

Lab Assignment 01:
Simulations of Binomial and Poisson Distributions

1. Generate 1000 random number using Binomial distribution with $n=10, 30, 50, 100$ and using each of $p = 0.1, 0.3, 0.5, 0.8$ (* total 16 different results). Store the results in different vectors (or one data frame). Summarise these 16 simulations and compare the results. What is the impact of increase in sample size? What is the effect of p on the results?
2. Compute mean and variance from each simulated results. Compare the empirical mean and variance with the actual (theoretical) mean $= np$ and variance $= npq$. Did you find any difference between empirical (simulated) and actual (theoretical) results.
3. Plots the results for $n = 30$ and $p = 0.1, 0.5$ and 0.9 . Comment on your findings.
4. Generate 1000 random number using Poisson distribution with $\lambda = 5, 10, 15, 25, 30, 50$. Store the results in different vectors (or one data frame). Summarise these results and comment on the effect of increase in parameter (λ) value simulations and compare the results.
5. Compute mean and variance from each simulated results. Compare the empirical mean and variance with the actual (theoretical) mean $= \lambda$ and variance $= \lambda$. Did you find any difference between empirical (simulated) and actual (theoretical) results.
6. Plot the graphs for $\lambda = 10, 20, 30$ and comment on the changing behaviours of these plots.

Online Supported

Note: You can use online resources and can use any package that fulfil the requirements. For plotting, you can use any plot type that suit discrete distributions. Making it more exploratory analysis.

- <https://statisticsglobe.com/binomial-distribution-in-r-dbinom-pbinom-qbinom-rbinom>
- <https://stackoverflow.com/questions/40316153/2-binomial-distributions-overlap-in-r>
- <https://stackoverflow.com/questions/44684279/how-to-combine-two-graphs-in-r-studio-using-ggplot>
- https://web.stanford.edu/class/bios221/labs/simulation/Lab_3_simulation.html