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CSC 578 sect. 901– Spring 2022
Assignment: HW5

Experiment results:

The results for each of the first 10 experiments did not match the given results. The main reason is that the "Dropout" code was incomplete. Initially, "Dropout" code was added to the "update_mini_batch" function, unfortunately, there were multiple error messages when adding code to the "SGD" function. Another issue is the uncertainty as to which function the code should be placed. After multiple attempts of trial and error, the incorrect code was scratched. If the correct the location(s) of where to place the "Dropout" code was known, then I strongly believe that the test results would have yielded a better outcome, close to the given results.

Implementation:

The code for the CrossEntropy hyperparameter code is complete. The class was updated by adding its derivative. The CrossEntropy derivative was taken from its mathematical definition provided in the NNDL text and converted to Python code.

The LogLikelihood class was written with two functions, fn and derivative and it is complete. The original function was found in the Week 4 class notes. That cost function was converted to Python code. Its derivative was calculated and then converted to Python code.

The function for the Softmax class is complete. The function was written based on its definition provided in the NNDL text.

The Tanh class is complete. The class is composed of 2 functions. The first function returns the Python version of the Tanh definition. The derivative function is the Python version of the derivative of Tanh.

The ReLU or Rectified Linear Unit function was written and is complete. The ReLU class is composed of 2 functions. The first function is the definition of ReLu while the second function is the derivative of ReLU. Both definitions were found in the NNDL text and were converted to Python.

The set_parameters function was updated and is compete. The function was updated to include code regarding the QuadraticCost message. Basically, an IF-statement was used to determine if the value was Tanh and the instance was NOT Quadractic costs, then display the message and change the instance value to "QuadraticCost".

Regularization parameters "L1" and "L2" were added to the "update_mini_batch" function. This is complete. The "L2" parameter was hardcoded for us, which meant that "L1" parameter needed to be added. To do this, an If-Else condition was added. If the self.regularization value is "L1", then the biases and weights are calculated with its cost function. The same is applied to "L2".

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Regarding the “dropoutpercent”, this is incomplete. This section was the most challenging. As stated earlier, the main issue that I encountered was trying to determine where exactly to add the code. The instructions indicated which functions to modify, but I was completely unsure which direction to take. I was able to add code to the “update_mini_batch” function, but am uncertain if it is correct. The code basically looks for the value of dropoutpercent, if that value is not zero, then assign a value to the dropout mask based on the dropoutpercent and the length of the mini-batch.

Reflections:

In regard to this assignment, I found the difficulty level to be a mixture of challenging and enlightening. One of my concerns is that this course is my first experience/exposure to Neural Networks. The challenge was the “dropout” code. While the instructions stated which functions to update, I had difficulty in trying to determine a direction. I thought about adding print statements to “trace” the code, but wasn’t sure if that would work in this case. The writing of the code for the actual “Calculus” of the cost functions and hyperparamters was actually interesting and dare I say “enlightening”. This part of the assignment was a good exercise to provide more understanding to the underlying code that builds the NN model.

In conclusion, I believe that with a bit more direction regarding the “dropout” Python code, I would be able to fully complete this project.