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Task 1 : Expand Humidity & Wind like Sunny did for Outlook & Temp.

Solve For following

[Sunny, Hot, High, Strong] → O/P ?

P(Y | [S, H, H, S]) = ?

P(N | [S, H, H, S]) = ?

Data

Day	Outlook	Temp	Humidity	Wind	Play Tennis
1	Sunny	High	High	Weak	Yes No
2	Sunny	High	High	Strong	No
3	Overcast	High	High	Weak	Yes
4	Rain	Mild	High	Weak	Yes
5	Rain	Cold	Normal	Weak	Yes
6	Rain	Cold	Normal	Strong	No
7	Overcast	Cold	Normal	Strong	Yes
8	Sunny	Mild	High	Weak	No
9	Sunny	Cold	Normal	Weak	Yes
10	Rain	Mild	Normal	Weak	Yes
11	Sunny	Mild	Normal	Strong	Yes
12	Overcast	Mild	Normal	Strong	Yes
13	Overcast	Hot	Normal	Weak	Yes
14	Rain	Mild	High	Strong	No

$P(Y) = \frac{9}{14}$, $P(N) = \frac{5}{14}$

Outlook	Y	N	P(Y)	P(N)
Sunny	2	3	2/9	3/5
Overcast	4	0	4/9	0/5
Rain	3/9	2/5	3/9	2/5

Temp.	Y	N	P(Y)	P(N)
Hot	2	2	2/9	2/5
Mild	4	2	4/9	2/5
Cold	3/9	1/5	3/9	1/5

Humidity	Y	N	P(Y)	P(N)
High	2	4	2/9	4/5
Normal	7/9	1/5	7/9	1/5

Wind	Y	N	P(Y)	P(N)
Weak	6	2	6/9 = 2/3	2/5
Strong	3/9	3/5	3/9 = 1/3	3/5

$$P(Y|[\text{Sunny, High, Hot, Strong}]) = \frac{P(Y) \times P(\text{Sunny}|Y) \times P(\text{Hot}|Y) \times P(\text{High}|Y) \times P(\text{Strong}|Y)}{P(\text{Sunny}) \times P(\text{Hot}) \times P(\text{High}) \times P(\text{Strong})}$$

$$= \frac{9}{14} \times \frac{2}{9} \times \frac{2}{9} \times \frac{2}{9} \times \frac{2}{3}$$

$$= 0.00470$$

$$P(N|[\text{Sunny, Hot, High, Strong}]) = \frac{P(N) \times P(\text{Sunny}|N) \times P(\text{Hot}|N) \times P(\text{High}|N) \times P(\text{Strong}|N)}{P(\text{Sunny}) \times P(\text{Hot}) \times P(\text{High}) \times P(\text{Strong})}$$

$$= \frac{5}{14} \times \frac{3}{5} \times \frac{2}{5} \times \frac{4}{5} \times \frac{2}{5}$$

$$= 0.0274$$

$$P(Y|[S,H,H,S]) = \frac{0.00470}{0.0047+0.0274} = 0.1464 \text{ ie } 14.64\%$$

$$P(N)[S,H,H,S]) = \frac{0.0274}{0.0047+0.0274} = 0.8535 \text{ ie } 85.35\% \checkmark$$

[Sunny, Hot, High, Strong] ⇒ O/P is No