ポアソン検定

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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 xtest 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
```