Example 1: one feature

Training Data Set

Weather	Sunny	Overcast	Rainy	Sunny	Sunny	Overcast	Rainy	Rainy	Sunny	Rainy	Sunny	Overcast	Overcast	Rainy
Play	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	No

This can be easily calculated by following the below given steps:

Create a frequency table of the training data set given in the above problem statement. List the count of all the weather conditions against the respective weather condition.

Weather	Yes	No
Sunny	3	2
Overcast	4	0
Rainy	2	3
Total	9	5

Find the probabilities of each weather condition and create a likelihood table.

Weather	Yes	No	
Sunny	3	2	=5/14(0.36)
Overcast	4	0	=4/14(0.29)
Rainy	2	3	=5/14(0.36)
Total	9	5	
	=9/14 (0.64)	=5/14 (0.36)	

Calculate the posterior probability for each weather condition using the Naive Bayes theorem. The weather condition with the highest probability will be the outcome of whether the players are going to play or not.

Use the following equation to calculate the posterior probability of all the weather conditions:

$P(A|B) = P(A) * P(B|A)/P(B)$

After replacing variables in the above formula, we get:

P(Yes|Sunny) = P(Yes) * P(Sunny|Yes) / P(Sunny)

Take the values from the above likelihood table and put it in the above formula.

P(Sunny|Yes) = 3/9 = 0.33, P(Yes) = 0.64 and P(Sunny) = 0.36

Hence, P(Yes|Sunny) = (0.64*0.33)/0.36 = 0.60

Example 2: multiple features

Age	Income	Status	Buy
<=20	low	students	yes
<=20	high	students	yes
<=20	medium	students	no
<=20	medium	married	no
<=20	high	married	yes
21 - 30	low	married	yes
21 - 30	low	married	no
21 - 30	medium	students	no
21 - 30	medium	married	no
21 - 30	high	students	yes
>30	high	married	no
>30	high	married	yes
>30	medium	married	yes
>30	medium	married	no
>30	low	students	no

Table 1. Data Training

1. First, Calculate **Prior Probability** P(y):
   - P (Buy=yes) → 7/15 → 0,467
   - P (Buy=no) → 8/15 → 0,5332.

2. Second, Calculate the **Likelihood** each features P (x | y):
   - P (Age = 21–30 | Buy=yes) → 2/7 → 0,285
   - P (Age = 21–30 | Buy=no) → 3/8 → 0,375
   - P (Income= Medium | Buy=yes) → 1/7 → 0,143
   - P (Income= Medium | Buy=no) → 5/8 → 0,625
   - P (Status= Married | Buy=yes) → 4/7 → 0,571
   - P (Status= Married | Buy=no) → 5/8 → 0,6253.
3. Calculate Total **Likelihood**
   *- P (x | Buy=yes) → 0,285 * 0,143 * 0,571 = 0,0233*
   - P (x | Buy=no) → 0,375 * 0,625 * 0,625 = 0,14644.
4. Calculate **Posterior Probability** P(y | x):
   - P (x | Buy=yes) * P (Buy=yes) → 0,0233 * 0,467 = 0,0108
   - P (x | Buy=no) * P (Buy=no) → 0,1464 * 0,533 = 0,0781