Assignment 6-Probability and Random Variable

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Download latex code from here-

https://github.com/annu100/AI5002−Probability−and−Random−variables/tree/main/ASSIGNMENT_6

download python code from here

https://github.com/annu100/AI5002−Probability−and−Random−variables/blob/main/ASSIGNMENT_5/assignment_6.py

I. Problem Statement-Problem 5.19

A carton consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects.Jimmy, a trader, will only accept the shirts which are good, but Sujatha, another trader, will only reject the shirts which have major defects.One shirt is drawn at random from the carton.
What is the probability that (i) it is acceptable to Jimmy? (ii) it is acceptable to Sujatha? Also generate random variables according to 3 categories i.e good shirts,minor defect shirts and major defect shirts.

II. SOLUTIONS

A. Probability calculation

Table I: Given data-table

Total number of shirts =100	
88 good shirts	out of 100, 88 are good shirts
8 Number of minor defected	out of 100,8 are accepted minor defected shirts
4 Number of minor defected	out of 100,4 are accepted major defected shirts

Total number of shirts =100

Number of good shirts =88

Number of minor defected shirts =8

Number of major defected shirts =4

(1) Acceptable shirts to jimmy =88

required probability $=\frac{88}{100}$

=0.88

(2) Acceptable shirts to sujata =88+8=96

required probability $=\frac{96}{100}$

=0.96

B. Random numbers generation

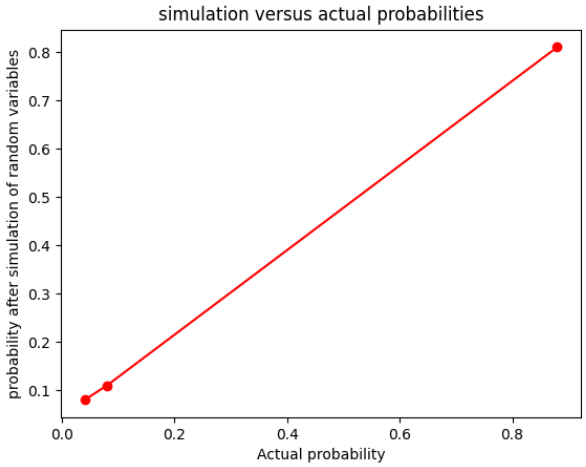
Table II: Random variables

A Random variable which has 3 possible vales	
$\Pr_(X = 0) = \frac{4}{100} = 004$	out of 100, 4 have major defects shirts
$\Pr_(X = 1) = \frac{8}{100} = 0.08$	out of 100,8 are accepted minor defected shirts
$\Pr_(X = 0) = \frac{88}{100} = 0.88$	out of 100,88 are accepted good shirts

let numtrials is sample size p is 3 length vector containing probabilities(pmf) X is random variable which has 3 outcomes p=[0.04,0.08,0.88]
Given distribution P(X=0)=0.04 ,P(X=1)=0.08 ,P(X=2)=0.88 Now generating numtrials samples according to given probability distribution described in above table.

Generated samples according to the probability distribution is
['2', '2', '2', '1', '0', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '1', '1', '2', '2', '2', '2', '2', '2', '2', '0', '2', '2', '2', '0', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '1', '2', '2', '2', '2', '2', '2', '2', '2', '1', '1', '2', '2', '2', '2', '1',

Figure 1: grapgh for actual probability versus simulated probability



Above is is the grapgh for actual probability versus simulated probability and we can see almost they are same

'1', '2', '2', '2', '2', '1', '2', '2', '2', '2', '2', '2', '2', '2', '2', '1', '0', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '2', '1', '2', '2', '2', '2', '2', '2', '2', '2']

Actual probabilities are [0.04, 0.08, 0.88]
simulation probabilities are given by
Probability for X=0 is 0.04
Probability for X=1 is 0.11
Probability for X=2 is 0.85