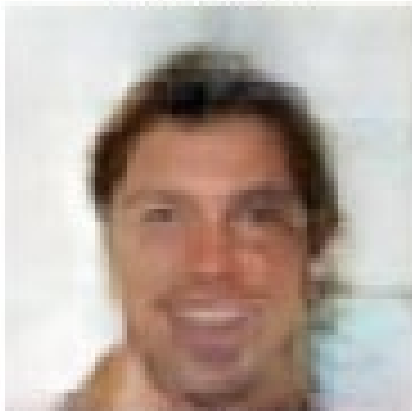
interpolated 1



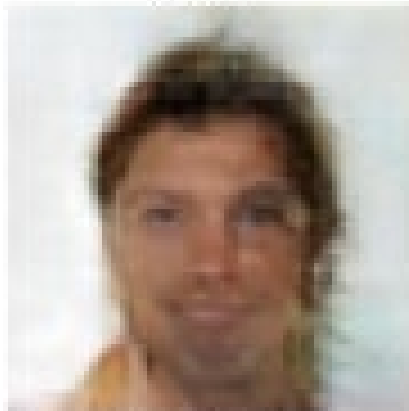
interpolated 2



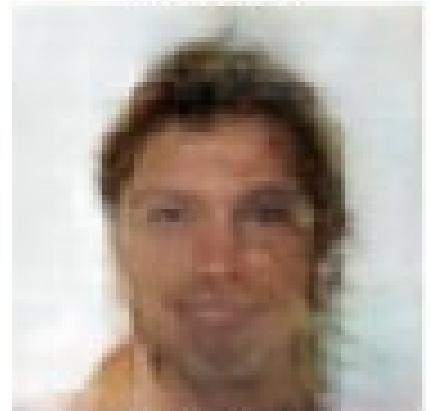
interpolated 3



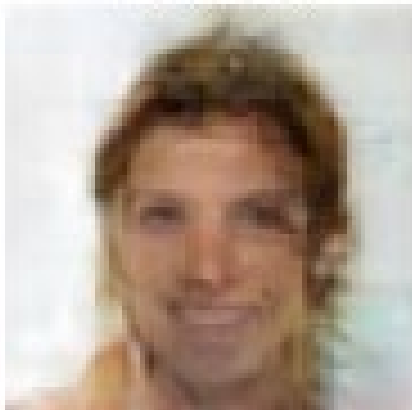
Original



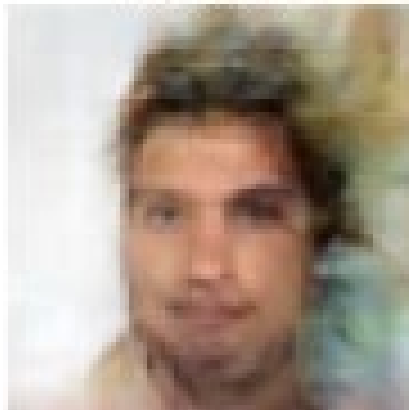
interpolated 4



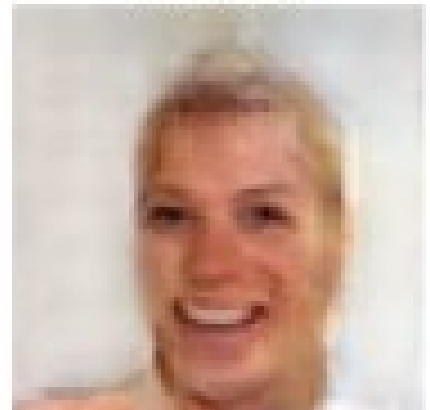
interpolated 5



interpolated 6

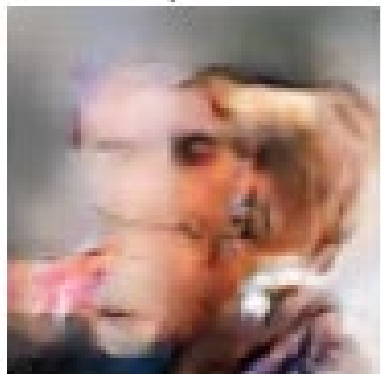


interpolated 7

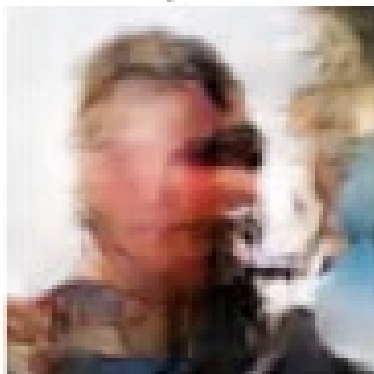


On input space:

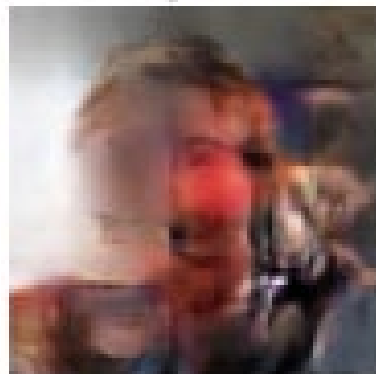
Interpolated 0



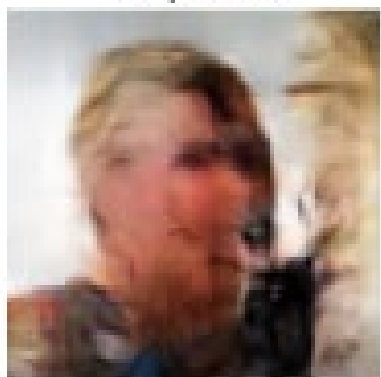
Interpolated 1



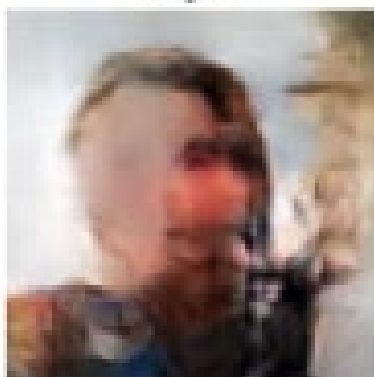
Interpolated 2



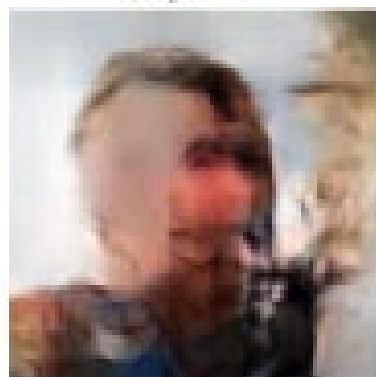
Interpolated 3



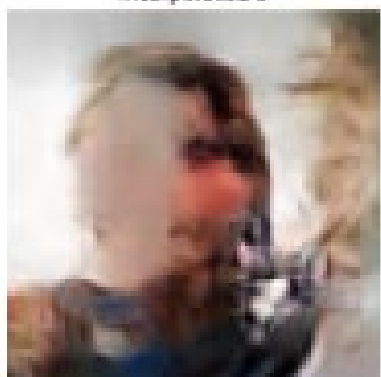
Original



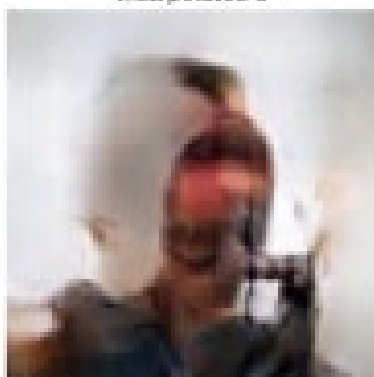
Interpolated 4



Interpolated 5



Interpolated 6



Interpolated 7

