Probability

Veerasak Kritsanapraphan

1/18/2020

## A is event pick red from 1st urn  
## B is event pick red from 2nd urn  
## Find B  
##  
## B = S ∩ B   
## = (A ∪ ~A) ∩ B   
## = (A ∩ B) ∪ (~A ∩ B)  
### notice that A ∩ B and Ac ∩ B are disjoint  
## P(B) = P(A ∩ B) + P(~A ∩ B)  
### = P(A) P(B|A) + P(~A)P(B|~A)  
  
L1 <- rep(c("red","green"), times = c(5,3))  
L2 <- rep(c("red","green"), times = c(2,6))  
L3 <- c(L2, "red")  
L4 <- c(L2, "green")  
print(L1)

## [1] "red" "red" "red" "red" "red" "green" "green" "green"

print(L2)

## [1] "red" "red" "green" "green" "green" "green" "green" "green"

print(L3)

## [1] "red" "red" "green" "green" "green" "green" "green" "green" "red"

print(L4)

## [1] "red" "red" "green" "green" "green" "green" "green" "green" "green"

M1 <- urnsamples(L1, size = 1, replace = TRUE, ordered = TRUE)  
M2 <- urnsamples(L2, size = 1, replace = TRUE, ordered = TRUE)  
M3 <- urnsamples(L3, size = 1, replace = TRUE, ordered = TRUE)  
M4 <- urnsamples(L4, size = 1, replace = TRUE, ordered = TRUE)  
print(M1)

## out  
## 1 red  
## 2 red  
## 3 red  
## 4 red  
## 5 red  
## 6 green  
## 7 green  
## 8 green

print(M2)

## out  
## 1 red  
## 2 red  
## 3 green  
## 4 green  
## 5 green  
## 6 green  
## 7 green  
## 8 green

print(M3)

## out  
## 1 red  
## 2 red  
## 3 green  
## 4 green  
## 5 green  
## 6 green  
## 7 green  
## 8 green  
## 9 red

print(M4)

## out  
## 1 red  
## 2 red  
## 3 green  
## 4 green  
## 5 green  
## 6 green  
## 7 green  
## 8 green  
## 9 green

N1 <- probspace(M1)  
print(N1)

## out probs  
## 1 red 0.125  
## 2 red 0.125  
## 3 red 0.125  
## 4 red 0.125  
## 5 red 0.125  
## 6 green 0.125  
## 7 green 0.125  
## 8 green 0.125

N2 <- probspace(M2)  
print(N2)

## out probs  
## 1 red 0.125  
## 2 red 0.125  
## 3 green 0.125  
## 4 green 0.125  
## 5 green 0.125  
## 6 green 0.125  
## 7 green 0.125  
## 8 green 0.125

N3 <- probspace(M3)  
print(N3)

## out probs  
## 1 red 0.1111111  
## 2 red 0.1111111  
## 3 green 0.1111111  
## 4 green 0.1111111  
## 5 green 0.1111111  
## 6 green 0.1111111  
## 7 green 0.1111111  
## 8 green 0.1111111  
## 9 red 0.1111111

N4 <- probspace(M4)  
print(N4)

## out probs  
## 1 red 0.1111111  
## 2 red 0.1111111  
## 3 green 0.1111111  
## 4 green 0.1111111  
## 5 green 0.1111111  
## 6 green 0.1111111  
## 7 green 0.1111111  
## 8 green 0.1111111  
## 9 green 0.1111111

PA <- Prob(N1, isrep(N1, "red", 1))  
print(PA)

## [1] 0.625

PnotA <- Prob(N1, isrep(N1, "green", 1))  
print(PnotA)

## [1] 0.375

PBgivenA <- Prob(N3, isrep(N3, "red", 1))  
print(PBgivenA)

## [1] 0.3333333

PBgivennotA <- Prob(N4, isrep(N4, "red",1))  
print(PBgivennotA)

## [1] 0.2222222

PA \* PBgivenA + PnotA \* PBgivennotA

## [1] 0.2916667