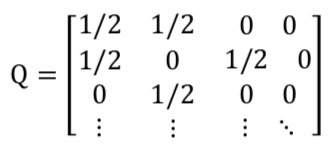
**Statistical Computing and Simulation(0625)** 統碩一 106354003 林健宏  
＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

Poisson() is Poisson distribution with mean . It has the probability mass function :

Generate samples from Poisson(5) by Metropolis -Hasting algorithm. Use the following proposal distribution:



That is, .

**(a) Write down the Metropolis -Hasting algorithm.**

< Sol. >

Step1.

Q 為一個轉移矩陣，此矩陣的橫軸與縱軸皆由0起始，轉移的方法為以下

，

，

Step2.

接受率, ,

而，，因此，來確認是否接受下一個值。

Step3.

**(b) Generate an MCMC sequence of length 5000.**

< Sol. >

給定起始值

(1) Compute the acceptance rate.

Acceptance rate: 0.818

(2) Draw the time series plot

|  |  |
| --- | --- |
|  |  |

(3) Discard the first 2000 values, and then compute the mean and variance based on the remaining 3000 value.

Mean: 4.802667; Variance: 5.157445

(4) Discard the first 2000 values, and then compute where x = 0,1,2, …,10 base on the remaining 3000 values.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 | 4 | 5 |
| Rate(%) | 0.733 | 4.367 | 10.533 | 16.067 | 17.000 | 15.700 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X | 6 | 7 | 8 | 9 | 10 | - |
| Rate(%) | 12.833 | 9.767 | 6.467 | 3.467 | 1.967 | - |

**Appendix:**

Code is in my github:

<https://github.com/kevinpiger/Exam-problem-number-1-Metropolis-algorithm-for-Poisson-5->