:: Deep Learning :: COSE474

Project #1. MLP Implementation

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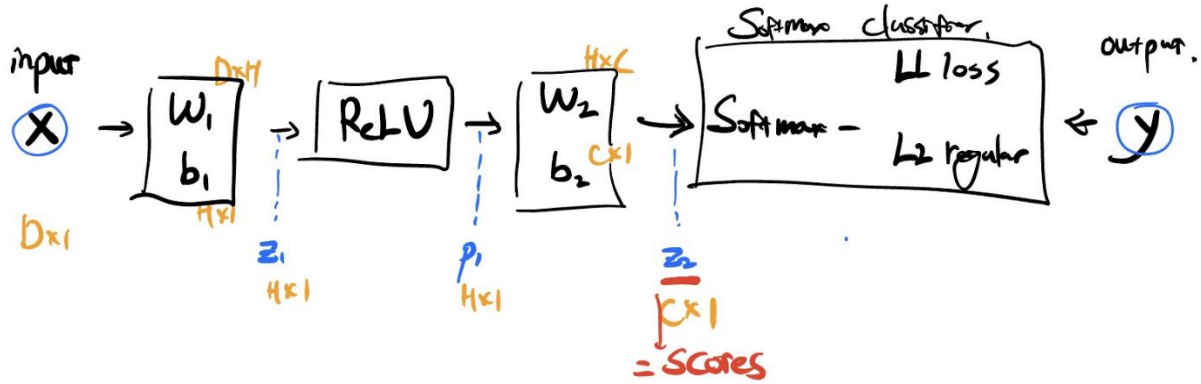
This report explains the first assignment, MLP. For 'neural_net.py', the goal is implementing a two layer Fully-Connected neural network which has the following network architecture.



I implemented the 'loss' method : forward pass for 'scores' and 'loss' value and backpropagation for 'grads' value. For ReLU, I implemented it by using numpy's maximum() in forward pass. It is also important part in backpropagation that it returns 0 for negatives and returns identity for positives. And one more significant part is for loss gradients for W1 and W2 in terms of dealing with Regularization. Their values are defined not only by upstream gradients but also by L2-Regularizers

In 'train' method, which is based on Stochastic Gradient Descent, I sat 'bid' as index value which is randomly 'batch_size'-sized selected among 'num_train'. Then the parameters are updated by adding up negative value of gradients multiplied by learning rate. Lastly in 'predict' method, it returns the maximum scores' index in forward pass.

For 'two_layer_net.ipynb', it tested out the two layer FC neural network as seen from the above on the CIFAR-10 dataset. The main issue is tuning the hyperparameters : Hidden layer size, Learning Rate, the number of epochs, and regularization strength. In my code, there is some description I attached with codes for the four hyperparameters that each has three candidates. Increasing the learning rate in desirable value helps accelerating the loss decrement. However, in my experience, no matter what the other parameters were, learning rate 0.1 created a terrible result, 0.097 accuracy which seems to overshoot to suboptimal. And to overcome the possible underfitting problem, I increased hidden layer size and the number of iterations. In addition, the plot for visualization showed notable gap between the train and validation accuracy value. Larger dataset might be desirable to make the gap closer.