# Assignment 4 - Manual calculation

## Si linear regression

Data:

| X | Y |
|---|---|
| 7.6 | 157 |
| 7.1 | 174 |

eqn: $y = mx + c$.

Step ①: Intialize:- $m=1$, $c=-1$, epochs$=2$, $\eta = 0.1$, ns$=2$

step ②: iter $= 1$

step ③: sample $=1$.

step ④: $\frac{\partial E}{\partial m} = -(y - mx - c)x_i$

$= -(157 - (1)(7.6) - (-1))7.6$

$= -(157 - 7.6 + 1)7.6$

$= -(150.4)7.6 = -1143.04$

$\frac{\partial E}{\partial c} = -(y - mx - c)$

$= -(150.4)$

Step ⑤: $\Delta m = -\eta\left(\frac{\partial E}{\partial m}\right) = -(0.1)(-1143.04)$

$= 114.3$

$\Delta c = -\eta\left(\frac{\partial E}{\partial c}\right) = -(0.1)(-150.4)$

$= 15.04$

Step ⑥: $m = m + \Delta m = 1 + 114.3 = 115.3$

$c = c + \Delta c = -1 + 15.04 = 14.04$

step ⑦: sample += 1 (sample = 2)

step (8): if ($i^{2} <= ns$)

↳ True.

go to step (4)

step (4): $\frac{\partial E}{\partial m} = -(y - mx - c)x$

$= -(174 - (115.3)(7.1) - 14.04)7.1$

$= -(174 - 818.63 - 14.04)7.1$

$= 4676.5$

$\frac{\partial E}{\partial c} = -(y - mx - c)$

$= -(174 - (115.3)(7.1) - 14.04)$

$= 658.67$

step (5): $\Delta m = -\eta\left(\frac{\partial E}{\partial m}\right) = -(0.1)(4676.5)$

$= -467.65$

$\Delta c = -\eta\left(\frac{\partial E}{\partial c}\right) = -(0.1)(658.67)$

$= -65.8$

step (6): $m = m + \Delta m = 115.3 - 467.65$

$= -352.35$

$c = c + \Delta c = 14.04 - 65.8$

$= -51.76$

step (7): sample += 1 (sample = 3)

step (8): if ($i^{3} <= ns$)

↳ False

go to step (9).

step (9): iter += 1 (iter = 2)

step (10): if ($iter^{2} <= epochs$)

↳ True

go to ~~next~~ step (3)

Repeat...

Step (3): sample = 1.

Step (4): gradient calculation

Step (5): step length calculation

Step (6): ~~step to~~ update model parameters

Step (7): sample = 2.

→ Repeat this process for 2nd iteration.

Step (9): iter = 3

Step (10): if (iter 3 <= epochs 2)

↳ False.

Go to next step.

Step (11): print model parameters and errors (testing & training)

Step (12): Deployment.