Deep Learning (Spring 2020)

Assignment 01: Linear Regression with and without Gradient Descent

Guidelines:

- Submit all of your code and results in a single zip file with name FirstName_RollNumber_01.zip
- Submit single zip file containing
  a) code   c) report

  There should be **Report.pdf** detailing your experience and highlighting any interesting result. Kindly don't explain your code in report, just explain the results. Your report should include your comments on results of all the steps, with images, for example what happened when you changed learning rate etc.
- The assignment is only acceptable in Jupyter notebook. No PyCharm, Spider or other IDEs.
- In the root directory, there should be a single Jupyter Notebook code. There should be a folder called **'Results'** where you should place all the results for all steps.
- Root directory should be named as **FirstName_RollNumber_01**
- Your code notebook should be named as **'rollNumber_01.ipynb'**
- Follow all the naming conventions.
- For each convention, there is 3% penalty if you don't follow it.
- Email instructor or TA if there are any questions. You cannot look at others code or use others code, however you can discuss with each other. Plagiarism will lead to a straight zero with additional consequences as well.
- Deadline is Monday 24th February before 11:59 pm.
- 10% (of obtained marks) deduction per day for late submission.

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Part 1: Data Pre-processing

You have to pre-process the data given in **'googleplaystore.csv'** and perform various functions on it. Please see given notebook for details about tasks. Please note that **pandas** has very useful built-in functions for each of the tasks. So please avoid using un-necessary loops.

Part 2: Linear Regression without Gradient Descent:

In this task you have to minimize MSE for two house pricing datasets without gradient descent. Please refer to attached notebook for more details. You are required to report/submit the following for each dataset:

1. In your reports, show what m and c values you calculated
2. **Plot test and train datasets. With different colors (Figure 1 – Right)**
3. **Plot the line you obtained on test and training data separately. (Figure 1 – Left)**
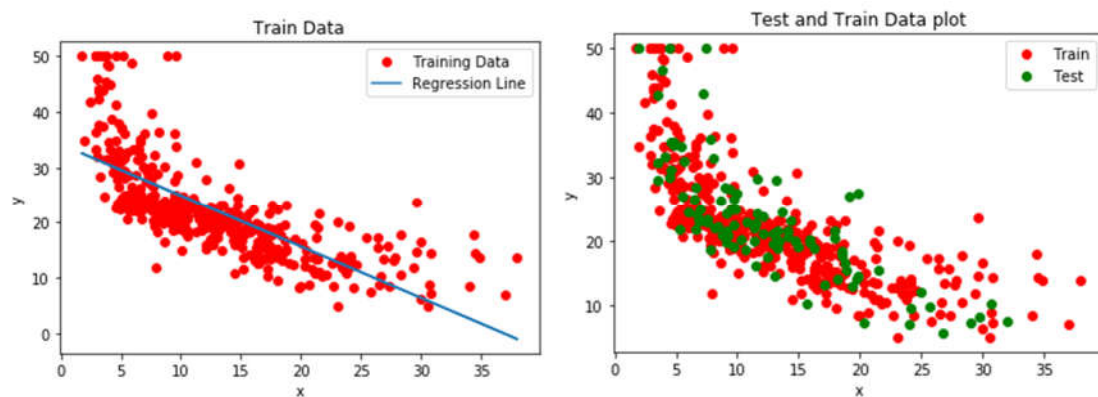

Figure 1. Sample plots of data and results

4. Report MSE on test data.
5. Analyze your results by varying different hyperparameters (batch size, initial m & c, number of epochs etc)

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Part 3: Linear Regression with Gradient Descent:

In this task you have to minimize MSE for two house pricing datasets with gradient descent. Please refer to attached notebook for more details. Requirements for this task are same as task 2 with the following additional requirement:
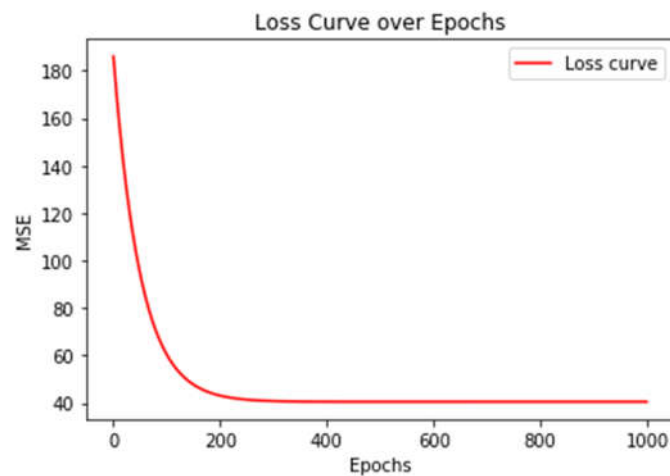
1. Plot the training loss curve for each epoch **(Figure 2).**

Figure 2: Training Loss curve