ML HW4 Introduction to Neural Networks

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Note: I use label of 1, 2, ..., 10, where label 10 has real value of "0".

Q1-Q6:
in "nn_rawlist&loss.py"

```
Classify process runtime: 12.250357627868652s
124 / 5000
Error Rate: 0.0248
Cross Entropy Loss of the given weights: 0.0868885603747501
```

Q7:
In this specific neural network, m=5000,
Cross entropy loss for softmax output layer is $L = -\frac{1}{m}\sum_{i=1}^{m} log P_w(y^{(i)}|x^{(i)})$
$= -\frac{1}{5000}\sum_{i=1}^{5000} log([a^{[3]}]_{y_{(i)}})$,
where $a^{[3]}$ is a vector of the 10 output "probabilities", $y_{(i)}$ is the label $\in \{1, 2, ...10\}$.

Coding part also in "nn_rawlist&loss.py"

Q8:
in "nn_withnp.py"

```
Classify process runtime: 0.2355501651763916s
124 / 5000
Error Rate: 0.0248
```