Machine Learning Bootcamp

Project Report

Winter of Code 3.0

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Description: -

The Objective of this Project is to get familiar with basic ML Algorithms like Linear Regression, Logistic Regression, Neural Networks, KNN.

The following Libraries are used: NumPy, Pandas, Matplotlib, scipy to code these from scratch

My Observations, Mistakes, Conclusions and Learnings of each Project are listed below.

1.Linear Regression: -

The Project consists of 3 parts

I. Construction of Functions
II. Loading and Analyzing the Data
III. Testing the Algorithm

In the first part I have created the Functions like cost function, Gradient Descent, Linear Regression model,etc. These Functions contain individual formulas for finding the Weights and Bias of the Data.

In the second part I have loaded MNIST training and testing csv files into separate files. I also faced many errors while loading the csv files and finally learnt it. After that I have done the Data preprocessing. I have Observed that MNIST Data is free from Null, Duplicative Values etc.

In the third part I have fitted the Data into my training Algorithm and also printed the graph of training cost with number of iterations using matplotlib library. While fitting the data many errors were raised like incorrect shape of matrices, warnings in graph plotting etc. From my errors I have learnt that data must be Normalised and data should be in an NumPy array with proper size. As this was my first project, I was unable to find the accuracy, and create a class.

Hyper Parameters: -Epochs =700, learning rate=0.2

2.Logistic Regression: -

The Project consists of 4 parts

I. Construction of a Class
II. Loading the Data
III. Testing the Algorithm
IV. Calculation of Accuracy

In the first part I have created a class which contains all the Functions required for Logistic Regression

In the second part I have loaded MNIST training and testing csv files

In the third part I have tested the algorithm on testing data. While doing so I have faced so many errors in the defined class Few of my errors are undefined value encountered in logarithmic and exponential form ,error in the insert function, error in fit function.

In the fourth part I have printed the score which is the accuracy of my model. I observed that mnist data contains 10 classes from 0 to 9 and the plot of the data was very irregular.

Accuracy: -88.99%

Hyper Parameters: -Alpha=0.3, no of iterations=500

3.Neural Network: -

The Project consists of 3 parts

I. Loading the Data
II. Construction of Functions
III. Testing the Algorithm

In the first part I have loaded MNIST training and testing csv files

In the second part I have created functions for initializing parameters, forward propagation, backward propagation and activations etc. I have used some functions like Relu, One hot function.

In the third part I have tested the algorithm on testing data. The Neural Network is of Two layers. I have Failed many times while writing the code for back propagation. Finally, I have printed the accuracy with each iteration

Accuracy: -88.99%

Hyper Parameters: - Hidden Layers=2, Alpha=0.3, iterations=7000, Nodes per layer=10

3.K-Nearest Neighbours: -

The Project consists of 4 parts

I. Construction of a Class
II. Loading the Data
III. Testing the Algorithm
IV. Calculation of Accuracy

In the first part I have created a class which contains all the Functions required for KNN.I have used a special library SciPy for calculating the mode of the data

In the second part I have loaded MNIST training and testing csv files

In the third part I have tested the algorithm on testing data. I have learnt that the K value must be taken as odd number. I also faced errors while defining the predict function.

In the fourth part I have printed the score which is the accuracy of my model. I observed that the shorter is the code longer is the execution time. It took me 30 minutes for execution of accuracy

Accuracy: -98.455%

Hyper Parameters: -K=3

Takeaways

I gained much Knowledge from my mistakes. I have started these projects from complete beginner level. In the due course of time, I learnt the Basics of Python and its Libraries. I have realized that Machine Learning is no other Ordinary Language like C, C ++ which can be learnt from formulas but its extraordinary language which automates the computer without explicitly programming it and the course really requires much patience to learn it.I am looking forward to take more such projects in the future

Acknowledgement

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