Cheatography

Hypothesis Testing Cheat Sheet

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Statistical inference

Draw conclusions from a set of data

Put a probability on whether a conclusion is correct 'beyond reasonable doubt'

The major question to answer is whether a difference between samples, or between a sample and a population, has occurred simply as a result of natural variation or because of a real difference between the two

Two-tailed or one-tailed

The alternative hypothesis may be classified as two-tailed or one-tailed

Two-tailed test

- is a two-sided alternative
- we do the test with no preconceived notion that the true value of μ is either above or below the hypothesised value of μ 0
- the alternative hypothesis is written: H1: μ =/= μo

One-tailed test

- one-sided alternative
- do the test with a strong conviction that, if H0 is not true, it is clear that m is either grater than μ0 or less than μ0
- E.g. the alternative hypothesis is written as: H1: μ > μo

Decision-making process steps

1. Collecting the data
2. Summarising the data
3. Setting up a hypothesis (i.e. a claim or theory), which is to be tested
4. Calculating the probability of obtaining a sample such as the one we have if the hypothesis is true
5. Either accepting or rejecting the hypothesis

Significance level

After the appropriate hypotheses have been formulated, we must decide upon the significance level (or α -level) of the test

most common significance level used is 0.05, commonly written as α = 0.05

A 5% significance level says in effect that an event has occurred that occurs less than 5% of the time is considered unusual

One-sample z-test

Deals with the case of a single sample being chosen from a population and the question of whether that particular sample might be consistent with the rest of the population

Construct a test statistic according to a particular formula

Information required in calculation

- the size (n) of the sample
- the mean of the sample
- the standard deviation (s) of the sample

Other information of interest might include:

- Does the population have a normal distribution?
- Is the population's standard deviation known?
- Is the sample size (n) large? (25+)

There are different cases for the one-sample z-test statistic

Case I

the population has a normal distribution and

the population standard deviation, s, is known

Case II

the population has any distribution

the sample size, n, is large (i.e. at least 25), and

the value of population standard deviation is known

In both these cases we can use a z-test statistic formula (a)

Case III

the population has any distribution

the sample size, n, is large (i.e. at least 25), and

One-sample z-test (cont)

the value of population standard devation is unknown (however, since n is large, the value of population standard devation is approximated by the sample standard deviation, s)

In this case we can use a z-test statistic formula (b)

Set up your Hypothesis

Null Hypothesis

Part of formulation of an hypothesis

Statement that nothing unusual has occurred

The notation is Ho

Alternative hypothesis

States that something unusual has occurred

The notation is H1 or HA

Together they may be written in the form: Ho: (statement) v. H1(alternative statement)

Conclusion errors

Two possible errors in making a conclusion about a null hypothesis

Type I errors occur when you reject H0 (i.e. conclude that it is false) when H0 is really true.

Type II errors occur when you accept H0 (i.e. conclude that it is true) when H0 is really false.

z-test statistic formula (a)

$$z = \frac{\bar{x} - \mu_0}{\frac{\sigma}{\sqrt{n}}}$$

z-test statistic formula (b)

$$z = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$$

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Published 19th March, 2017.
Last updated 12th May, 2016.