CS 460G Assignment 4 Report

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Create a char-RNN to Generate Shakespearean Text:

For this assignment I used the Pytorch library to construct my recurrent neural network. I first read the input file in as a single string, created a set of all unique characters in that string, and then made dictionaries for char to int and int to char conversions. In order to make my input and target values, I created a list of lists of size 100 to be able to use batches when training my model. The input lists are then converted into lists of one-hot vectors to represent the different characters in that list. After the one-hot vectors are created, both the inputs and targets are converted into Pytorch Tensors to send into the model. I have added functionality that allows the use of a GPU in the program but it doesn’t work with AMD GPU’s so I could not take advantage of it.

For the model implementation I used a basic RNN from the Pytorch library that takes in input size, hidden layer size, and the number of hidden layers. The model class has an init method and a forward method, which initializes the hidden state, and does all the computations for the model. For my model the input size is the number of unique characters, which is the length of the one-hot vectors. The hidden layer size that I found to be the most effective is of size 300 with 2 hidden layers. I ended up training my model for 50 epochs with a batch size of 10. The loss function I used is a Cross Entropy Loss function from the Pytorch library and the optimizer used is the Adam optimizer. When I predict new text, I use the softmax function and then returned the character with the highest probability. I tried quite a few different combinations of layer sizes, number of layers, number of epochs and batch sizes but found that the combination above was the most effective at generating text. Since it is 50 epochs, it does take quite a while to train, but with a GPU it should train a lot faster.

Output:

All:

So shall be seem of the way the world was a serves

To the world was a spirit with a submit with him.

ANTONIO:

And then we will not be a subject of his hours are words

She was a strange thee and with him the world was a serves

To the world was a spirit with a submit with him.

Error:

Epoch: 1 Loss: 1.7597

Epoch: 2 Loss: 1.5771

Epoch: 3 Loss: 1.4819

Epoch: 4 Loss: 1.4305

Epoch: 5 Loss: 1.3998

Epoch: 6 Loss: 1.3866

Epoch: 7 Loss: 1.3757

Epoch: 8 Loss: 1.3581

Epoch: 9 Loss: 1.3518

Epoch: 10 Loss: 1.3475

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Epoch: 41 Loss: 1.2812

Epoch: 42 Loss: 1.2820

Epoch: 43 Loss: 1.2902

Epoch: 44 Loss: 1.2916

Epoch: 45 Loss: 1.2804

Epoch: 46 Loss: 1.3017

Epoch: 47 Loss: 1.2948

Epoch: 48 Loss: 1.3056

Epoch: 49 Loss: 1.2972

Epoch: 50 Loss: 1.3017