EXAM PROJECT FOR PML 2022/2023

REPORT

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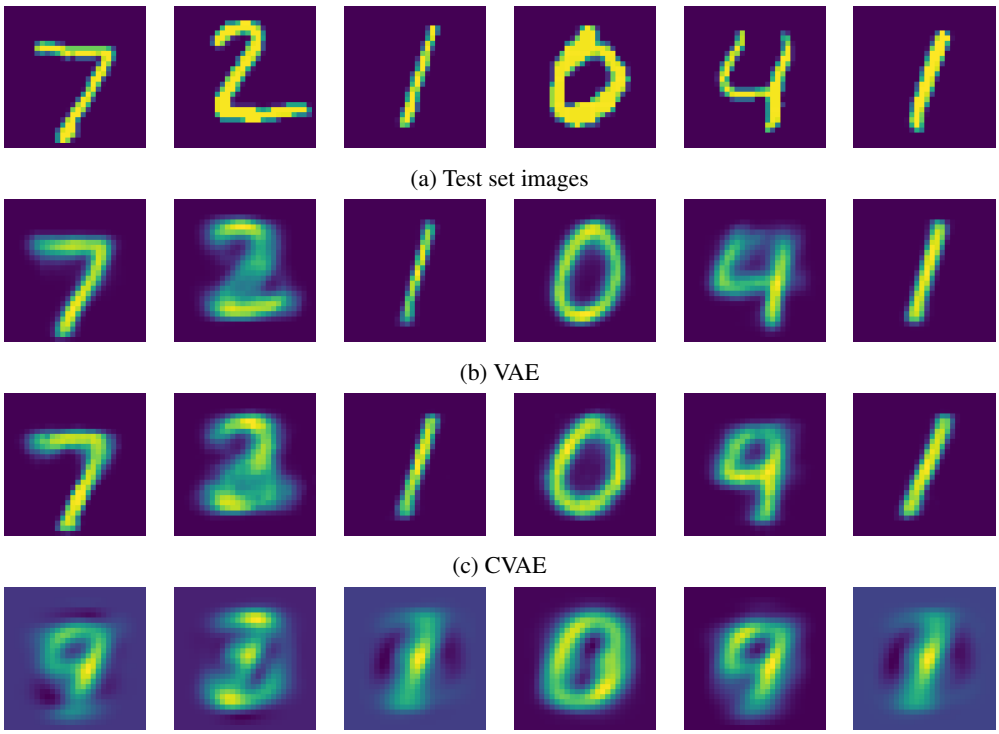
1 Density modeling

1.1 Implement a convolutional VAE

1.2 Alternative models



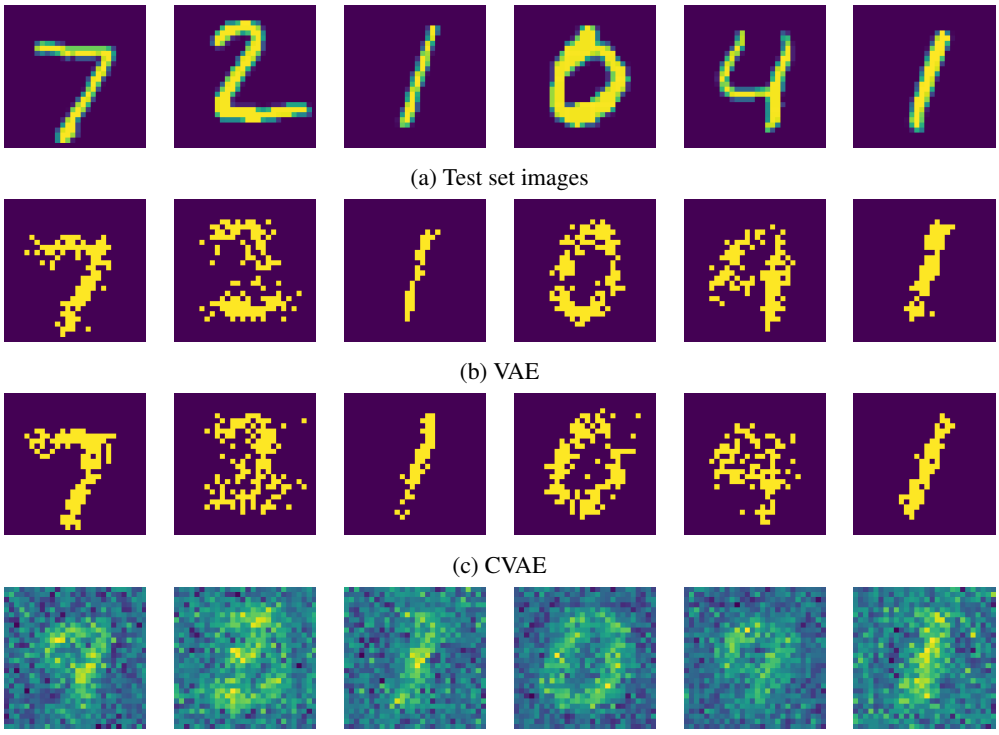
(a) Test set images

(b) VAE

(c) CVAE

(d) PPCA

Figure 1: Comparison of MNIST test set images and corresponding mean parameters generated by density models



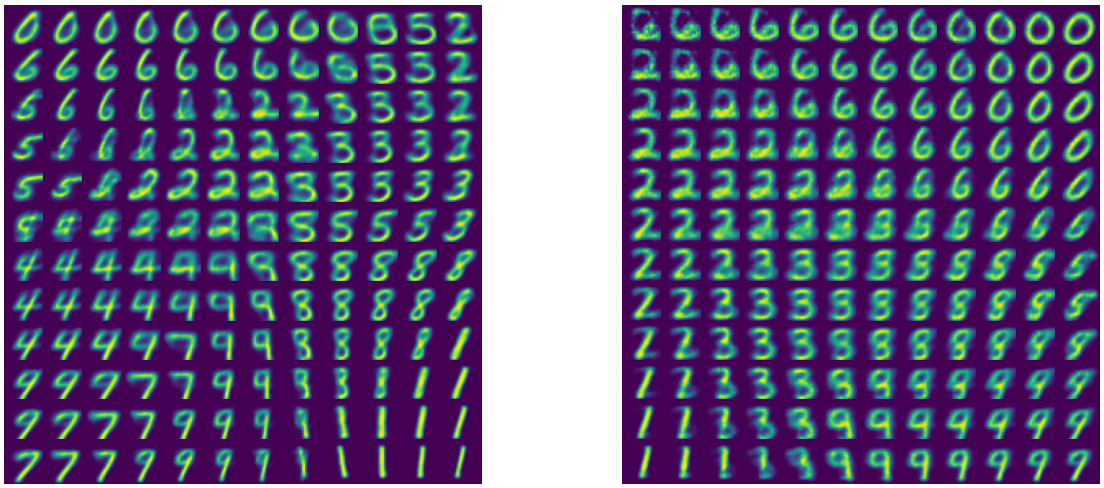
(a) Test set images

(b) VAE

(c) CVAE

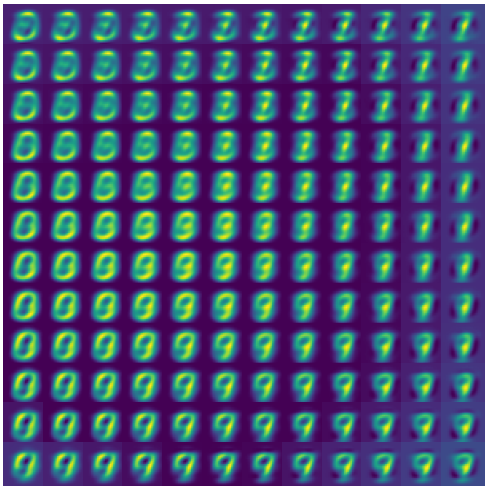
(d) PPCA

Figure 2: Comparison of MNIST test set images and corresponding reconstructions sampled from density models



(a) VAE

(b) CVAE

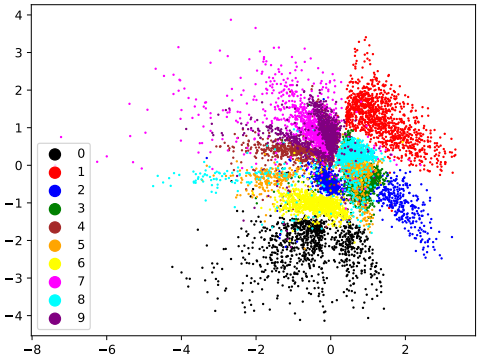


(c) PPCA

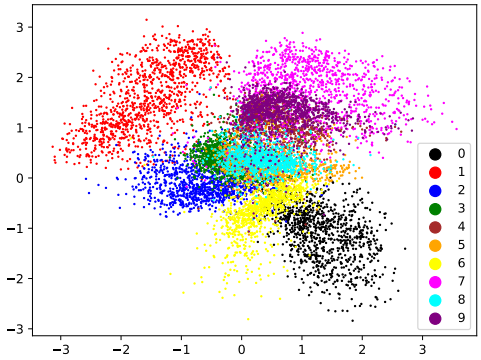
Figure 3: Interpolating images from latent space variables using trained density models.

	Log-Likelihood/ELBO	MSE
VAE	-142.813448	0.037524
CVAE	-156.987707	0.044402
PPCA	-4329.655762	3629.250732

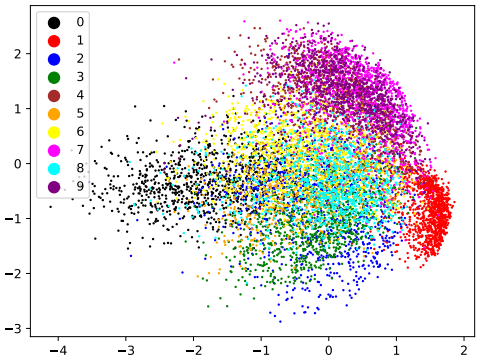
Table 1: Model performance metrics



(a) VAE



(b) CVAE



(c) PPCA

Figure 4: Clustering on MNIST test (projection to latent space) using trained density models.

2 Function fitting

2.1 Fitting a GP with Pyro

2.2 Bayesian Optimization

3 Bibliography