



# Vidyavardhini's College of Engineering and Technology

## Department of Artificial Intelligence & Data Science

AY: 2024-25

|              |        |              |     |
|--------------|--------|--------------|-----|
| Class:       | TE     | Semester:    | V   |
| Course Code: | CSC506 | Course Name: | DWM |

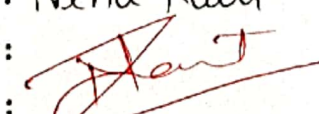
|                      |  |
|----------------------|--|
| Name of Student:     | Sunit Sunil Khairu                             |
| Roll No. :           | 19   |
| Assignment No.:      | 3  |
| Title of Assignment: | <del>Classification</del> Minmax normalization |
| Date of Submission:  |  |
| Date of Correction:  |  |

### Evaluation

| Performance Indicator  | Max. Marks | Marks Obtained |
|------------------------|------------|----------------|
| Completeness           | 5          | 4              |
| Demonstrated Knowledge | 3          | 3              |
| Legibility             | 2          | 2              |
| Total                  | 10         | 9              |

| Performance Indicator  | Exceed Expectations (EE) | Meet Expectations (ME) | Below Expectations (BE) |
|------------------------|--------------------------|------------------------|-------------------------|
| Completeness           | 5                        | 3-4                    | 1-2                     |
| Demonstrated Knowledge | 3                        | 2                      | 1                       |
| Legibility             | 2                        | 1                      | 0                       |

Checked by

Name of Faculty : Neha Raut  
Signature :   
Date :

Q.1)  
Soln:

Given: - Let A be attribute income

$$\min_A = \$12,000, \max_A = \$98,000,$$

$$V = \$73,600$$

$$\text{new } \min_A = 0.0, \text{ new } \max_A = 1.0$$

$$V^* = \frac{V - \min_A}{(\max_A - \min_A) \cdot (\text{new } \max_A - \text{new } \min_A) + \text{new } \min_A}$$

$$\therefore V^* = \frac{73600 - 12000}{(98000 - 12000)(1.0 - 0.0) + 0.0}$$

$$\therefore V^* = \frac{61600}{86000}$$

$$\therefore \boxed{V^* = 0.7162}$$

$\therefore$  Income \$73,600 is transformed to 0.7162

Q.2)

| Fruit  | yellow | Sweet | Long | Total |
|--------|--------|-------|------|-------|
| Orange | 350    | 450   | 0    | 650   |
| Banana | 400    | 300   | 350  | 400   |
| Others | 50     | 100   | 50   | 150   |
| Total  | 800    | 850   | 400  | 1200  |

$$X = [\text{yellow, sweet, long}] = \text{fruit}$$

(i) To check the probability of orange

$$\begin{aligned}\textcircled{1} P(\text{Yellow}|\text{Orange}) &= \frac{P(\text{Orange}|\text{Yellow}) \cdot P(\text{Yellow})}{P(\text{Orange})} \\ &= \frac{\frac{350}{800} \times \frac{800}{1200}}{\frac{650}{1200}} \\ &= \frac{350}{800} \times \frac{800}{1200} \times \frac{1200}{650} \\ &= 0.538\end{aligned}$$

$$\begin{aligned}\textcircled{2} P(\text{Sweet}|\text{Orange}) &= \frac{P(\text{Orange}|\text{Sweet}) \cdot P(\text{Sweet})}{P(\text{Orange})} \\ &= \frac{\frac{450}{850} \times \frac{850}{1200}}{\frac{650}{1200}} \\ &= 0.692\end{aligned}$$

$$\begin{aligned}\textcircled{3} P(\text{Long}|\text{orange}) &= \frac{P(\text{Orange}|\text{Long}) \cdot P(\text{Long})}{P(\text{Orange})} \\ &= \frac{\frac{0}{400} \times \frac{400}{1200}}{\frac{650}{1200}} \\ &= 0\end{aligned}$$

$$\therefore P(x=\text{orange}) = 0.538 \times 0.692 \times 0 = 0$$

(ii) Similarly using Naive Bayes to check probability of Banana:-

$$\begin{aligned}\textcircled{1} P(\text{Yellow}|\text{Banana}) &= \frac{\frac{400}{800} \times \frac{800}{1200}}{\frac{400}{1200}} \\ &= 1\end{aligned}$$



$$\textcircled{2} P(\text{Sweet}|\text{Banana}) = \frac{\frac{300}{850} \times \frac{850}{1200}}{\frac{400}{1200}} = 0.75$$

$$\textcircled{3} P(\text{LONG}|\text{Banana}) = \frac{\frac{350}{400} \times \frac{400}{1200}}{\frac{400}{1200}} = 0.875$$

$$\therefore P(X = \text{Banana}) = 1 \times 0.75 \times 0.875 = 0.656$$

(iii) Similarly using Naive Bayes to check probability of other ~~fruits~~ fruits :-

$$\textcircled{1} P(\text{Yellow}|\text{others}) = \frac{\frac{500}{800} \times \frac{800}{1200}}{\frac{150}{1200}} = 0.333$$

$$\textcircled{2} P(\text{Sweet}|\text{others}) = \frac{\frac{100}{850} \times \frac{850}{1200}}{\frac{150}{1200}} = 0.666$$

$$\textcircled{3} P(\text{Long}|\text{others}) = \frac{\frac{50}{400} \times \frac{400}{1200}}{\frac{150}{1200}} = 0.333$$

$$\therefore P(X = \text{Others}) = 0.33 \times 0.66 \times 0.33 = 0.071$$

$\therefore$  By comparing all 3 probabilities; i.e.

$$P(X = \text{Orange}) = 0$$

$$P(X = \text{Banana}) = 0.656$$

$$P(X = \text{others}) = 0.071$$

We conclude that

$$P(\text{Banana}) > P(\text{others}) > P(\text{Orange})$$

$\therefore$  The fruit which is yellow, sweet & long is  
Banana.