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Machine Learning - Ex4 CNN

Algorithm Implementation:

We chose to implement the CNN (Convolution Neural Network), since we are working with sound files that were converted to images and CNN works better for these types of inputs (as we researched online) otherwise we would have chosen to implement RNN.

First, we created a CNN class that consists of 3 layers of convolution. Each layer did a convolution of different sizes, then we performed the ReLU function then we called the maxpool function that reduces the size of the matrix (as we learned in class). We made batch sizes of 100 for each batch, and ran the training algorithm on the training set given to us for a total of 16 iterations. After that, we loaded the validation set and tested the algorithm on it. After many tries, we reached an accuracy rate of around 87% which we then decided was good enough to run the testing set and write it into a file before submitting it.

Choosing our parameters:

We chose each of the convolution layers to consist of a filter of size 5 by 5, striding each time 1 line over with a padding of 2. We also tried to run it with filter sizes of 3 by 3 and 7 by 7, however, each one of those gave us results that were less accurate than using the 5 by 5 filter. We chose the number of strides to be 1 since we thought it would give us the best results to multiply the filter on the matrix as much as possible.

For the learning rate of the algorithm, we tried various numbers and landed on 0.001 since it gave us the best results. Our batch size was set to 100 since it divides the testing set, training set and validation set and also is not too big.

As for the amount of iterations, we started at 10 and gradually increased the number of epochs. Each time, we checked the accuracy rate of the validation set as well and chose the best result, which landed on 16 iterations.

For the optimization, we tried 2 of them: SGD and Adam optimizations. Both gave us similar results and as such we chose one of them, picking the Adam optimization.

As for the amount of layers we tried running it with 2 then 3 and finally 4. We didn't try anything above that since we learned in the recitation lessons that it's futile to do more since it doesn't improve the algorithm. 2 and 4 gave us around 1.5% accuracy less on the validation set and that is why we chose to do 3 layers.