Ling 572 HW10

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1 Q1

Table 1: Classification accuracy with **sigmoid** activation function

Expt id	# of hidden layer	# of neurons in hidden layers	# of epoches	mini-batch size	test accuracy (%)	CPU time minutes,seconds
1	1	30	30	10	73.24	38s
2	1	30	30	50	60.86	50s
3	1	30	100	10	78.76	2m 3s
4	1	60	30	10	73.1429	53s
5	2	30, 30	30	10	73.81	46s
6	2	40, 20	30	10	72.29	50s
7	3	20, 20, 20	30	10	70.76	53s

2 Q2

For Q2 I changed two functions:*tanh* and *tanh_prime* on line 160 and 165 in network.py. First, I implemented the code with the unsimplified methods(full equations).
Next, using the identities learned in class and HW9($tanh(z) = 2 * sigmoid(2 * z) - 1$ and $tanh'(z) = (1 - tanh(z) * tanh(z))$), I modified the functions to use the sigmoid and sigmoid prime methods for ease of use.
In general, we see the sigmoid function as a better fit for this data and the addition of more training epochs proving the highest accuracy at the expense of training time.

Table 2: Classification accuracy with **tanh** activation function

Expt id	# of hidden layer	# of neurons in hidden layers	# of epoches	mini-batch size	test accuracy (%)	CPU time minutes,seconds
1	1	30	30	10	72.19	35s
2	1	30	30	50	59.90	48s
3	1	30	100	10	75.90	3m 16 s
4	1	60	30	10	63.14	56s
5	2	30, 30	30	10	73.52	38s
6	2	40, 20	30	10	62.67	41s
7	3	20, 20, 20	30	10	62.57	44s