Auto-encoding Variational Bayes

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THE OBTAINED RESULTS:

```
Epoch: 0 ELBO: -2.220131e+02
Epoch: 1 ELBO: -1.934818e+02
Epoch: 2 ELBO: -1.805705e+02
Epoch: 3 ELBO: -1.664317e+02
Epoch: 4 ELBO: -1.548852e+02
Epoch: 5 ELBO: -1.463868e+02
Epoch: 6 ELBO: -1.390776e+02
Epoch: 7 ELBO: -1.343981e+02
Epoch: 8 ELBO: -1.303842e+02
Epoch: 9 ELBO: -1.261567e+02
Epoch: 10 ELBO: -1.228824e+02
Epoch: 11 ELBO: -1.205947e+02
Epoch: 12 ELBO: -1.190836e+02
Epoch: 13 ELBO: -1.177239e+02
Epoch: 14 ELBO: -1.167119e+02
```

```
Epoch: 15 ELBO: -1.159205e+02
Epoch: 16 ELBO: -1.151034e+02
Epoch: 17 ELBO: -1.143162e+02
Epoch: 18 ELBO: -1.135846e+02
Epoch: 19 ELBO: -1.129953e+02
Epoch: 20 ELBO: -1.124856e+02
Epoch: 21 ELBO: -1.117956e+02
Epoch: 22 ELBO: -1.110689e+02
Epoch: 23 ELBO: -1.106104e+02
Epoch: 24 ELBO: -1.102020e+02
Epoch: 25 ELBO: -1.098817e+02
Epoch: 26 ELBO: -1.094777e+02
Epoch: 27 ELBO: -1.092068e+02
Epoch: 28 ELBO: -1.088990e+02
Epoch: 29 ELBO: -1.087090e+02
```

GENERATION OF 25 IMAGES FROM THE GENERATIVE MODEL

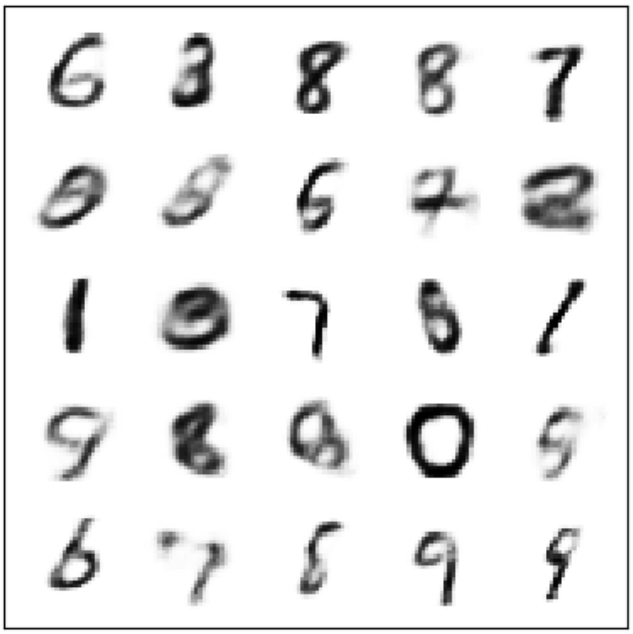

FIGURE 1 – GENERATION OF 25 IMAGES FROM THE GENERATIVE MODEL

GENERATION OF 10 IMAGE RECONSTRUCTIONS USING THE RECOGNITION MODEL AND THEN THE GENERATIVE MODEL

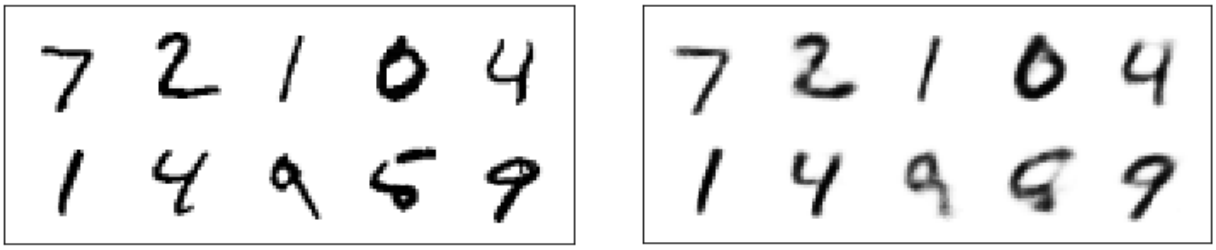

FIGURE 2 – THE RESULT OF THE RECOGNITION MODEL (LEFT)

AND GENERATIVE MODEL (RIGHT)

5 INTERPOLATIONS IN THE LATENT SPACE FROM ONE IMAGE TO ANOTHER

The results are provided in the figure below.

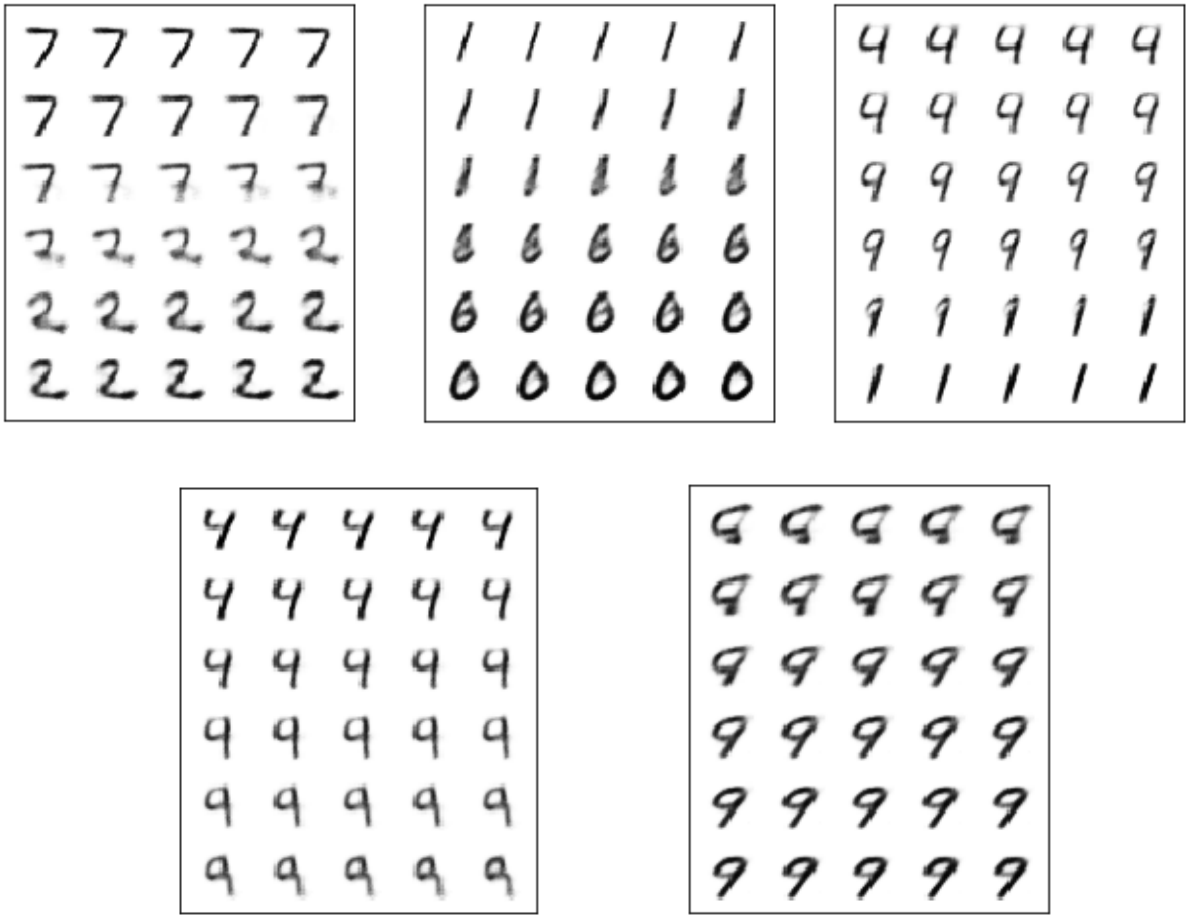

FIGURE 3 – INTERPOLATION RESULTS

Note:

In order to save all interpolations to one file, the code of subtask 3.3 should be changed to:

```
alpha_values = np.linspace(0, 1, 30)
D = np.shape(outputs10)[-1] // 2
latent_mean = outputs10[:, :D]
vectors = []

k = 0

for i in range(5):
  for alpha in alpha_values:
    # Latent space interpolation
    vector = latent_mean[k] * (1 - alpha) + latent_mean[k+1] * alpha
    vectors.append(vector)
    preds_inter  = sigmoid(neural_net_predict(gen_params, vectors))
    save_images(preds_inter, "all_interpolations")
  k = k+2
```

Then the output file will contain all interpolations in one file:

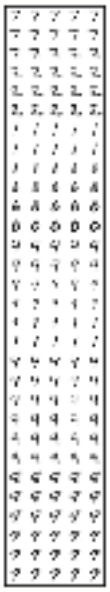

FIGURE 4 – INTERPOLATION RESULTS

Or in order to save each step to the different file:

```
alpha_values = np.linspace(0, 1, 30)
D = np.shape(outputs10)[-1] // 2
latent_mean = outputs10[:, :D]
vectors = []

k = 0

for i in range(5):
  for alpha in alpha_values:
    # Latent space interpolation
    vector = latent_mean[k] * (1 - alpha) + latent_mean[k+1] * alpha
    vectors.append(vector)
```

```
  preds_inter  = sigmoid(neural_net_predict(gen_params, vectors))
  save_images(preds_inter, str(i))
k = k+2
```

Then the otput files are the following:

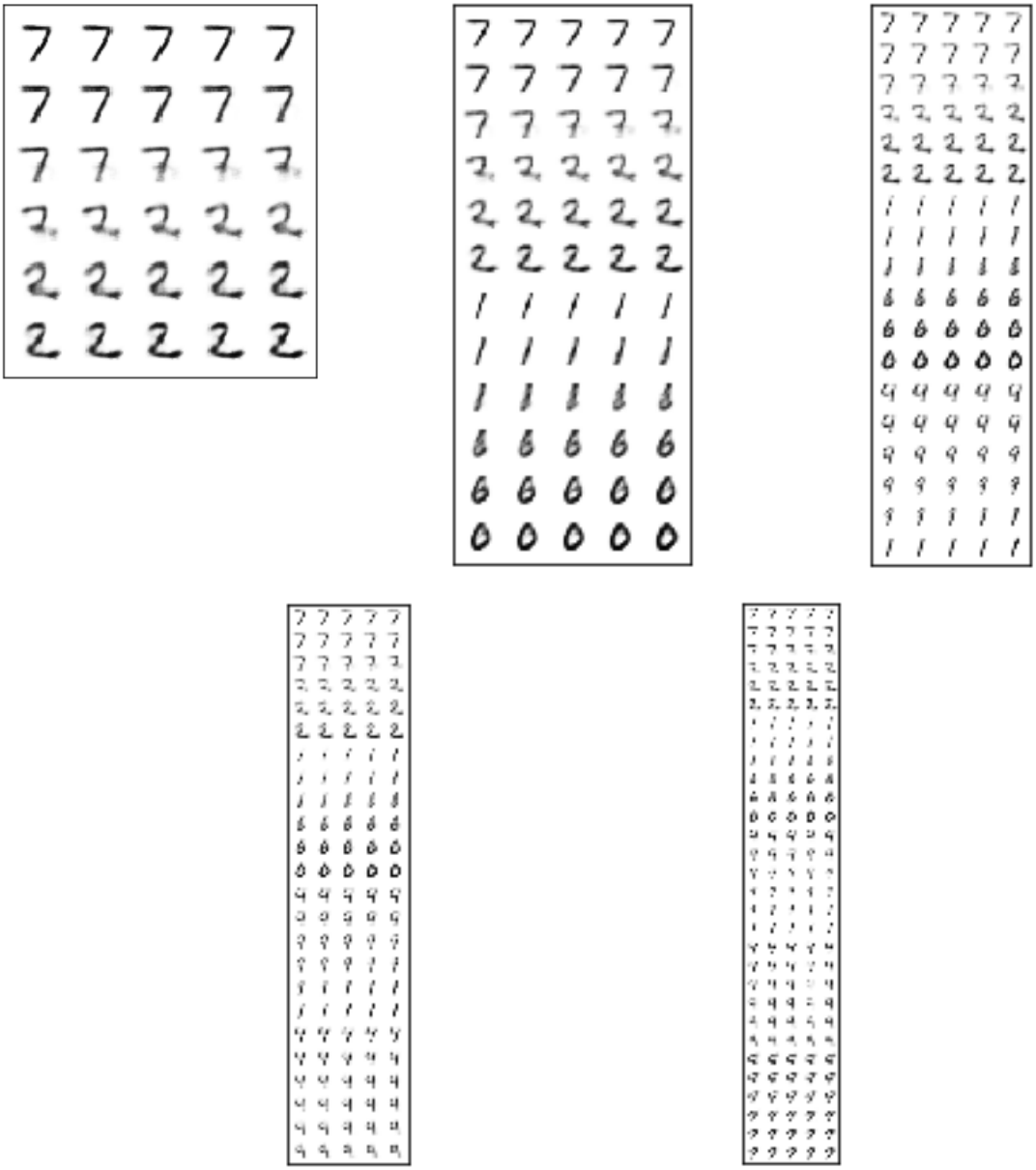

FIGURE 5 – INTERPOLATION RESULTS