Assignment 1 Report :

I played around only with `Deep Neural Networks` in mnist. There were a lot parameters to play with and the accuracy was pretty fluctuating on changing these.

Intially, just changing the `epoch` and `learning rate` gave better results than the intial ones. After a few alterations, it was clear that increasing the epoch and decreasing the learning rate will give better results. It is pretty obvious because decreasing the learning rate will make the propagation finer and increasing the epoch will make the batches train better.

But touching the mark of 98 % was tough by just altering these. Then after decreasing the `batch size` to 75, finally, I got an accuracy of **98.07**, with learning rate being **0.33** and Epoch being **25**.

Then decreasing the learning rate to 0.20 gave 98.09. Then I fixed the values of Epoch and learning rate and only altered the values of `FullyConnected` layers and `Activation` functions. After changing relu to tanh, I got 98.12. Then altering `num_hidden` to 512 and 256 of first two fully connected layers, I got 98.16. Then changing the activation function to `leakyrelu` also gave me similar results. Then I added 2 new layers, but I think it got overfitted and I got a lesser value. With one additional layer, results gave me again something like 98.15. Removing both the additional layers and changing back to relu gave 98.22. It felt like this would be the highest. Then changing the `num_hidden to 512 and 256` of first two fully connected layers, gave the highest of **`98.444`**. Then again I added new layers, but it yield any better results.

So the 98.444 yielding parameters are : **num_epoch = 25** ; **learning_rate = 0.33** ; **batch_size = 60**;

```
# The first fully-connected layer
fc1  = mx.sym.FullyConnected(data=data, name='fc1', num_hidden=512)
# Apply relu to the output of the first fully-connnected layer
act1 = mx.sym.Activation(data=fc1, name='relu1', act_type="relu")

# The second fully-connected layer and the according activation function
fc2  = mx.sym.FullyConnected(data=act1, name='fc2', num_hidden = 256)
act2 = mx.sym.Activation(data=fc2, name='relu2', act_type="relu").
```

The very normal ***CNNs*** which is available gave a straight ***99.1 %***. So it didn't motivate me much to work on it, hence I am not including that code.