Lab 8: Linear Regression

CPSC429/529 Machine Learning

We will build the following linear regression model based on the dataset given below:

$$OxyCon = w[0] + w[1] \times Age + w[2] \times HeartReate \tag{1}$$

Note: the second column is our target value, not the last column.

ID	OxyCon	Age	Heart Rate
1	37.99	41	138
2	47.34	42	153
3	44.38	37	151
4	28.17	46	133
5	27.07	48	126
6	37.85	44	145
7	44.72	43	158
8	36.42	46	143
9	31.21	37	138
10	54.85	38	158
11	39.84	43	143
12	30.83	43	138

Answer the following questions:

1. Assuming that the current weights in a multivariate linear regression model are `w[0]=-59.50`, `w[1]=-0.15`, and `w[2]=0.60`, make a prediction for **the first training instance** using this model. **You need to show me your formula and detailed calculation**.

2. Calculate the `error`, `squared error`, `erroDelta(D, w[0])`, `erroDelta(D, w[1])`, `erroDelta(D, w[2])` for the first training instance. **Show me your formulas and detailed calculations**.

3. Write down `error`, `squared error`, `erroDelta(D, w[0])`, `erroDelta(D, w[1])`, `erroDelta(D, w[2])` for the remaining training instances (You don't need to show me detailed calculations).

4. Assuming a learning rate of 0.000002, calculate the weights at the next iteration of the gradient descent algorithm. **Show me your formulas and detailed calculations**.

5. Calculate the squared errors of all training instances using the new set of weights calculated in part (4).

Submission instruction: Take a picture of your hand written answer, save it as `lab8.png` or `lab8.pdf`, submit it to D2L, and hand in the original copy to me in class.