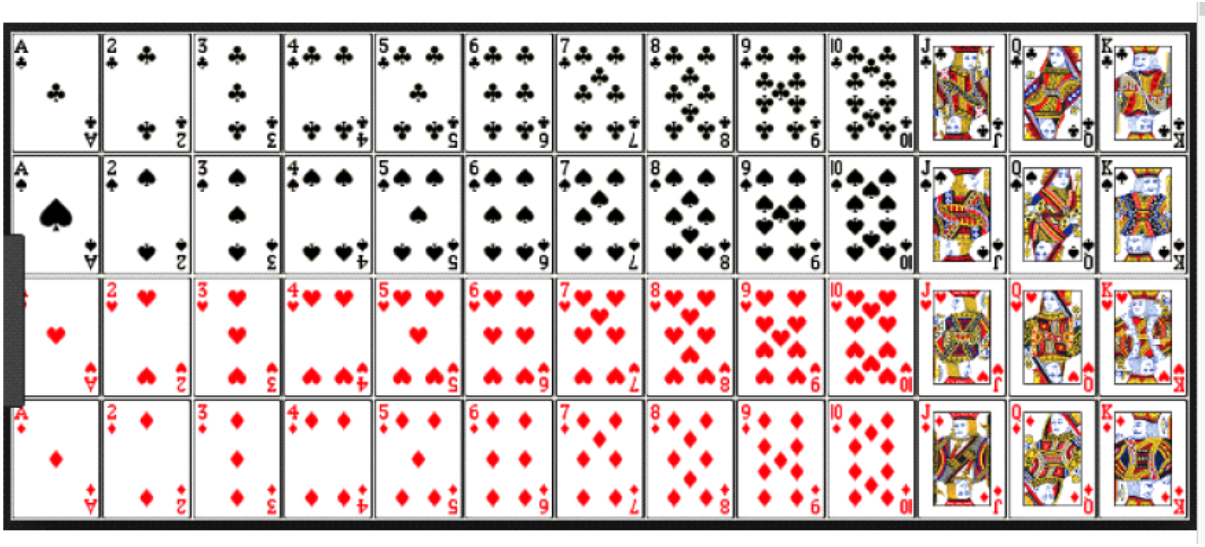
Naïve bayes

14 April 2022 11:22



p(one card) = 1/52

P(Red) = 26/52

P(picture) = 12/52

P(Red and picture) = P(Red ∩ picture) $= 6/52$
P(Red or picture) = P(Red U picture) = 32/52

In presence of red color cards what is the prob of picture card = 6/26

When I apply condition instead of total and calculating some probability --> it is called conditional probability.

$$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{6/52}{26/52} = 6/26$$

B = Red
A= picture

$$P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{6/52}{12/52} = 6/12$$

P(A /B =! P(B/A)

P(A /B). P(B) = P(A ∩ B)
P(B/A) . P(A) = P(A ∩ B)

$$P(A/B) = \frac{P(B/A) \cdot P(A)}{P(B)}$$

P(A/B) ---> Posterior Probability
P(B/A) ---> Likelihood probability
P(A) ---> Prior probability
P(B) ---> Marginal Probability

Day	Outlook	Temp	Humidity	Wind	Decision					
1	Sunny	Hot	High	Weak	No			yes	no	total
2	Sunny	Hot	High	Strong	No		sunny	2	3	5
3	Overcast	Hot	High	Weak	Yes		overcast	4	0	4
4	Rain	Mild	High	Weak	Yes		rain	3	2	5
5	Rain	Cool	Normal	Weak	Yes		total	9	5	14
6	Rain	Cool	Normal	Strong	No					
7	Overcast	Cool	Normal	Strong	Yes			yes	no	
8	Sunny	Mild	High	Weak	No	sunny	hot	2		
9	Sunny	Cool	Normal	Weak	Yes		mild			
10	Rain	Mild	Normal	Weak	Yes		cool			
11	Sunny	Mild	Normal	Strong	Yes	rain	hot			
12	Overcast	Mild	High	Strong	Yes		mild			
13	Overcast	Hot	Normal	Weak	Yes		cool			
14	Rain	Mild	High	Strong	No	overcast	hot			
							mild			

Screen clipping taken: 14-04-2022 12:11

When I want to apply naïve baye classifier I need to make sure my X variables should be independent to each other.

Naïve bayes will works better when we have X variables are categorical variables

To identify the relationship between the categorical variables we have something
"Chi-square Test of independence"

Test of hypothesis

HO: There is No relationship between two categorical variables (**they are independent**)

H1: There is relationship between two categorical variables (**they are dependent**)

If my test statistic value is greater than table value Ho is rejected, H1 is accepted
If my test statistic value is lesser than table value H1 is rejected, H0 is accepted

If p-value is lesser than 0.05 Ho is rejected and H1 is accepted
If p-value is greater than 0.05 H1 is rejected and H0 is accepted

---

Chi-Square Test Statistic

$$\chi^2 = \sum \frac{(Observed - Expected)^2}{Expected}$$

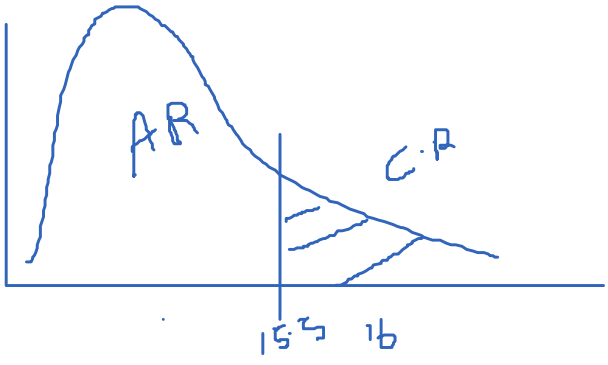
Expected Cell Value

$$E = \frac{row\ total \times column\ total}{n}$$

Degrees of Freedom: Chi-Square Test of Independence

$$df = (number\ of\ rows - 1)(number\ of\ columns - 1)$$

Df = 4 * 2 =8



Chi square: 16.2092

Pv alue 0.0395