Hypothesis testing

How to?

Step 1:

List:

List these parameters.

: number of samples

: observed value of mean in sample .

: estimated standard deviation in sample .

: expected mean in sample X. (Which we want to find)

: significance level.

Step 2:

Make:

Make hypothesis. Generating conditions for hypothesis.

as accepted condition.

as rejected condition.

When the result is in , the hypothesis is accepted.

Otherwise, the hypothesis is NOT accepted (I.e. rejected)

NOTICE

NOTICE that conditions contains equal sign must be placed in .

Step 3:

Statistic evaluation:

Select what statistic value we should use for evaluation.

Step 4:

Statistic model:

Select a statistic model for hypothesis according to number of sample etc.

Step 5:

Hypothesis testing:

Find type of hypothesis testing we need according to conditions listed in Step 2, by the way, list its critical.

It is always one of following:

Lower-tail test

Upper-tail test

Two-tail test

For more details, see my note (Z值法.docx)

Step 6:

Critical point:

According to significance level, look at distribution table, get critical point. (It may be or according to type of hypothesis testing)

Moreover, draw a graph for visual computation.

Step 7:

Observed value:

Evaluate observed value in hypothesis.

Step 8:

Check condition:

I.e. Compare observed value in hypothesis to critical.

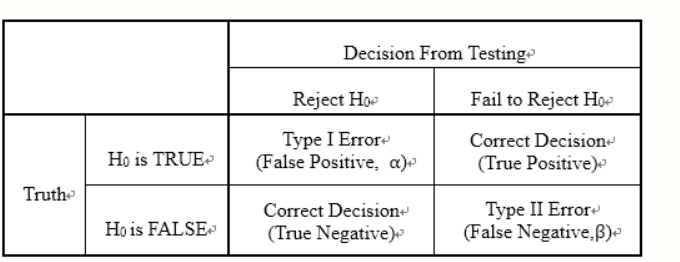
NOTICE

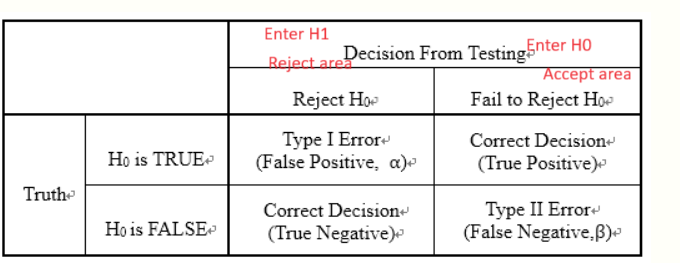
NOTICE that

Iff hypthesis statistic is in condition, it accepts.

Otherwise, it does NOT accepts (I.e. it rejects).

Type Error





Examples

Example 1

From example 11.2 in p.278 in textbook CH11.

Step 1:

We can know that

= 36

= 7.8h

= 2.7h

= 10h

= 0.05

Step 2:

Make hypothesis.

: (accept)

: (reject)

Step 3:

We use to evaluate it.

Step 4:

Select the distribution.

Since , it is consider as big sample. Thus, it approximates to normal

distribution.

(for more details about definition of big data and approximation to normal distribution , see textbook)

Here, we use standardized normal distribution to evaluate it.

Step 5:

Since only contain sign, we have to adopt lower-tail test.

Step 6:

Get critical.

With significance level = 0.05, look at standardized normal distribution table, we can get that

=

=>

=

(since it is symmetric to y-axis in standardized normal distribution)

Step 7:

Evaluate the observed value in hypothesis.

=

NOTICE

NOTICE that we adopt the formula

rather than

because we don’t know what actual standard deviation in original research (the question does NOT offer it), we have to use observed standard deviation in sample space .

( for more details, see my note Formula of Variance analysis.docx )

=

=

=

Step 8:

Compare observed value in hypothesis to critical.

observed value in hypothesis : = - 4.89

critical : = -1.645

Thus, it falls to reject area.

That is, with siginificance level == 0.05, we know that

It spends less than 10 hours on sleeping for college student in Taiwan.

Example 2

From example 11.1 in p.274 in textbook CH11.

Step 1:

We know that

= 3kg

= 2.95kg

= 0.38kg

= 49

= 0.05

Step 2:

Make hypothesis.

: (accept area)

: (reject area)

Step 3:

Value of mean in sample is a good estimation of value of mean in population.

Thus, we use value of mean in sample.

Step 4:

Select the distribution.

Since , it is considered as a big sample.

According to CLT, value of mean in sample approximates to the value of mean in sample with normal distribution.

Thus, we use normal distribution.

Step 5:

Since only contain sign, we have to adopt the lower-tail test.

Step 6:

Get critical.

With significance level == 0.05, look at standardized normal distribution table,

=

=>

(since it is symmetric to y-axis in standardized normal distribution)

Step 7:

Evaluate observed value in hypothesis.

=

=

=

Step 8:

Compare observed value in hypothesis to critical.

= 2.911

Critical =

=>

Critical

Thus, it falls to accept area. That is, we can know that

台新company does NOT lie to customers.

Example 3

From example 11.4 in p.280 textbook CH11.

Step 1:

We know that

= 100

= 80.21

= 4

= 80.0

= 0.01

Step 2:

Make hypothesis.

: == 80.0

: 80.0

Step 3:

Use .

Step 4:

Since , it can be considered as a big sample.

Thus, it approxiates normal distribution.

Step 5:

Since only contain sign, we have to use two-tail test.

Step 6:

Get critical.

With == 0.01 (here == 0.005 ), look at standardized normal distribution, the uppper critical:

= 2.575

While lower critical:

= -2.575

(since it is symmetric to y-axis in standardized normal distribution)

Step 7:

Evaluate observed value in hypothesis.

=

=

= 0.525

Step 8:

Compare observed value in hypothesis to critical.

Observed value in hypothesis:

= 0.525

Upper critical:

= 2.575

Lower critical:

= -2.575

=>

Thus, it falls in accept area.

That is, in significance level , the mean of life for Taiwanese citizen is 80 age.

Ref

From textbook CH 11 ( see GitHub ).

From pixnet.

[假設檢定(Hypothesis Testing) @ 有勁的基因資訊 :: 痞客邦 :: (pixnet.net)](https://yourgene.pixnet.net/blog/post/116944086-%E5%81%87%E8%A8%AD%E6%AA%A2%E5%AE%9A(hypothesis-test)

From Wiki.

[Statistical hypothesis testing - Wikipedia](https://en.wikipedia.org/wiki/Statistical_hypothesis_testing)