比率の検定

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1　目的

1 標本の場合の母比率の検定，2 標本の場合の母比率の差の検定，3 標本以上の場合の母比率の一様性の検定を行う。

2　使用法

```
import sys
sys.path.append("statlib")
from xtest import prop_test
prop_test(x, n=None, p=None, alternative="two_sided", conflevel=0.95,
          correct=True, verbose=True)}
```

2.1　引数

x	成功数のベクトル（1 標本の場合はスカラー），または，成功数と失敗数の 2 列からなる行列。
n	試行回数のベクトル（1 標本の場合はスカラー）。x が行列の場合には無視される。
p	成功する確率のベクトル。長さは x と同じであること。
alternative	対立仮説。デフォルトは "two_sided"。他に "less"，"greater" を指定できる。3 標本以上の場合は "two_sided" 以外を指定しても無視される。
conflevel	信頼度。デフォルトは 0.95
correct	連続性の補正の有無（デフォルトは True。3 標本以上の場合は無視される）
verbose	必要最小限のプリント出力をする。

2.2　戻り値の名前

"chisq"	検定統計量（χ^2 分布にしたがう）
"df"	自由度
"pvalue"	p 値
"estimate"	標本比率
"nullvalue"	母比率

"confint"　　信頼区間
"alternative"　対立仮説
"method"　　検定手法名

3　使用例

3.1　1 標本の場合（母比率の検定）

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

a = prop_test(3, 10)
```

```
1-sample proportions test with continuity correction
data: 3 out of 10, null probability = 0.5
chisq = 0.9,  df = 1,  p value = 0.34278
alternative hypothesis: true p is not equal to 0.5
95 percent confidence interval: [0.080948, 0.64633]
sample estimate = 0.3
```

```
a = prop_test(3, 10, alternative="less")
```

```
1-sample proportions test with continuity correction
data: 3 out of 10, null probability = 0.5
chisq = 0.9,  df = 1,  p value = 0.17139
alternative hypothesis: true p is less than 0.5
95 percent confidence interval: [0, 0.60435]
sample estimate = 0.3
```

```
a = prop_test(3, 10, alternative="greater")
```

```
1-sample proportions test with continuity correction
data: 3 out of 10, null probability = 0.5
chisq = 0.9,  df = 1,  p value = 0.82861
alternative hypothesis: true p is greater than 0.5
95 percent confidence interval: [0.096449, 1]
sample estimate = 0.3
```

```
a = prop_test(3, 10, correct=False)
```

```
1-sample proportions test without continuity correction
data: 3 out of 10, null probability = 0.5
chisq = 1.6,  df = 1,  p value = 0.20590
alternative hypothesis: true p is not equal to 0.5
95 percent confidence interval: [0.10779, 0.60322]
```

```
sample estimate = 0.3
```

```
a = prop_test(3, 10, alternative="less", correct=False)
```

```
1-sample proportions test without continuity correction
data: 3 out of 10, null probability = 0.5
chisq = 1.6,  df = 1,  p value = 0.10295
alternative hypothesis: true p is less than 0.5
95 percent confidence interval: [0, 0.5583]
sample estimate = 0.3
```

```
a = prop_test(3, 10, alternative="greater", correct=False)
```

```
1-sample proportions test without continuity correction
data: 3 out of 10, null probability = 0.5
chisq = 1.6,  df = 1,  p value = 0.89705
alternative hypothesis: true p is greater than 0.5
95 percent confidence interval: [0.12688, 1]
sample estimate = 0.3
```

```
a = prop_test(3, 10, p=0.4)
```

```
1-sample proportions test with continuity correction
data: 3 out of 10, null probability = 0.4
chisq = 0.10417,  df = 1,  p value = 0.74689
alternative hypothesis: true p is not equal to 0.4
95 percent confidence interval: [0.080948, 0.64633]
sample estimate = 0.3
Chi-squared approximation may be incorrect
```

3.2 2 標本の場合（比率の差の検定）

```
a = prop_test([3, 6], [10, 15])
```

```
2-sample test for equality of proportions with continuity correction
data: [3 6]  out of  [10 15]
chisq = 0.0072338,  df = 1,  p value = 0.93222
alternative hypothesis: two_sided
95 percent confidence interval: [-0.56034, 0.36034]
sample estimates = 0.3, 0.4
Chi-squared approximation may be incorrect
```

```
a = prop_test([3, 6], [10, 15], correct=False)
```

```
2-sample test for equality of proportions without continuity correction
data: [3 6]  out of  [10 15]
chisq = 0.26042,  df = 1,  p value = 0.60983
```

```
alternative hypothesis: two_sided
95 percent confidence interval: [-0.47701, 0.27701]
sample estimates = 0.3, 0.4
Chi-squared approximation may be incorrect
```

```
a = prop_test([3, 6], [10, 15], p=[0.5, 0.4])
```

```
2-sample test for equality of proportions with continuity correction
data: [3 6]  out of  [10 15]
chisq = 0.96944,  df = 2,  p value = 0.61587
alternative hypothesis: two_sided
null values = 0.5, 0.4
sample estimates = 0.3, 0.4
```

```
a = prop_test([3, 6], [10, 15], alternative="less")
```

```
2-sample test for equality of proportions with continuity correction
data: [3 6]  out of  [10 15]
chisq = 0.0072338,  df = 1,  p value = 0.46611
alternative hypothesis: less
95 percent confidence interval: [-1, 0.29973]
sample estimates = 0.3, 0.4
Chi-squared approximation may be incorrect
```

3.3 3 標本以上の場合（比率の一様性の検定）

「成功数」と「試行回数」の 2 つのベクトルで与える場合

```
a = prop_test([3, 4, 6], [10, 15, 23])
```

```
3-sample test for equality of proportions with continuity correction
data: [3 4 6]  out of  [10 15 23]
chisq = 0.055958,  df = 2,  p value = 0.97241
alternative hypothesis: two_sided
sample estimates = 0.3, 0.26667, 0.26087
Chi-squared approximation may be incorrect
```

「成功数」「失敗数」の 2 列を持つ行列で与える場合

```
a = prop_test([[3, 7], [4, 11], [6, 17]])
```

```
3-sample test for equality of proportions with continuity correction
data: [3 4 6]  out of  [10 15 23]
chisq = 0.055958,  df = 2,  p value = 0.97241
alternative hypothesis: two_sided
sample estimates = 0.3, 0.26667, 0.26087
Chi-squared approximation may be incorrect
```