Homework 3_ Part 2
CS 4661
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Ques2 Three features are:-

X_1 = GPA X_2 = AGE X_3 = Type of Position
1 for Technical Position
0 for Non-Technical Position

$$Target(y) = \theta_0 + \theta_1 X_1 + \theta_2 X_2 + \theta_3 X_3 + \theta_4 X_1 X_2 + \theta_5 X_1 X_3$$

Target is "starting salary after graduation".

Given
$\theta_0 = 30, \theta_1 = 20, \theta_2 = 0.07, \theta_3 = -30, \theta_4 = 0.01, \theta_5 = 10$

a)
i) For fixed value of Age & GPA, Technical positions earn more on average than non-technical positions.
- False

lets say: AGE = 13 GPA = 2.4 (Tech < Non-Tech)

$$\text{for Technical} = 30 + (20 \times 2.4) + (0.07 \times 13) + (-30 \times 1) + (0.01 \times 2.4 \times 13) + (10 \times 2.4 \times 1)$$
$$= 30 + 48 + 0.91 + (-30) + 0.312 + 24$$
$$= 73.222$$

$$\text{for Non-Technical} = 30 + (20 \times 2.4) + (0.07 \times 13) + (-30 \times 0) + (0.01 \times 2.4 \times 13) + (10 \times 2.4 \times 0)$$
$$= 30 + 48 + 0.91 + (-30) + 0.312 + 0$$
$$= 79.222$$

ii) GPA = 3.0 AGE = 12

for Technical

$= 30 + (20 \times 3) + (0.07 \times 12) + (-30 \times 1) + (0.01 \times 3.0 \times 12) + (10 \times 3.0 \times 1)$

$= 30 + 60 + 0.84 - 30 + 0.36 + 30$

$= 91.2$

for Non-Technical

$= 30 + (20 \times 3) + (0.07 \times 12) + (-30 \times 0) + (0.01 \times 3 \times 12) + (10 \times 3 \times 0)$

$= 30 + 60 + 0.84 + 0 + 0.36 + 0$

$= 91.2$

for any particular value it is not stable So for some values it is true and some it is false & some it is equal.

iii) GPA = 3.2 AGE = 36

for Technical

$= 30 + (20 \times 3.2) + (0.07 \times 36) + (-30 \times 1) + (0.01 \times 3.2 \times 36) + (10 \times 3.2 \times 1)$

$= 30 + 64 + 2.52 - 30 + 1.152 + 32$

$= 99.672$

for Non-Technical $= 30 + (20 \times 3.2) + (0.07 \times 36) + (-30 \times 0) + (0.01 \times 3.2 \times 36) + (10 \times 3.2 \times 0)$

$= 30 + 64 + 2.52 + 0 + 1.152 + 0$

$= 97.672$

$\Rightarrow$ True (Tech > Non-Tech)

iv) GPA = 3.8 AGE = 40

for Technical

$= 30 + (20 \times 3.8) + (40.07 \times 40) + (-30 \times 1) + (0.01 \times 3.8 \times 40) + (10 \times 3.8 \times 1)$

$= 30 + 76 + 2.8 + 30 + 1.52 + 38$

$= 118.32$

for Non Technical

$= 30 + (20 \times 3.8) + (0.07 \times 40) + (-30 \times 0) + (0.01 \times 3.8 \times 40) + (10 \times 3.8 \times 0)$

$30 + 76 + 2.8 + 0 + 1.52 + 38$

$= 110.32$

False, because (Non-Tech < Tech).

b) Salary of Technical, when GPA = 4.0 & Age = 27

$30 + (20 \times 4) + (0.07 \times 27) + (-30 \times 1) + (0.01 \times 4 \times 27) + (10 \times 4 \times 1)$

$= 30 + 80 + 1.89 - 30 + 1.08 + 40$

$= \underline{122.97}$

Salary for Non-Technical, when GPA = 4.0 & Age = 27

$30 + (20 \times 4) + (0.07 \times 27) + (-30 \times 0) + (0.01 \times 4 \times 27) + (10 \times 4 \times 0)$

$= 30 + 80 + 1.89 + 0 + 1.08 + 0$

$= 112.97$