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Assignment-1

Solve problem using Naive bayes theorem:-

Given-

Given Birth	Can fly	live in water	have legs	Class

$$P(\text{class} / \text{attributes}) = \frac{P(\text{attributes} \mid \text{class}) \times P(\text{class})}{P(\text{attributes})}$$

Probabilities for each class label-

$$P(\text{mammals}) = \frac{\text{no. of mammals}}{\text{total no. of instances}}$$

$$P(\text{non mamals}) = \frac{\text{no. of non mammals}}{\text{total no. of instances}}$$

$$P(\text{attributes} / \text{class}) = \frac{\text{no of instance with attribut \& class}}{\text{total no. instance with class}}$$

Given birth: yes, Can fly: no, live in water: yes, have legs: yes

Probabilities (Conditional)

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P(given birth : yes / mammals) = $\frac{6}{7}$

P(can fly : no / mammals) = $\frac{5}{7}$

P(live in water : yes / mammals) = $\frac{2}{7}$

P(have legs : yes / mammals) = $\frac{5}{7}$

P(given birth : yes / non mammals) = $\frac{1}{13}$

P(can fly : no / non mammals) = $\frac{10}{13}$

P(live in water : yes / non mammals) = $\frac{3}{13}$

P(have legs : yes / non mammals) = $\frac{9}{13}$

Prior probability of mammals
= $\frac{7}{20}$

Prior probability of non mammals
= $\frac{15}{20}$

Probabilities of "mammals" class

1] P (mammals / attributes) = P(given birth : yes / mammals)
× P [can fly : no / mammals) ×
P(live in water : yes / mammals) × P [have legs : yes / mammals

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$\times P(\text{mammals})$

$= \frac{6}{7} \times \frac{5}{7} \times \frac{2}{7} \times \frac{5}{7} \times \frac{7}{20}$

$= 0.04$

2] For "non mammals" class

$P(\text{non mammals} / \text{attributes}) = P(\text{given birth : yes / non mamma}$
$\times P(\text{can fly : no / non mammals})$
$\times P(\text{live in water : yes / non mammals}) \times P(\text{have legs : yes / non mammals}) \times P(\text{non mammals})$

$= \frac{1}{13} \times \frac{10}{13} \times \frac{3}{13} \times \frac{9}{13} \times \frac{13}{20}$

$= 0.006$

∴ Probability of Mammals is greater $= 0.04$