NAIVE BAYES CLASSIFIER

No	Color	Type	Origin	Stolen
1	Red	Sports	Domestic	Yes
2	Red	Sports	Domestic	No
3	Red	Sports	Domestic	Yes
4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes
6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Sports	Imported	Yes

New Instance = (Red, SUV, Domestic) → (Yes or NO)

$$P(yes) = \frac{5}{10} = 0.5$$

$$P(NO) = \frac{5}{10} = 0.5$$

Color	Yes	NO
Red	3|5	2|5
Yellow	2|5	3|5

5 Yes samples

5 No samples

(2)

Type	No	Yes
Sports	215	415
SUV	315	115

Origin	Yes	No
Domestic	215	315
Imported	315	215

$P(\text{Yes} \mid \text{New Instance}) = P(\text{Yes}) \times$

$P(\text{Color} = \text{Red} \mid \text{Yes}) \times$
$P(\text{Type} = \text{SUV} \mid \text{Yes}) \times$
$P(\text{Origin} = \text{Domestic} \mid \text{Yes})$

$P(\text{Yes} \mid \text{New Instance}) = \frac{5}{10} \times$

$\frac{3}{5} \times \frac{1}{5} \times \frac{2}{5} = 0.024$

P(No/New Instance) = P(No) x

P(Color = Red/No) x
P(Type = SUV/No) x
P(Origin = Domestic/No)

P(No/New Instance) = $\frac{5}{10} \times \frac{2}{5} \times \frac{3}{5} \times \frac{3}{5}$

= 0.072

P(No/New Instance) >
P(Yes/New Instance

— x — x —