

# ポアソン検定

青木繁伸

2019年3月7日

## 1 目的

ポアソン分布において、rate パラメータの検定、および、2つの rate パラメータの比の検定を行う。

## 2 使用法

```
import sys
sys.path.append("statlib")
from xttest import poisson_test
poisson_test(x, T=1, r=1, alternative="two_sided", conflevel=0.95, verbose=True)
```

### 2.1 引数

x	イベント数 (1つのスカラー値か2要素からなるベクトル)
T	time base (1つのスカラー値か2要素からなるベクトル)
r	rate または2つの rate の比
alternative	"two_sided", "less", "greater" のいずれか (デフォルトは "two_sided")
conflevel	信頼区間を計算するときの信頼率
verbose	必要最小限のプリント出力をする

### 2.2 戻り値の名前

"statistic"	イベント数
"parameter"	イベント数の期待値
"pvalue"	p 値
"confint"	信頼区間
"estimate"	event rate
"nullvalue"	帰無仮説に対応する値
"alternative"	対立仮説
"method"	検定手法名

## 3 使用例

### 3.1 rate の検定

```
import sys
sys.path.append("statlib")
from xtest import poisson_test

a = poisson_test(137, 24.19893)
```

Exact Poisson test

number of events = 137, time base = 24.199, p value < 0.0001  
alternative hypothesis: true event rate is not equal to 1  
95 percent confidence interval: [4.7531, 6.6927]  
sample estimate: event rate = 5.6614

```
a = poisson_test(137, 24.19893, alternative="less")
```

Exact Poisson test

number of events = 137, time base = 24.199, p value = 1.00000  
alternative hypothesis: true event rate is less than 1  
95 percent confidence interval: [0, 6.524]  
sample estimate: event rate = 5.6614

```
a = poisson_test(137, 24.19893, alternative="greater")
```

Exact Poisson test

number of events = 137, time base = 24.199, p value < 0.0001  
alternative hypothesis: true event rate is greater than 1  
95 percent confidence interval: [4.89, inf]  
sample estimate: event rate = 5.6614

```
a = poisson_test(21, 25)
```

Exact Poisson test

number of events = 21, time base = 25, p value = 0.48390  
alternative hypothesis: true event rate is not equal to 1  
95 percent confidence interval: [0.51997, 1.284]  
sample estimate: event rate = 0.84

```
a = poisson_test(21, 25, alternative="less")
```

Exact Poisson test

number of events = 21, time base = 25, p value = 0.24730  
alternative hypothesis: true event rate is less than 1  
95 percent confidence interval: [0, 1.2096]  
sample estimate: event rate = 0.84

```
a = poisson_test(21, 25, alternative="greater")
```

Exact Poisson test

number of events = 21, time base = 25, p value = 0.81451  
alternative hypothesis: true event rate is greater than 1  
95 percent confidence interval: [0.56288, inf]  
sample estimate: event rate = 0.84

```
a = poisson_test(27, 25)
```

Exact Poisson test  
number of events = 27, time base = 25, p value = 0.68815  
alternative hypothesis: true event rate is not equal to 1  
95 percent confidence interval: [0.71173, 1.5713]  
sample estimate: event rate = 1.08

```
a = poisson_test(27, 25, alternative="less")
```

Exact Poisson test  
number of events = 27, time base = 25, p value = 0.70019  
alternative hypothesis: true event rate is less than 1  
95 percent confidence interval: [0, 1.4894]  
sample estimate: event rate = 1.08

```
a = poisson_test(27, 25, alternative="greater")
```

Exact Poisson test  
number of events = 27, time base = 25, p value = 0.37061  
alternative hypothesis: true event rate is greater than 1  
95 percent confidence interval: [0.76232, inf]  
sample estimate: event rate = 1.08

### 3.2 2つの rate の比の検定

```
import sys  
sys.path.append("statlib")  
from xtest import poisson_test  
  
b = poisson_test([11, 6 + 8 + 7], [800, 1083 + 1050 + 878])
```

Comparison of Poisson rates  
count1 = 11, expected count1 = 6.7174, p value = 0.07967  
alternative hypothesis: true rate ratio is not equal to 1  
95 percent confidence interval: [0.85843, 4.2773]  
sample estimate: rate ratio = 1.9715

```
b = poisson_test([11, 6 + 8 + 7], [800, 1083 + 1050 + 878],  
                 alternative="less")
```

Comparison of Poisson rates  
count1 = 11, expected count1 = 6.7174, p value = 0.97593  
alternative hypothesis: true rate ratio is less than 1  
95 percent confidence interval: [0, 3.8274]  
sample estimate: rate ratio = 1.9715

```
b = poisson_test([11, 6 + 8 + 7], [800, 1083 + 1050 + 878],  
                 alternative="greater")
```

Comparison of Poisson rates  
count1 = 11, expected count1 = 6.7174, p value = 0.05601  
alternative hypothesis: true rate ratio is greater than 1

95 percent confidence interval: [0.97758, inf]

sample estimate: rate ratio = 1.9715