

A BRIEF PRE-REQUISITE TO THE COURSE

Hypothesis Testing

- A statistical hypothesis is sometimes called confirmatory data analysis is a hypothesis that is testable on the basis of observing a process that is modelled via a set of random variables.
- Statistical hypothesis is an assumption about a population parameter which may be true or not true.
- Hypothesis is the proposition about the presumed relation among natural phenomena. Or simply just defined as a testable belief/opinion/assumption.

There are two types of hypothesis;

(i) Null Hypothesis(H_0)

- *It is a statement which represents the theory that has been put forward, either because it isb*
- It can simply be defined as a statement of no change.
- It refers to all those values about a population parameter that are assumed to be true.

(ii) Alternative Hypothesis(H_1)

- *It is a statement of what a statistical hypothesis is set up to establish.*
- It can simply be defined as a set of all those values about a parameter that are not specified in the null hypothesis

Errors

- 1) Type I error is the error committed when one rejects a correct hypothesis given as alpha (α)
- 2) Type II error is the committed when one accepts a wrong hypothesis given as beta (β)

Note

- 1) Simple hypothesis is the hypothesis that specifies the population distribution completely sometimes referred to as a two tail test or non-directional test or a two sided test but a composite hypothesis does not specify the population distribution completely sometimes referred to as one tail test or directional test or a one sided test.
- 2) Level of significance (α) is the probability of rejecting a true null hypothesis
 $\alpha = \Pr(\text{Reject } H_0 \mid H_0 \text{ is correct}).$

Steps in significance/hypothesis testing

- i) State the hypothesis
- ii) Decide on a level of significance α .
- iii) Choose appropriate statistical test and compute the observed test statistic.
- iv) Using the distribution statistical test and α , determine the rejection region(s) (RR).
- v) Conclusion: If the observed test statistic falls in the RR, reject H_0 and conclude that based on the sample information, we are $(1 - \alpha)$ 100% confident that H_1 is true. Otherwise,

conclude that there is not sufficient evidence to reject H_0 . In all the applied problems, interpret the meaning of your decision.

vi) State any assumptions you made in testing the given hypothesis.

vii) Compute the *p-value* from the null distribution of the test statistic and interpret it.