

# Naïve Bayes Classifier: Training Dataset

input Age 31-40, income = high, stu = yes, fair

Class:

C1: buys\_computer = 'yes'

C2: buys\_computer = 'no'

Data to be classified:

X = (age <=30, Income = medium,  
Student = yes, Credit\_rating = Fair)

age	income	student	credit_rating	buys_computer
<=30	high	no	fair	no
<=30	high	no	excellent	no
31...40	high	no	fair	yes
>40	medium	no	fair	yes
>40	low	yes	fair	yes
>40	low	yes	excellent	no
31...40	low	yes	excellent	yes
<=30	medium	no	fair	no
<=30	low	yes	fair	yes
>40	medium	yes	fair	yes
<=30	medium	yes	excellent	yes
31...40	medium	no	excellent	yes
31...40	high	yes	fair	yes
>40	medium	no	excellent	no

↓  
P(X|C1) X  
P(X|C2)

input Age 31-40 > income = high, stu = yes, fair

$$P(\text{age} = "<=30" | \text{buys\_computer} = \text{"yes"}) = 2/9 = 0.222$$

$$P(\text{age} = "<=30" | \text{buys\_computer} = \text{"no"}) = 3/5 = 0.6$$

$$P(\text{income} = \text{"medium"} | \text{buys\_computer} = \text{"yes"}) = 4/9 = 0.444$$

$$P(\text{income} = \text{"medium"} | \text{buys\_computer} = \text{"no"}) = 2/5 = 0.444$$

$$P(\text{student} = \text{"yes"} | \text{buys\_computer} = \text{"yes"}) = 4/9 = 0.667$$

$$P(\text{student} = \text{"yes"} | \text{buys\_computer} = \text{"no"}) = 1/5 = 0.2$$

$$P(\text{credit\_rating} = \text{"fair"} | \text{buys\_computer} = \text{"yes"}) = 6/9 = 0.667$$

$$P(\text{credit\_rating} = \text{"fair"} | \text{buys\_computer} = \text{"no"}) = 2/5 = 0.4$$

X = (age <=30, income = medium, student = yes, credit\_rating = fair)

$$P(X|C_1): P(X | \text{buys\_computer} = \text{"yes"}) = 0.222 \times 0.444 \times 0.667 \times 0.667 = 0.044$$

$$P(X | \text{buys\_computer} = \text{"no"}) = 0.6 \times 0.4 \times 0.2 \times 0.4 = 0.019$$

$$P(X|C_1) * P(C_1): P(X | \text{buys\_computer} = \text{"yes"}) * P(\text{buys\_computer} = \text{"yes"}) = 0.028$$

$$P(X | \text{buys\_computer} = \text{"no"}) * P(\text{buys\_computer} = \text{"no"}) = 0.007$$

Therefore, X belongs to class ("buys\_computer = yes")