Statistical Methods for Data Science

DATA7202

Semester 2, 2020

Lab 6

Objectives

On completion of this laboratory session you should be able to understand and implement the bootstrap method and perform discrete event simulation.

https://powcoder.com

1. Consider the nerve data (nerve.csv) from Cox, D. and Lewis, P. (1966). The Statistical Analysis of Series of Events. Chapman & Hall, where the authors reported 799 waiting times between successive pulses along a nerve fiber.

Assignment Project Exam Help
Assignment Project Exam Help
Add WeChat powcoder
https://powcoder.com

   (a) Construct and plot the empirical cdf.

   (b) Provide an estimate the fraction of waiting times between 0.4 and 0.6 seconds.

   (c) The *skewness* is a measure of asymmetry of data (or probability distribution). The skewness is given by:

$$\mathbb{E}\left[\left(\frac{x-\mu}{\sigma}\right)^3\right].$$

Add WeChat powcoder

      i. Provide (and calculate) a plug-in estimate of the skewness for the nerve data.

      ii. Use the bootstrap method to (1000 samples), to provide the 95% confidence interval for the skewness.

2. Implement the Tandem Queue example for $1/\lambda = 3, \mu_1 = 1, \mu_2 = 2$. Plot a figure of the occupancy of both queues as a function of time. Obtain 95% confidence interval for the following.

   - Total time in the system.
   - Average waiting time in the first queue.
   - Average waiting time in the second queue.

   Repeat the analysis for the following parameters; $1/\lambda = 2.5$, $1/\lambda = 2$, and $1/\lambda = 1$.