

Practical Part: Neural Network Implementation & Experiments\n",

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Note to TAs

If you wish to re-run the training or view our source code for training, please go to

`src/scripts/q1_init_meth` for Q1 finite gradient difference with Glorot

`src/scripts/q1_10_err` for Q1 10 epochs of 3 different initialization methods

`src/scripts/q1_tuning` for Q1 hyperparameter search

`src/scripts/q1_hyper_gen.py` generates hyperparameters and stores in a json file. Json file is loaded in `src/scripts/q1_tuning` later

`src/algo` for algorithms and main source code for class `neuralNet` in `src/algo/neuralNet.py`

```

.
├─ mlp.ipynb # this main notebook
├─ plots # saved plots
└─ src
    ├─ __init__.py
    ├─ __pycache__
    │   └─ __init__.cpython-36.pyc
    ├─ algo # algorithms and main source code for functions in backprop
    │   ├─ __init__.py
    │   ├─ __pycache__
    │   ├─ error_func.py
    │   ├─ hyperparam_gen.py
    │   ├─ initWeight.py
    │   ├─ loadData.py
    │   ├─ neuralNet.py # neuralNet class
    │   ├─ neuron_unit_functions.py
    │   ├─ sampler.py
    │   └─ train_matrix.py
    ├─ scripts
    │   ├─ args.json # the hyperparameters we tested
    │   ├─ args2.json
    │   ├─ output
    │   │   ├─ max_diff.txt
    │   │   ├─ n_val_arr.txt
    │   │   ├─ new_max_diff.txt
    │   │   ├─ new_n_val_arr.txt
    │   │   ├─ q1
    │   │   │   ├─ 2019_02_04_22_45_26args.txt
    │   │   │   └─ # and more
    │   │   └─ q1_3
    │   │       └─ 2019_02_13_19_08_59__q1_finit_grad_N_50_real_grad.txt #
and more
    │   │   └─ q1_3_init_10_err
    │   │       └─ 2019_02_11_17_43_55_args.txt # and more
    │   │       └─ q1_dat_97
    │   │           └─ 2019_02_12_23_09_17_NN_model_h1_1461_h2_398_glorot_97_da
t1.txt
    │       └─ 2019_02_12_23_09_17_args.txt
    │   └─ q1_10_err.py # Q1 3 different initialization methods
    └─ a1_hyper_gen.py

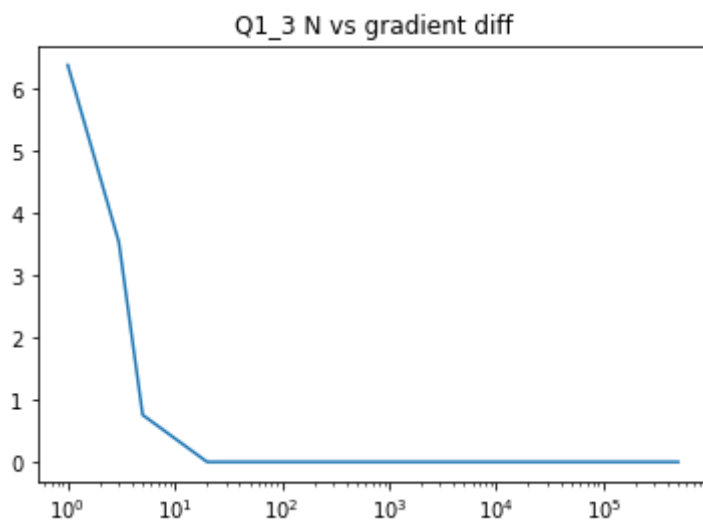
```

```
In [2]: import src.scripts.q1_10_err as q1_10_err
import src.scripts.q1_tuning as q1_tuning
import src.scripts.q1_hyper_gen as q1_hyper_gen
import src.scripts.q1_init_meth as q1_init_meth
import sys
import os

if __name__ == '__main__':
    q1_init_meth.main([])

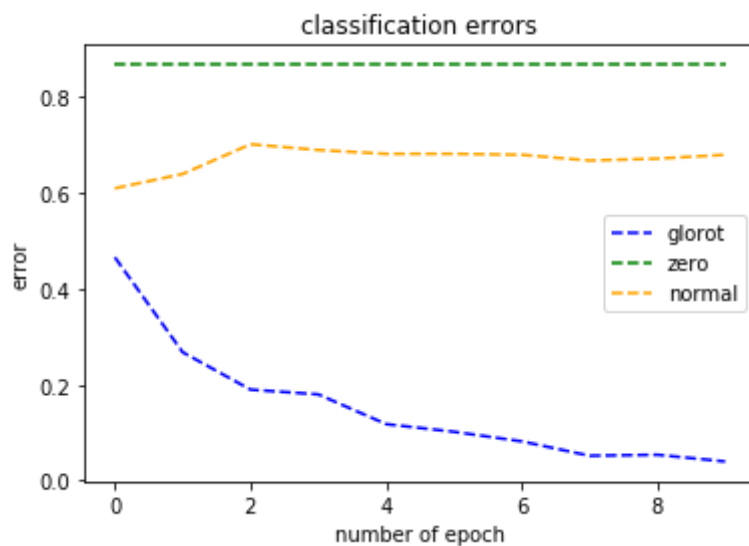
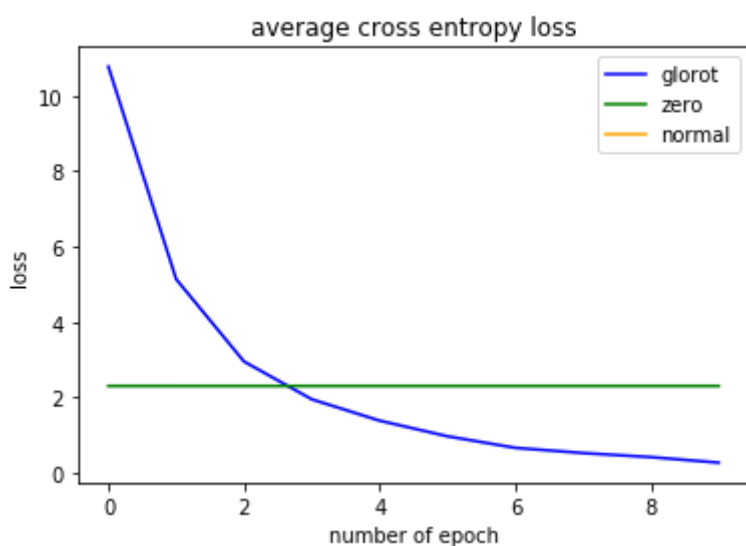
    q1_10_err.main([])

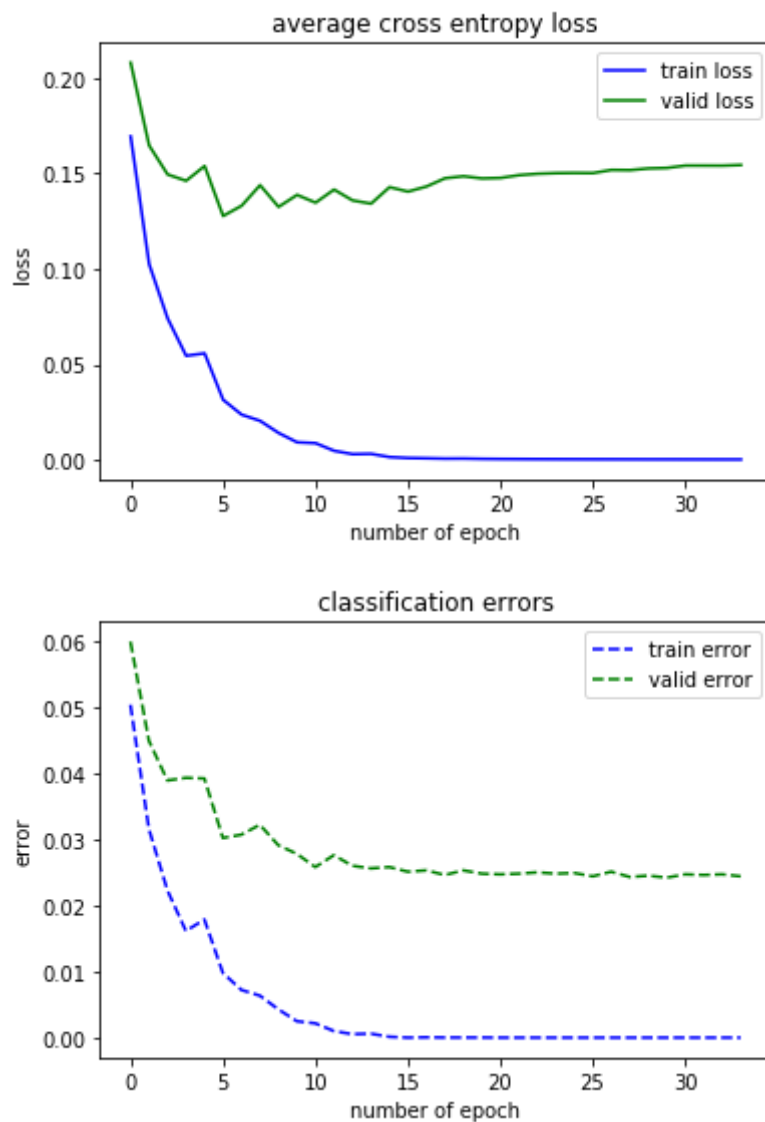
    q1_tuning.main([])
```



Finite gradient difference with different N

```
[(1, 6.387484313413516), (3, 3.536721505027195), (5, 0.7576155999830192), (20, 0.0), (40, 0.0), (50, 0.0), (200, 0.0), (300, 0.0), (1000, 0.0), (3000, 0.0), (5000, 0.0), (10000, 0.0), (30000, 0.0), (100000, 0.0), (400000, 0.0), (500000, 0.0)]
```





<Figure size 432x288 with 0 Axes>

In []:

In []: