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Project 4
CS 461
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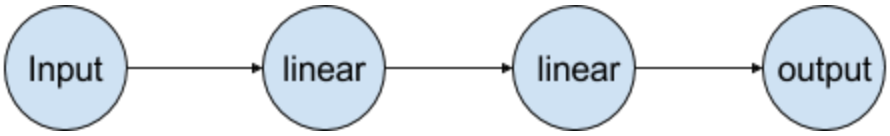
Predicting Airlines Delays using a Neural Network

Introduction

For this project I decided to build my own neural network in python and numpy. I found a good resource on Udacity's Self-Driving Car Engineer Nanodegree program. There was a section on how to build a neural network from scratch using numpy. I used that as a resource for a starting point.

NN Architecture

The neural network architecture consisted of an input layer, a linear layer, a sigmoid activation function, another linear layer, and the output layer.



Hyperparameters

Learning Rate = 1e-2
Epochs = 300
Batch size = 50

Preprocessing

Before feeding the data into the neural network i first dropped out Code, Name, Month, Year, Month Name, and Label from the features. Then I extracted the the Code column for the Labels. I then split up the data into training, validation, and testing set. Validation set is 5% of the full data set, and testing set is 5% of the training set. I then normalized the data to be values between -1 and 1. Then i shuffled the data to make it more randomize.

Training and Validation

Training was done in batches, and after each epoch, I evaluated the accuracy of the current model with the validation set.

Testing

After the neural network finishes training I evaluated the model using my test set.

Results

I've tried tweaking the hyper parameters many times and found that the setup stated gave me the best results. Validation accuracy of 20% and Test accuracy of 11%. Not too bad for a bare bones coded from scratch neural network.

```
Epoch: 298, Loss: 43.311, Validation Accuracy: 0.190
Epoch: 299, Loss: 41.857, Validation Accuracy: 0.190
Epoch: 300, Loss: 41.767, Validation Accuracy: 0.172
Test Accuracy:  0.11428571428571428
Micahels-MBP:Airline_NeuralNetwork mikePro$
```