

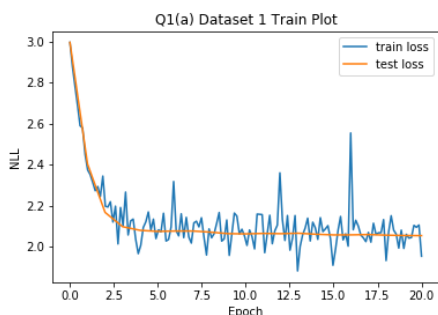
Homework 1: Autoregressive Models

Deliverable: PDF write-up by **Tuesday February 11th, 23:59pm**. Your PDF should be generated by simply replacing the placeholder images of this LaTeX document with the appropriate solution images that will be generated automatically when solving each question. The solution images are automatically generated and saved using the accompanying IPython notebook. Your PDF is to be submitted into Gradescope. This PDF already contains a few solution images. These images will allow you to check your own solution to ensure correctness.

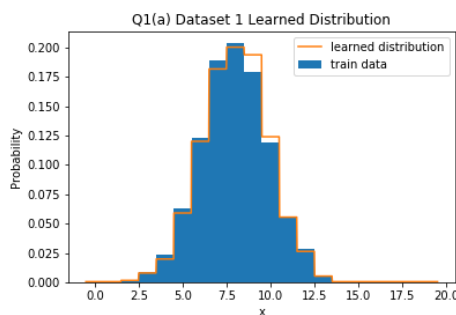
Question 1: 1D Data

(a) [10pt] Fitting a Histogram

Final test loss for dataset 1: 2.0553 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Learned distribution

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

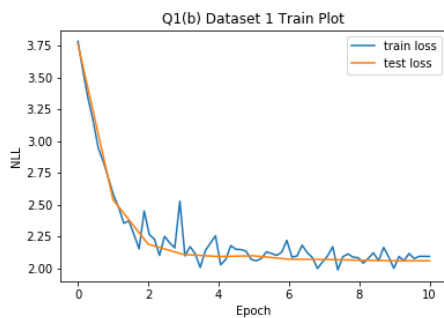
Placeholder

(a) Dataset 2: Training curve

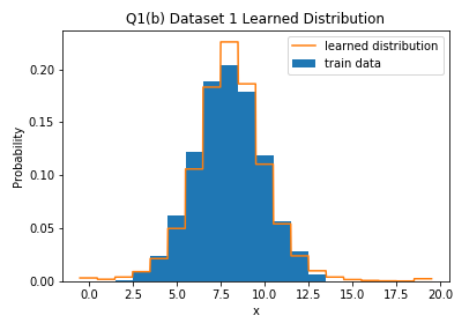
(b) Dataset 2: Learned distribution

(b) [10pth] Fitting Discretized Mixture of Logistics

Final test loss for dataset 1: 2.0586 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Learned distribution

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

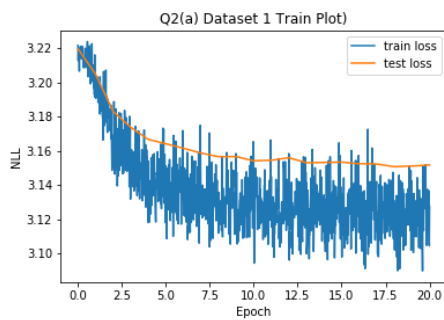
Placeholder

(a) Dataset 2: Training curve

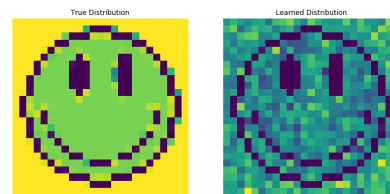
(b) Dataset 2: Learned distribution

Question 2: MADE**(a) [10pt] Fitting 2D Data**

Final test loss for dataset 1: 3.1518 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Learned distribution

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

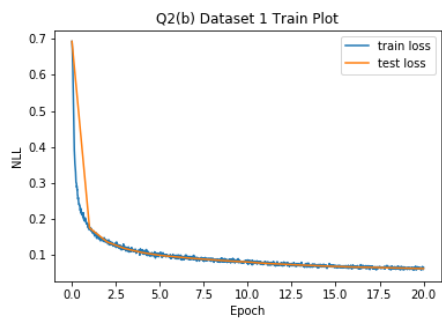
Placeholder

(a) Dataset 2: Training curve

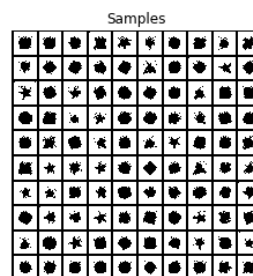
(b) Dataset 2: Learned distribution

(b) [10pt] Shapes and MNIST

Final test loss for dataset 1: 0.0623 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Samples

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

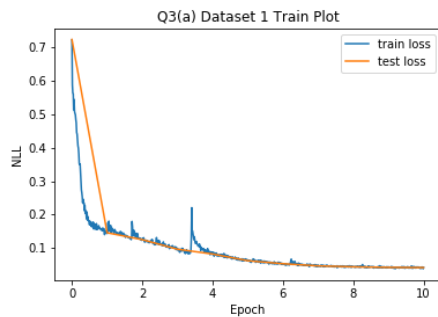
(a) Dataset 2: Training curve

Placeholder

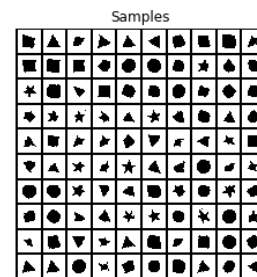
(b) Dataset 2: Samples

Question 3: PixelCNNs**(a) [10pt] PixelCNNs on Binary Data**

Final test loss for dataset 1: 0.0420 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Samples

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

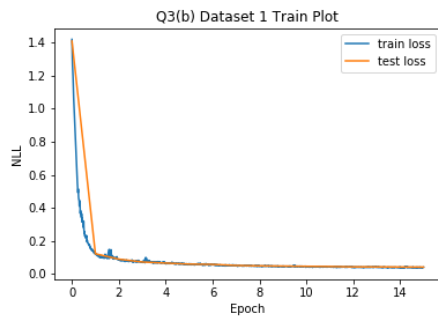
(a) Dataset 2: Training curve

Placeholder

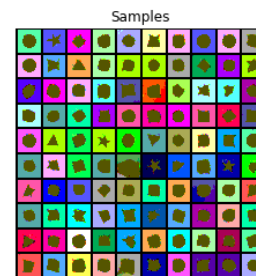
(b) Dataset 2: Samples

(b) [10pt] Independent Color Channels

Final test loss for dataset 1: 0.0444 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Samples

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

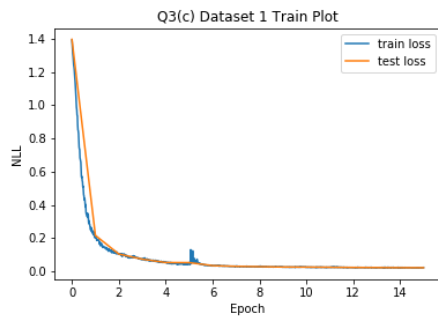
(a) Dataset 2: Training curve

Placeholder

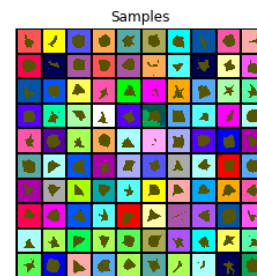
(b) Dataset 2: Samples

(c) [10pt] **Dependent Color Channels**

Final test loss for dataset 1: 0.0236 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Samples

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

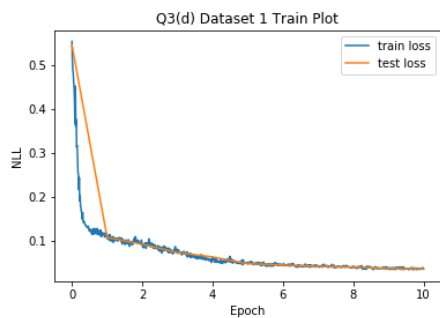
(a) Dataset 2: Training curve

Placeholder

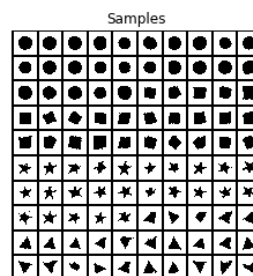
(b) Dataset 2: Samples

(d) [10pt] **Conditional PixelCNNs**

Final test loss for dataset 1: 0.0368 nats / dim



(a) Dataset 1: Training curve



(b) Dataset 1: Samples

Final test loss for dataset 2: 0.0000 nats / dim

Placeholder

(a) Dataset 2: Training curve

Placeholder

(b) Dataset 2: Samples

Bonus Questions (Optional)

[10pt] Gated PixelCNN

Final test loss: 0.0000 nats / dim

Placeholder

Placeholder

(a) Training curve

(b) Samples

[10pt] PixelCNN with Mixture of Logistics

Final test loss: 0.0000 nats / dim

Placeholder

Placeholder

(a) Training curve

(b) Samples

[10pt] Conditioning on Auxiliary Variables

Final test loss: 0.0000 nats / dim

Placeholder

Placeholder

(a) Training curve

(b) Samples

[10pt] Faster Sampling

Final test loss: 0.0000 nats / dim

Placeholder

Placeholder

(a) Training curve

(b) Samples