

Assignment 3: Due date Feb 28,2019 at 11:59pm

In this homework you will work with training Linear regression with different techniques.

Linear regression with one variable

You will implement linear regression with one variable to predict profits for a food truck. Suppose you are the CEO of a restaurant franchise and are considering different cities for opening a new outlet. The chain already has trucks in various cities and you have data for profits and populations from the cities. You would like to use this data to help you select which city to expand to next. The `ex1data1.csv` contains the dataset for our linear regression problem. The first column is the population of a city and the second column is the profit of a food truck in that city. A negative value for profit indicates a loss.

Find the parameters of the models

1. Step1 : Plotting the Data
2. Use the Normal Equation to find the parameters θ 's: intercept and the slope. Use those parameters to predict a profit for a population 35,000 and 70,000.
3. Repeat step 2 using LinearRegression class from scikit learn library and tell us your observation for the values of θ . Use those parameters to predict a profit for a population 35,000 and 70,000.
4. Train the linear regression using batch gradient descent and tell us your observation for the values of θ . Use those parameters to predict a profit for a population 35,000 and 70,000.
5. Train the linear regression using Stochastic gradient descent and tell us your observation for the values of θ . Use those parameters to predict a profit for a population 35,000 and 70,000.
6. Train the linear regression using Mini-batch gradient descent and tell us your observation for the values of θ . Use those parameters to predict a profit for a population 35,000 and 70,000.
7. Show by plotting and timing the steps 4-6 using different hyperparameters: number of iterations and learning rate.
8. Display an animation comparing Batch, Mini-Batch and Stochastic Gradient Descent for the cost function $J(\theta)$ and fitting the model on the data.

Linear regression with multiple variables

In this part, you will implement linear regression with multiple variables to predict the prices of houses. Suppose you are selling your house and you want to know what a good market price would be. One way to do this is to first collect information on recent houses sold and make a model of housing prices. The file `ex1data2.csv` contains a training set of housing prices in Portland, Oregon. The first column is the size of the house (in square feet), the second column is the number of bedrooms, and the third column is the price of the house.

Find the parameters of the models

1. Use the Normal Equation to find the parameters θ 's. Use those parameters to predict a price for a house of size 2200sq-ft and a house of size 3100sq-ft.
2. Use Linear regression to estimate the parameters θ 's.
3. Repeat step 2 after normalization of the features (columns) and show by plotting and timing the differences.
4. Train the linear regression using batch gradient descent and tell us your observation for the values of θ .
5. Train the linear regression using Stochastic gradient descent and tell us your observation for the values of θ .
6. Train the linear regression using Mini-batch gradient descent and tell us your observation for the values of θ .
7. Comparing Batch, Mini-Batch and Stochastic Gradient Descent for the cost function $J(\theta)$ and fitting the model on the data.