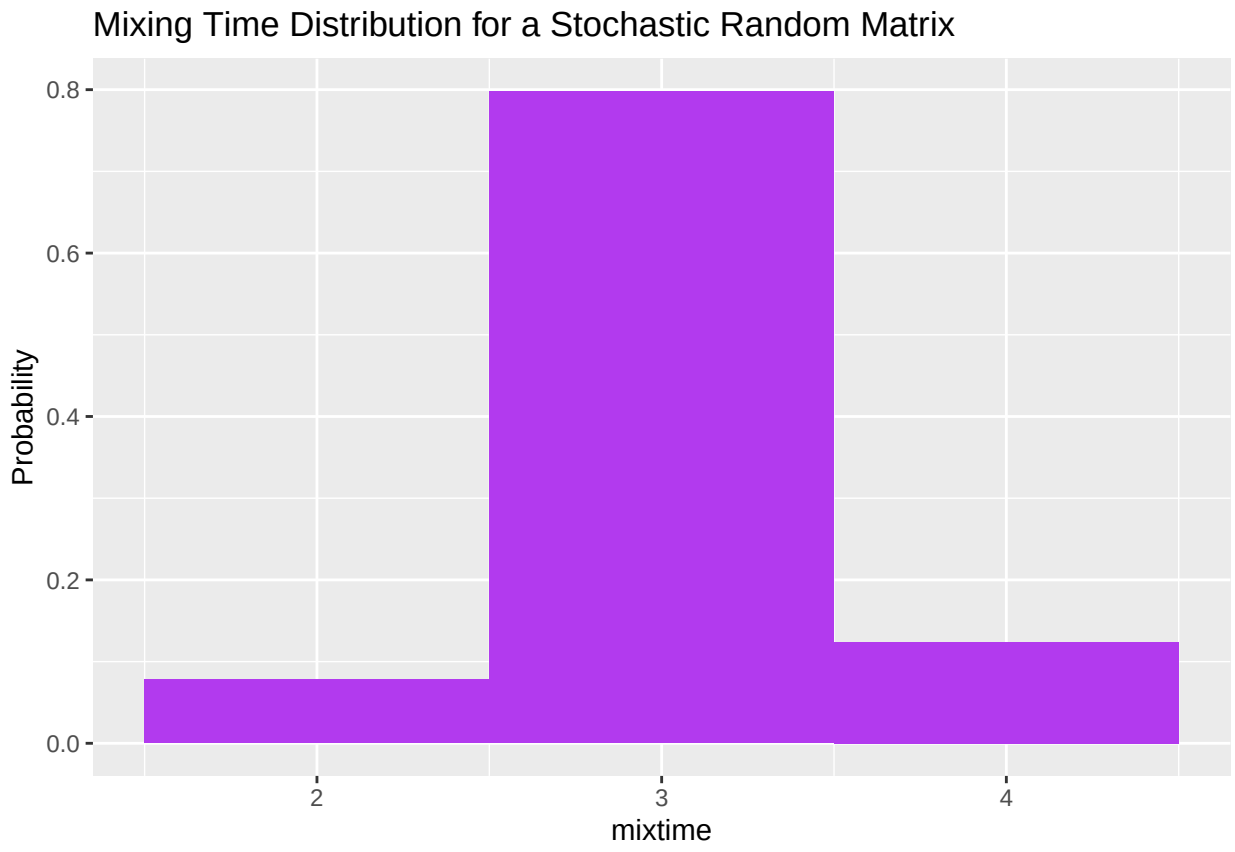
Spectral Statistics of Stochastic Matrices

Ali Taqi

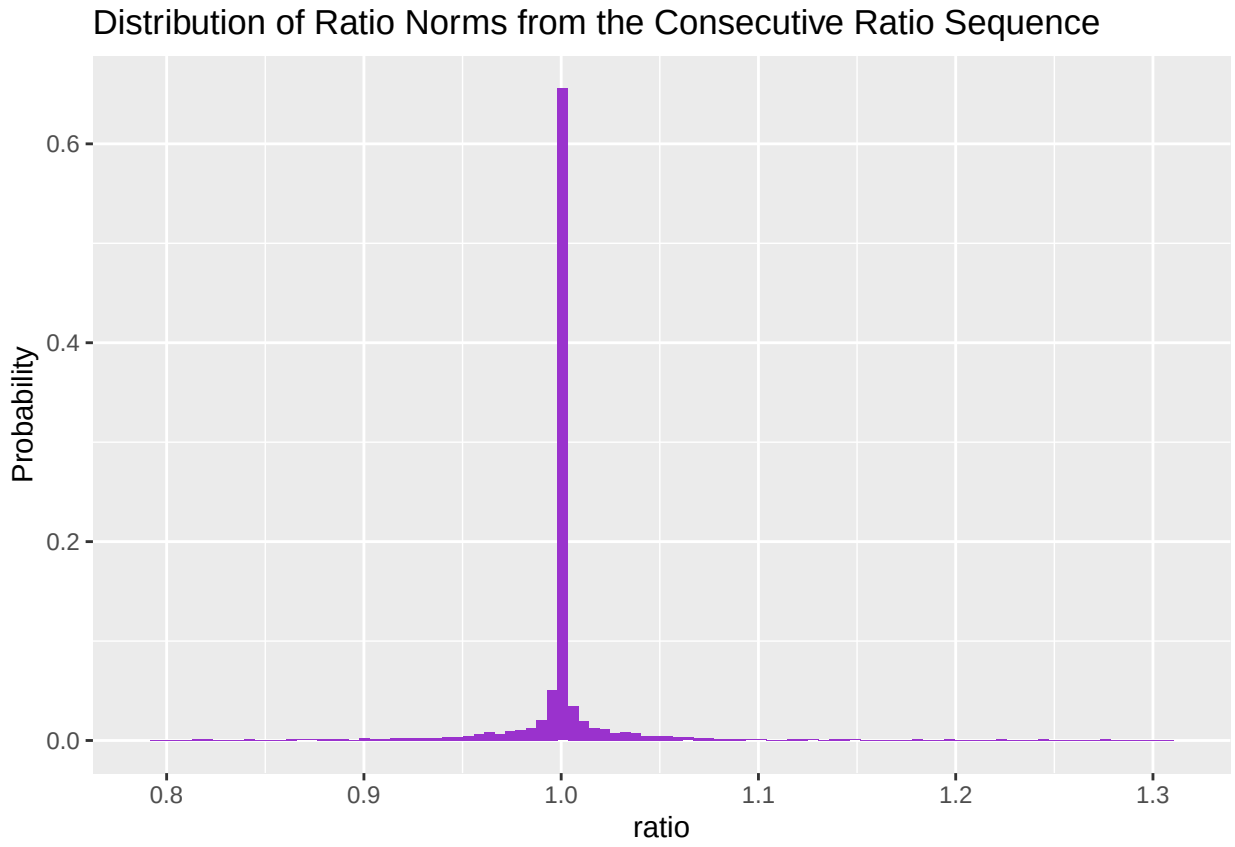
Consecutive Ratio Sequence: Stochastic Matrix

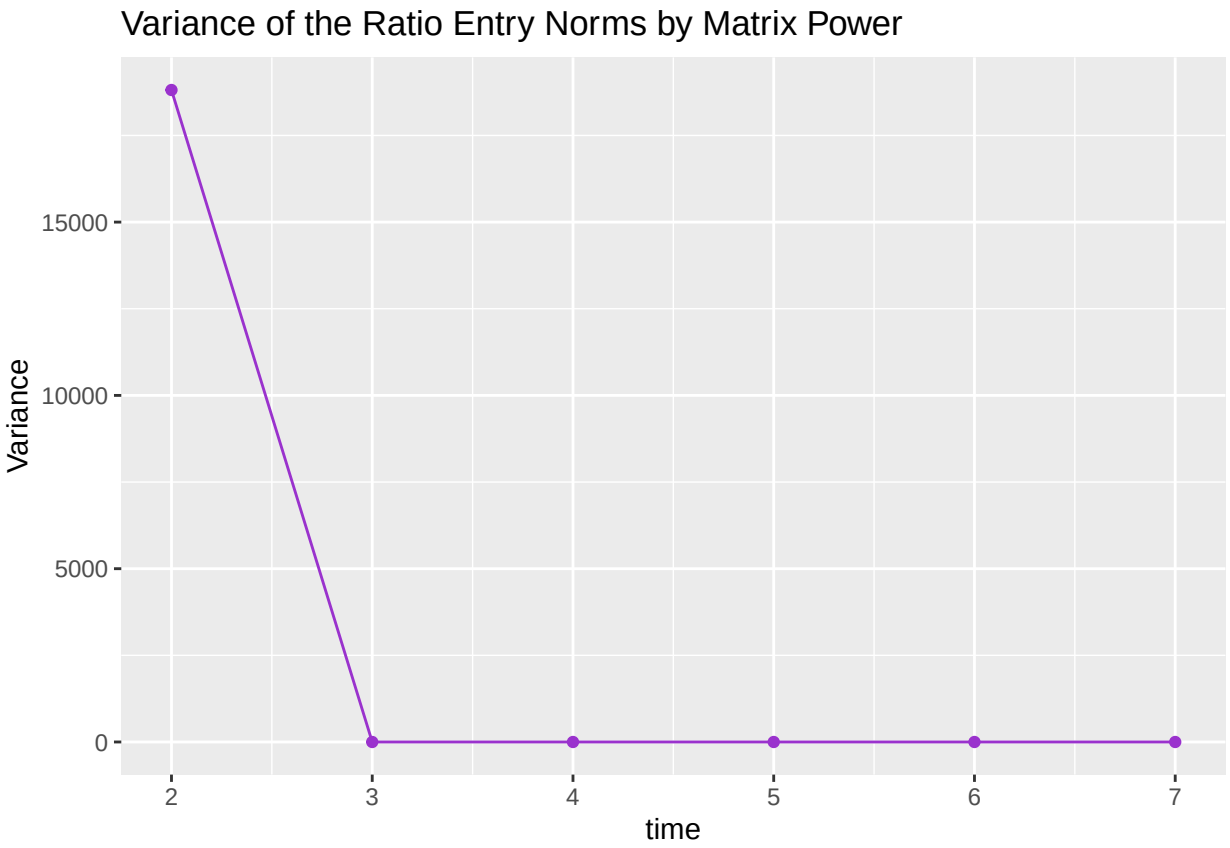
```
##           [,1]      [,2]      [,3]       [,4]
## [1,] 0.3129807 0.1210840 0.1801536 0.38578161
## [2,] 0.2572964 0.1330428 0.3025405 0.30712031
## [3,] 0.2468846 0.2927323 0.2543561 0.20602698
## [4,] 0.2309851 0.1862026 0.5004218 0.08239047
```



```
## [1] "Eigenvalues of the Matrix"
```

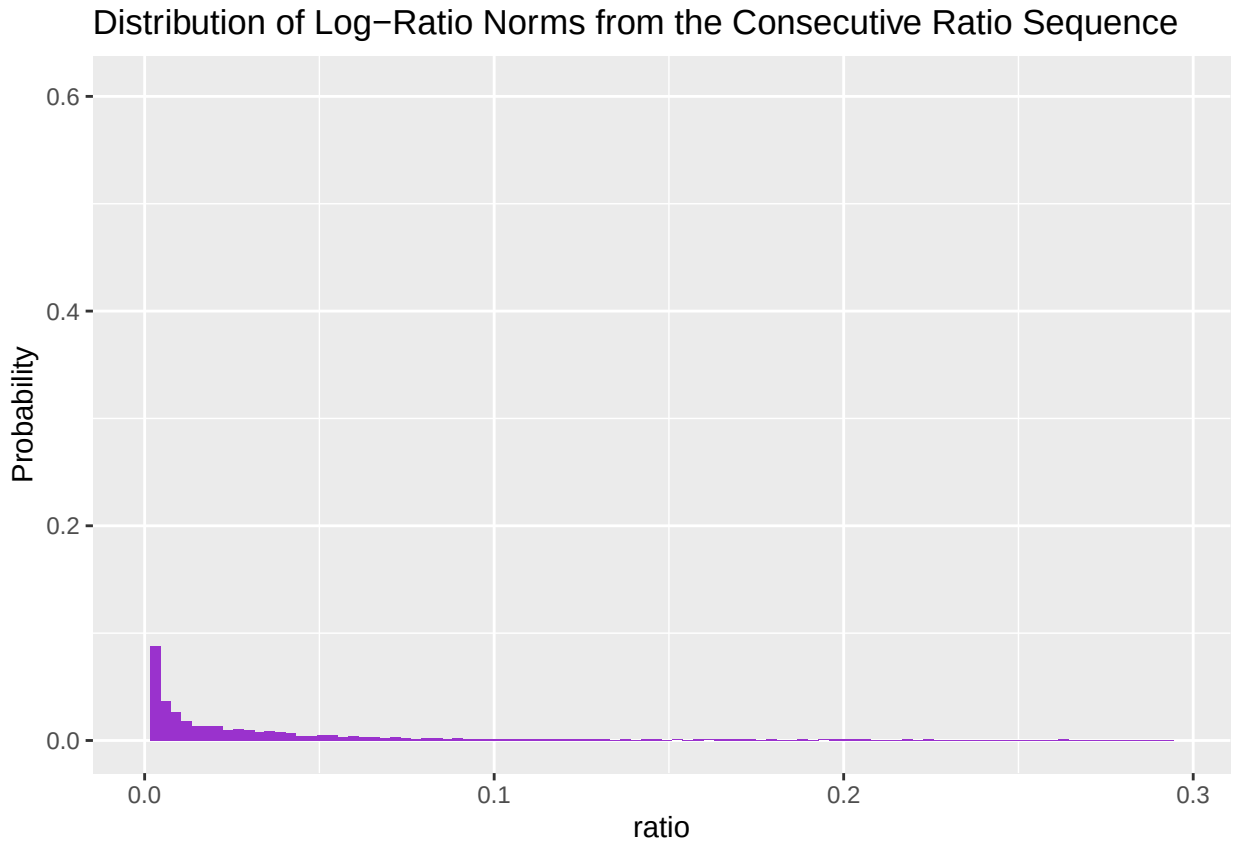
```
##          Re      Im Index
## 1   1.00000  0.0000     1
## 2 -0.13280  0.1079     2
## 3 -0.13280 -0.1079     3
## 4  0.04836  0.0000     4
```

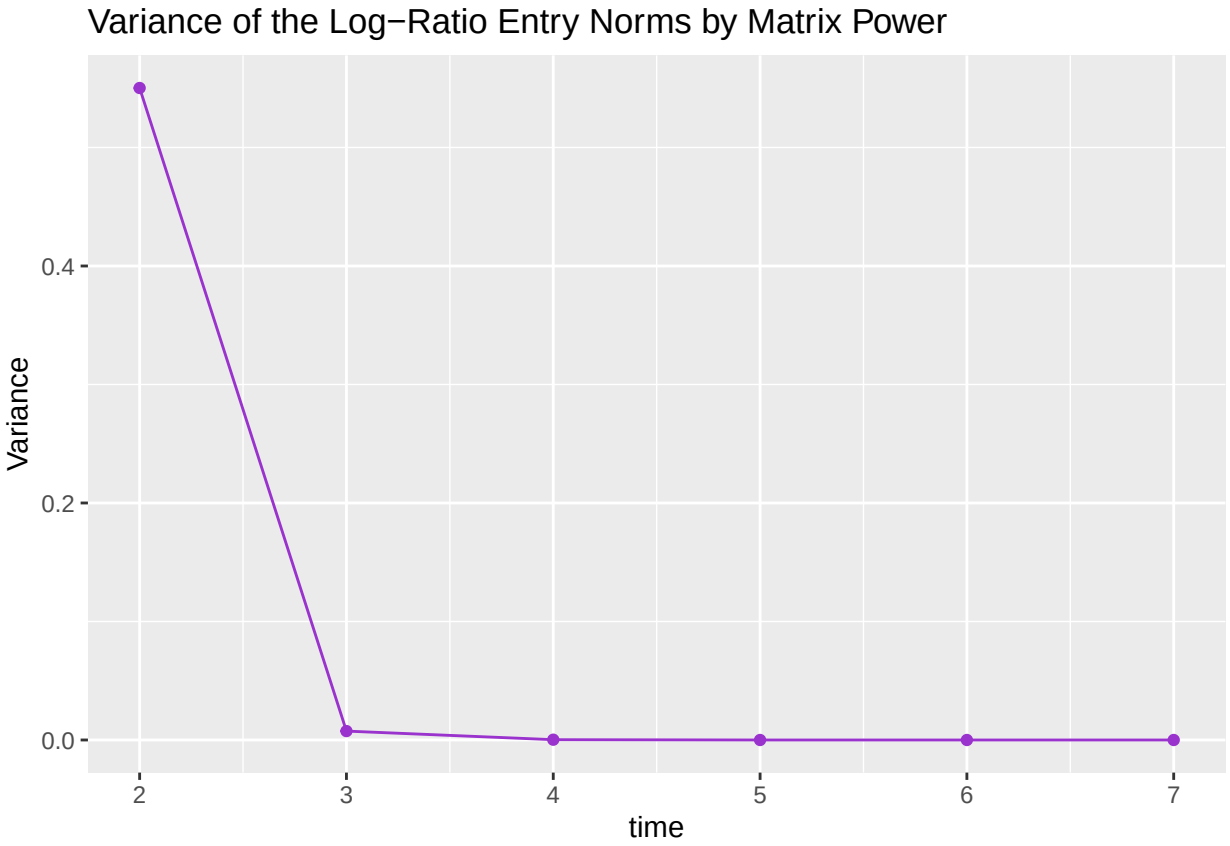


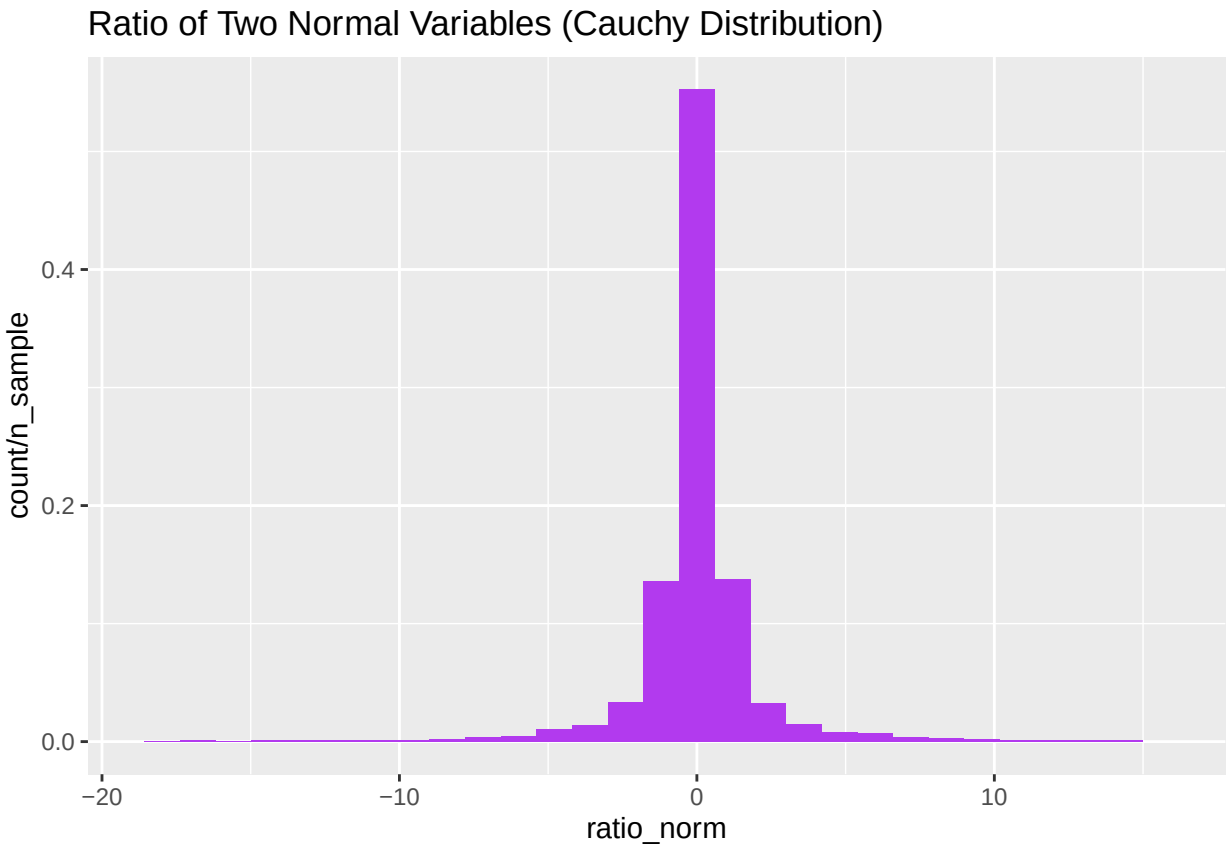

Variance of the Ratio Entry Norms by Matrix Power
Variance
15000
10000
5000
0
2
3
4
5
6
7
time

```
## [1] "Eigenvalues of the Matrix"
```

```
##         Re      Im Index
## 1  1.00000  0.0000     1
## 2 -0.13280  0.1079     2
## 3 -0.13280 -0.1079     3
## 4  0.04836  0.0000     4
```




Variance of the Log−Ratio Entry Norms by Matrix Power
Variance
0.0
0.2
0.4
2
3
4
5
6
7
time


Ratio of Two Normal Variables (Cauchy Distribution)
count/n_sample
0.0
0.2
0.4
−20
−10
0
10
ratio_norm