Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

AY: 2024-25

Class:	TE	**Semester:**	V
Course Code:		**Course Name:**	DWM

Name of Student:	Sainath Khot
Roll No. :	20
Assignment No.:	3
Title of Assignment:	
Date of Submission:	
Date of Correction:	

Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Completeness	5	
Demonstrated Knowledge	3	
Legibility	2	
Total	10	

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

Checked by

Name of Faculty :

Signature :

Date :

Q. Suppose that the minimum & maximum value for the attribute income are $12000 & $98000 respectively. Normalize income value $73,600 to range [0.0, 1.0] using min-max normalization method.

→ Given: Let A be attribute income

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

V = $73600

new_min_A = 0.0 , new_max_A = 1.0

$$V' = \frac{V - min_A}{(max_A - min_A) \cdot (new\_max_A - new\_min_A) + new\_min_A}$$

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

$$V' = \frac{61600}{86000(1) + 0}$$

$$V' = \frac{61600}{86000}$$

$$V' = 0.7162$$

Income $73,600 is transformed to 0.7162

Q2) Given the following data, predict fruit { yellow, sweet, long } using naive Bayes algorithm.

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

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

1) To check the probability of orange

① $P(\text{yellow}/\text{orange}) = \dfrac{P(\text{orange}/\text{yellow}) \cdot P(\text{yellow})}{P(\text{orange})}$

$$= \frac{350/800 \times 800/1200}{650/1200}$$

$$= \frac{350/800 \times 800/1200 \times 1200/650}{}$$

$$= \frac{350}{650}$$

$$= 0.538$$

② $P(\text{Sweet} \mid \text{orange}) = \dfrac{P(\text{orange} \mid \text{Sweet}) \cdot P(\text{Sweet})}{P(\text{orange})}$

$= \dfrac{450/850 \times 850/1700}{650/1700}$

$= \dfrac{450}{1700} \times \dfrac{1700}{650} = \dfrac{450}{650}$

$= 0.692$

③ $P(\text{Long} \mid \text{orange}) = \dfrac{P(\text{orange} \mid \text{Long}) \cdot P(\text{Long})}{P(\text{orange})}$

$= \dfrac{0/400 \times 400/1700}{650/1700}$

$= 0$

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

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

1) $P(\text{yellow} \mid \text{Banana}) = \dfrac{\frac{300}{850} \times \frac{850}{1700}}{\frac{400}{1700}}$

$= \dfrac{300}{350} \times \dfrac{250}{1200} \times \dfrac{1700}{400} = \dfrac{300}{406} = 0.73$

③ $P(\text{Long} / \text{Banana}) = \dfrac{\frac{350}{400} \times \frac{400}{1200}}{400/1200}$

$= 350/400 = 0.875$

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

iii) Similarly using Naive Bayes to check probablity of other fruits

① $P(\text{yellow} / \text{other}) = \dfrac{50/800 \times 800/1200}{150/1200}$

$= 50/800 \times 800/1200 \times 1200/150$

$= 50/150$

$= 0.333$

② $P(\text{sweet} / \text{other}) = \dfrac{100/850 \times 850/1200}{150/1200}$

$= \dfrac{100}{850} \times \dfrac{850}{1200} \times \dfrac{1200}{150} = \dfrac{100}{150}$

$= 0.666$

(3) $P(\text{long} \mid \text{othre}) = \dfrac{\frac{50}{400} \times \frac{400}{1200}}{\frac{150}{1200}}$

$= \dfrac{50}{400} \times \dfrac{400}{1200} \times \dfrac{1200}{150} = \dfrac{50}{150}$

$= 0.333$

$P(x = \text{othre}) = 0.33 \times 0.66 \times 0.33 = 0.071$

∴ By comparing all 3 probalitive i.e

$P(x = \text{orange}) = 0$

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

$P(x = \text{othre}) = 0.071$

we conclude that

$P(x = \text{orange}) = 0$

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

$P(x = \text{othre}) = 0.071$

we conclude that

$P(\text{Banana}) > P(\text{othre}) > P(\text{orange})$

∴ The fruit which is yellow, sweet & long is Banana