Monday, January 27, 2020
Vanderbilt University

Problem 1

For this problem, we were required to perform Linear regression with a single variable as the input consisted of only a single feature, that is the population, and the output label was the profit. This was achieved as follows:

1. I had to load the dataset and create the vectors for the input feature – population and the output label – profit.
2. I generated the data matrix of the shape 2 x number of entries in the dataset. The first column of this matrix was composed of only 1's corresponding to the bias term in the linear regression model, while the second column corresponded to the population data vector.
3. I generated a random matrix of shape 2 x 1, corresponding to the parameters of the linear regression model.
4. Setting the learning rate to 0.02, I performed the gradient descent algorithm to learn and update the parameters of the linear model, with the loss function defined as the least squares loss, until the change in the loss was less than 0.00001.
5. The learned model and the data set were plotted.

Problem 2

For this problem, we were required to perform Linear regression with multiple variables as the input consisted of two features, that is the house size and the number of bedrooms, and the output label was the price of the house. This was achieved as follows:

1. I had to load the dataset and create the vectors for the input features – house size and the no. of bedrooms, and the output label – price.
2. Feature scaling was required for the dataset as the range of various features varied by large factors.
3. I generated the data matrix of the shape 3 x number of entries in the dataset. The first column of this matrix was composed of only 1's corresponding to the bias term in the linear regression model, while the second and the third columns corresponded to the scaled input data vector – house size and no. of bedrooms respectively.
4. I generated a random matrix of shape 3 x 1, corresponding to the parameters of the linear regression model.
5. Setting the learning rate to 0.02, I performed the gradient descent algorithm to learn and update the parameters of the linear model, with the loss function defined as the least squares loss, until the change in the loss was less than 0.00001.
6. The learned model, rescaled corresponding to the scaling performed earlier, and the data set were plotted.
7. I assumed a hypothetical house with features – 1800 sq. feet size and 2 bedrooms. The price predicted by the model was: 292005.663.