

Quiz IV

The following table is a result from observing the behavior of a person whether he went out or stay home given the two weather conditions (sunny or rainy) and the two options regarding his car status (car-broken or car-working)

- $y_i \in \{go - out, stay\ home\}$
- $x_i^1 \in \{sunny, rainy\}$
- $x_i^2 \in \{car - broken, car - working\}$

i	x_i^1	x_i^2	y_i
1	sunny	car-broken	go-out
2	rainy	car-working	go-out
3	sunny	car-broken	go-out
4	sunny	car-broken	go-out
5	sunny	car-broken	go-out
6	sunny	car-working	stay home
7	rainy	car-working	stay home
8	rainy	car-broken	stay home
9	sunny	car-working	stay home
10	rainy	car-working	stay home

Assume that we are using a Binomial distribution as the modeling distribution for probability estimation. You are to demonstrate solutions to the following questions.

1. Estimate $P(y=go-out)$.
2. Estimate $P(y=stay\ home)$.
3. What is the estimate of $P(y)$?
4. What is the estimate of $P(x)$?
5. Estimate $P(x = (rainy, car-working) \text{ and } y=go-out)$.
6. Estimate $P(y=go-out \mid x = (rainy, car-working))$ directly.
7. Estimate $P(x = (rainy, car-working) \mid y=go-out)$ using Naive Bayes assumption.
8. By using Naive Bayes assumption, what would be the return of $h(x = (sunny, car-broken))$?