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19BCE245

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Practical 6

Win probability predictions

• **Definition :** Assume that you are a professional fighter and in the past, you had fights with Undertaker. There were total of m (scan m from the user) fights between you and Undertaker. Assume that you set up a fresh fight tournament of n (scan n from the user) fights between you and Undertaker. Write a program which scans result of m earlier fights and computes the probability of (i) you winning x number of fights (ii) you winning more than y number of fights in the new tournament. Scan x and y from the user. Assume that fights are independent and each fight can either result in you or him winning. Assume that probability of you winning in each fight remains constant.

• **Code :**

```
1. import random
2.
3. def factorial(number):
4.     answer = 1
5.     for num in range(number+1):
6.         answer *= (num+1)
7.     return answer
8.
9. def combination(N,R):
10.    return (factorial(N)/(factorial(R)*factorial(N-R)))
11.
12. def x_wins_out_of_n(x,n,probability_of_wins):
13.    return combination(n,x)*(probability_of_wins**x)*((1-
        probability_of_wins)**(n-x))
14.
15. m = int(input("Enter m [total number of fights happened] :
    "))
16.
```

```
17.result_of_fights = 0
18.
19.#RANDOM Approach :
20.
21.result_list = [random.randint(0, 1) for i in range(m)]
22.result_of_fights = result_list.count(1)
23.
24.#MANUAL Approach :
25.
26.#print("Enter results for",m,"fights : [0 for loss;1 for
    win]")
27.#for index in range(m):
28.# while True :
29.#     str_input = "\tFor fight number " + str(index+1) + "
    : "
30.#     choice = int(input(str_input))
31.#     if(choice == 1 or choice == 0):
32.#         break
33.#     else:
34.#         print("Enter valid choice :(")
35.# result_of_fights += choice
36.
37.probability_of_wins = result_of_fights/m
38.
39.n = int(input("Enter n [total number of fresh fights] : "))
40.x = int(input("Enter x [number of fights which you want to
    win] : "))
41.
42.print("Probability of",x,"wins out of",n,"wins :
    ",x_wins_out_of_n(x, n, probability_of_wins))
43.
44.y = int(input("Enter y [number of fights which atleast you
    want to win] : "))
45.
46.probability_of_yPLUS_wins = 0
47.for fight_number in range(y+1,n):
48.    probability_of_yPLUS_wins +=
        x_wins_out_of_n(fight_number, n, probability_of_wins)
49.
50.print("Probability of more than",y,"wins : ",
    probability_of_yPLUS_wins)
```

• **Sample I/O :**

```

10     answer *= (num+1)
11     return answer
12
13 def combination(N,R):
14     return (factorial(N)/(factorial(R)*factorial(N-R)))
15
16 def x_wins_out_of_n(x,n,probability_of_wins):
17     return combination(n,x)*(probability_of_wins**x)*((1-
18         probability_of_wins)**(n-x))
19
20 m = int(input("Enter m [total number of fights happened] : "))
21
22 result_of_fights = 0
23
24 #RANDOM PROCESS
25
26 result_list = [random.randint(0, 1) for i in range(m)]
27 print("Random generated data [1 for won, 0 for lose]: ",)
28 result_of_fights = result_list.count(1)
29
30 #MANUAL PROCESS
31
32 """
33 # Manual input for the number of fights, fresh fights, and wins
34 # and calculate the probability of wins
35 """
36
37 # Input for the number of fights, fresh fights, and wins
38 m = int(input("Enter m [total number of fights happened] : "))
39 n = int(input("Enter n [total number of fresh fights] : "))
40 x = int(input("Enter x [number of fights which you want to win] : "))
41 y = int(input("Enter y [number of fights which atleast you want to win] : "))
42
43 # Calculate the probability of wins
44 probability_of_wins = result_of_fights/n
45
46 # Calculate the probability of more than y wins
47 probability_of_more_than_y_wins = 0
48 for i in range(y, m+1):
49     probability_of_more_than_y_wins += x_wins_out_of_n(i, m, probability_of_wins)
50
51 # Print the results
52 print("Probability of {} wins out of {} wins : {}".format(x, m, probability_of_wins))
53 print("Probability of more than {} wins : {}".format(y, probability_of_more_than_y_wins))

```

Enter m [total number of fights happened] : 10
Random generated data [1 for won, 0 for lose]:
Enter n [total number of fresh fights] : 20
Enter x [number of fights which you want to win] : 15
Probability of 15 wins out of 20 wins : 0.00028317045800042514
Enter y [number of fights which atleast you want to win] : 18
Probability of more than 18 wins : 1.731730813747202e-07

Run Succeeded | Time 63 ms | Peak Memory 7.5M | x_wins_out_of_n | Tabs: 4 | Line 26, Column 52