

# Homework 02

Sami Ellougani

October 22nd, 2017

## 1 Results

Neurons/Learning Rate	0.00001	0.0001	0.001	0.01	0.1	1.0
16	0.1131	0.3321	0.8093	0.9123	0.8768	0.1121
32	0.1076	0.6238	0.8979	0.9476	0.8421	0.1001
64	0.2396	0.7856	0.9021	0.9531	0.8690	0.1304
128	0.4301	0.8467	0.9137	0.9689	0.3412	0.1209
256	0.5176	0.9010	0.9430	0.9690	0.5433	0.1101
512	0.6198	0.9435	0.9476	0.4398	0.1239	0.1003
1024	0.7893	0.9477	0.9501	0.3209	0.1001	0.1109
2048	0.7932	0.9503	0.9494	0.2198	0.0879	0.1001
4096	0.8436	0.9327	0.9386	0.1593	0.1200	0.0981

## 2 Discussion

### 2.1 Overview

In this lab, I applied RNNs/LSTMs to the MNIST dataset to gain a better understanding of what metrics are best used for these types of neural networks. I varied the number of hidden units exponentially as follows, 16, 32, 64, 128, 256, 512, 1024, 2048, and 4096; and also varied the learning rate exponentially as follows: 0.00001, 0.0001, 0.001, 0.01, 0.1, and 1.0.

### 2.2 Results Analysis

If you look at the results, you can clearly see that as the Learning Rate gets higher, the accuracy lowers tremendously. My prediction for this is because the neurons within the LSTM/RNN are not trained enough to gain a higher accuracy, as the jumps of training is much higher. Also, one thing I noticed, was that as you use more neurons, it takes much longer to train the LSTM/RNN.