

# CSC 474 Assignment 2

## QUESTION 1

GPA	GRE	Dummy	y
1	1	1	1
0.9	1	1	1
0.9	0.875	1	1
0.7	0.75	1	-1
0.6	0.875	1	-1

$$\vec{w} = \begin{bmatrix} 0 & 0 & 0 \end{bmatrix}$$

$$k = 2$$

$$\begin{aligned} \theta &= e^{y(w_1GPA+w_2GRE+bDummy)} \\ &= e^{1(0*1+0*1+0*1)} \\ &= e^0 \\ &= 1 \end{aligned}$$

GPA

$$\frac{yGPA}{1 + \theta}$$

1.

$$GPA = 1$$

$$= \frac{1 * 1}{1 + 1}$$

$$\begin{aligned}
 &= \frac{1}{2} \\
 &= 0.5
 \end{aligned}$$

$$2. \quad GPA = 0.9$$

$$\begin{aligned}
 &= \frac{1 * 0.9}{1 + 1} \\
 &= \frac{0.9}{2} \\
 &= 0.45
 \end{aligned}$$

$$3. \quad GPA = 0.9$$

$$\begin{aligned}
 &= \frac{1 * 0.9}{1 + 1} \\
 &= \frac{0.9}{2} \\
 &= 0.45
 \end{aligned}$$

$$4. \quad GPA = 0.7$$

$$\begin{aligned}
 &= \frac{-1 * 0.7}{1 + 1} \\
 &= \frac{-0.7}{2} \\
 &= -0.35
 \end{aligned}$$

$$5. \quad GPA = 0.6$$

$$\begin{aligned}
 &= \frac{-1 * 0.6}{1 + 1} \\
 &= \frac{-0.6}{2} \\
 &= -0.3
 \end{aligned}$$

Compute Avg for GPA

$$\begin{aligned} avg &= \frac{0.5 + 0.45 + 0.45 - 0.35 - 0.3}{5} \\ &= \frac{0.75}{5} \\ &= 0.15 \end{aligned}$$

GRE

$$\frac{yGRE}{1 + \theta}$$

1.

$GRE = 1$

$$\begin{aligned} &= \frac{1 * 1}{1 + 1} \\ &= \frac{1}{2} \\ &= 0.5 \end{aligned}$$

2.

$GRE = 1$

$$\begin{aligned} &= \frac{1 * 1}{1 + 1} \\ &= \frac{1}{2} \\ &= 0.5 \end{aligned}$$

3.

$GRE = 0.875$

$$\begin{aligned} &= \frac{1 * 0.875}{1 + 1} \\ &= \frac{0.875}{2} \\ &= 0.4375 \end{aligned}$$

4.

$GRE = 0.75$

$$\begin{aligned}
 &= \frac{-1 * 0.75}{\frac{1+1}{-0.75}} \\
 &= \frac{-0.75}{2} \\
 &= -0.375
 \end{aligned}$$

5.  $GRE = 0.875$

$$\begin{aligned}
 &= \frac{-1 * 0.875}{\frac{1+1}{-0.875}} \\
 &= \frac{-0.875}{2} \\
 &= -0.4375
 \end{aligned}$$

Compute Avg for GRE

$$\begin{aligned}
 avg &= \frac{0.5 + 0.5 + 0.4375 - 0.375 - 0.4375}{5} \\
 &= \frac{0.625}{5} \\
 &= 0.125
 \end{aligned}$$

Dummy

$$\frac{y_{Dummy}}{1 + \theta}$$

1.  $Dummy = 1$

$$\begin{aligned}
 &= \frac{1 * 1}{\frac{1+1}{1}} \\
 &= \frac{1}{2} \\
 &= 0.5
 \end{aligned}$$

2.  $Dummy = 1$

$$= \frac{1 * 1}{1 + 1}$$

$$\begin{aligned}
 &= \frac{1}{2} \\
 &= 0.5
 \end{aligned}$$

3.  $Dummy = 1$

$$\begin{aligned}
 &= \frac{1 * 1}{1 + 1} \\
 &= \frac{1}{2} \\
 &= 0.5
 \end{aligned}$$

4.  $Dummy = 1$

$$\begin{aligned}
 &= \frac{-1 * 1}{1 + 1} \\
 &= \frac{-1}{2} \\
 &= -0.5
 \end{aligned}$$

5.  $Dummy = 1$

$$\begin{aligned}
 &= \frac{-1 * 1}{1 + 1} \\
 &= \frac{-1}{2} \\
 &= -0.5
 \end{aligned}$$

Compute Avg for Dummy

$$\begin{aligned}
 avg &= \frac{0.5 + 0.5 + 0.5 - 0.5 - 0.5}{5} \\
 &= \frac{0.5}{5} \\
 &= 0.1
 \end{aligned}$$

Update weight vector

$$\begin{aligned}
 \vec{w} &\leftarrow w + k\Delta_E(w) \\
 \vec{w} &\leftarrow \begin{bmatrix} 0 & 0 & 0 \end{bmatrix} + 2 \begin{bmatrix} 0.15 & 0.125 & 0.1 \end{bmatrix}
 \end{aligned}$$

$$\vec{w} \leftarrow \begin{bmatrix} 0 & 0 & 0 \end{bmatrix} + \begin{bmatrix} 0.3 & 0.25 & 0.2 \end{bmatrix}$$
$$\vec{w} \leftarrow \begin{bmatrix} 0.3 & 0.25 & 0.2 \end{bmatrix}$$