Maximum Likelihood Estimation

Deadline: 20 September 2021

Assignment2

Q.1 Download the artificial dataset from your LMS Account and perform the following operations on this dataset:

a) Assume the predefined parameters range according to the definition of pmf or pdf of respective distribution, accordingly.

b) Estimate the Parameters using Maximum Likelihood Estimation in Theoretical perspective for various distribution.
   i. Poisson distribution
   ii. Exponential distribution
   iii. Gamma distribution
   iv. Uniform distribution
   v. Binomial distribution
   vi. Gaussian distribution

c) Implement and estimate the parameters using Maximum Likelihood Estimation in the python code for various distribution on downloaded data.
   i. Poisson distribution
   ii. Exponential distribution
   iii. Gamma distribution
   iv. Uniform distribution
   v. Binomial distribution
   vi. Gaussian distribution

d) Plot the point mass function graph for to throw a coin 10,000 times for head and tail.

e) Draw the probability density function graph for 10,000 random samples using mentioned distribution as
   i. Poisson distribution
   ii. Exponential distribution
   iii. Gamma distribution
   iv. Uniform distribution
   v. Binomial distribution
   vi. Gaussian distribution

f) Implement and estimate the parameters using Maximum Likelihood Estimation in the python code

Suppose that X is a discrete random variable with the following probability mass function: where $0 \leq \theta \leq 1$ is a parameter. The following 10 independent observations

X	0	1	2	3
$P(X)$	$2\theta/3$	$\theta/3$	$2(1-\theta)/3$	$(1-\theta)/3$

were taken from such a distribution: (3,0,2,1,3,2,1,0,2,1). What is the maximum likelihood estimate of θ.