Deep Learning: Homework 3

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1 Energy-Based Model

Almost all default hyper-parameters are modified according to [2].

To train, run:

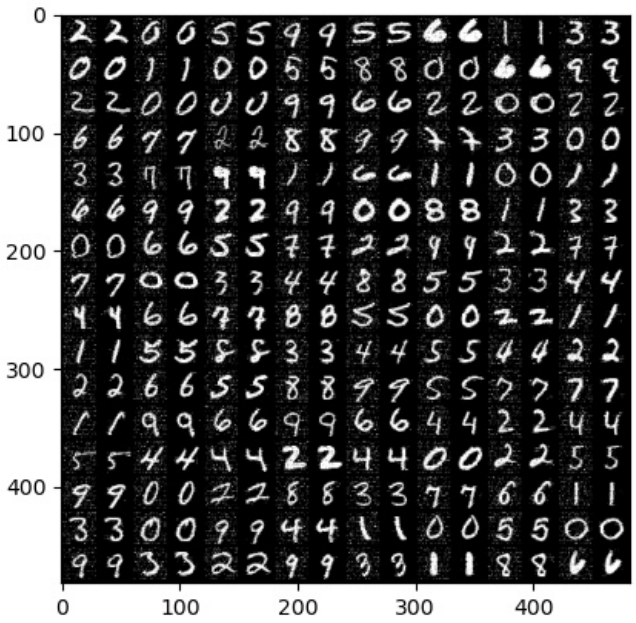
```
python main.py
```

To validate, run:

```
python main.py --play --load_dir=ebm_checkpoint_99.pth
```

Result:

For the two adjacent grids, the right one is the denoised picture.



2 Normalizing Flows (As Bonus)

Implemented according to [1].

To train, run:

```
python train.py
```

To validate, run:

```
python inpainting.py
```

Line 48-49, 58-63 are modified to load data and checkpoint correctly.

Result:

3 Variational Autoencoder

Loss function derived from [3].

To train variational autoencoder, run:

```
python vae.py
```

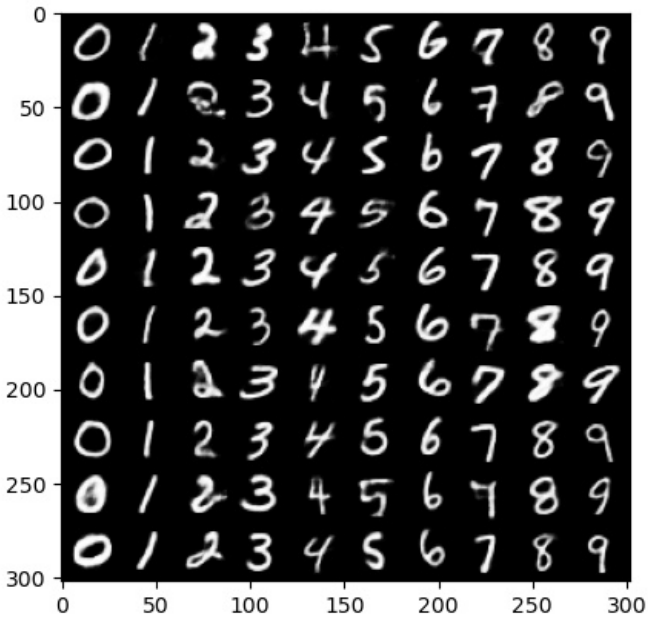
Before this, you need to train an MNIST classifier:

```
python mnist_classifier.py
```

To validate, run:

```
python vae.py --eval --load_path=best.pth
```

Result:



4 Generative Adversarial Network

Loss function derived from [3].

To train variational autoencoder, run:

```
python gan.py
```

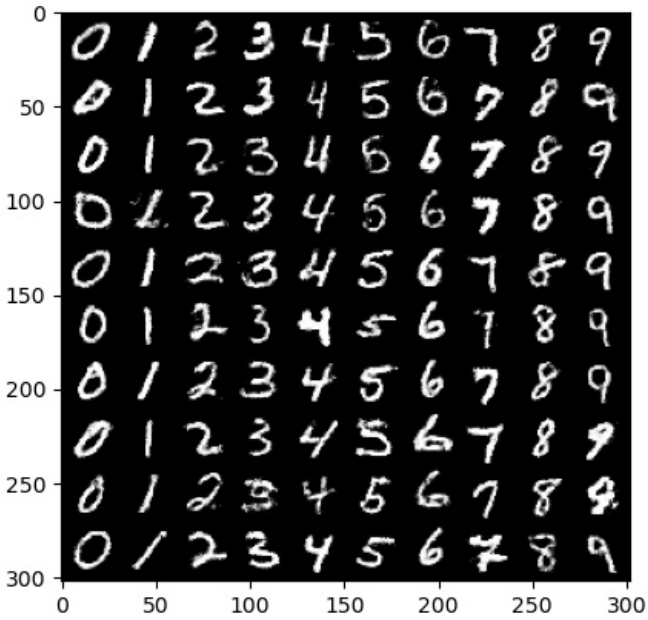
Before this, you need to train an MNIST classifier:

```
python mnist_classifier.py
```

To validate, run:

```
python gan.py --eval --load_path=best.pth
```

Result:



References

[1] Dinh, L., Sohl-Dickstein, J., and Bengio, S. Density estimation using real nvp, 2017.

[2] Du, Y., and Mordatch, I. Implicit generation and generalization in energy-based models, 2020.

[3] Kingma, D. P., and Welling, M. Auto-encoding variational bayes, 2014.