

Nonparametrics

LECTURE 12

Objectives

- ▶ Define terms.
- ▶ Understand the advantages and disadvantages of nonparametric tests.
- ▶ Recognize situations that call for nonparametric tests.
- ▶ Select and execute the correct test for a given situation.

Advantages and disadvantages

- ▶ Do not concern the calculation or estimation of population parameters
- ▶ Fewer and easier assumptions
- ▶ Almost all parametric tests assume a specific distribution – this is not so with some nonparametric methods and thus they are sometimes referred to as distribution-free tests.

Advantages and disadvantages

- ▶ Advantages
 - ▶ Use more types of data
 - ▶ Some nonparametric are fairly easy to perform.
- ▶ Disadvantages
 - ▶ Parametric tests are more powerful (less type II errors) than nonparametric tests – unless the assumptions of the parametric tests are seriously violated.

When should nonparametric tests be used?

- ▶ When the assumptions of the appropriate parametric test are violated and the consequences are either serious or unknown.
- ▶ When you have nominal or ordinal data.
- ▶ When the hypothesis to be tested does not involve a population parameter.

Mann-Whitney U

- ▶ Used in situations similar to Student's t-test, you want to see if the two samples differ significantly in central tendency.
 - ▶ MWU tests for differences in Central Tendency – Medians
 - ▶ t-test for differences in Central Tendency – Means
- ▶ We do not use the actual measurements, but rather we use the rank of the measurements.
 - ▶ If two or more measurements are tied then all of the tied values are assigned the average rank.

Assumptions -- Mann-Whitney U

- ▶ Random samples.
- ▶ Independent samples.
- ▶ The two distributions that the samples are drawn from are of similar shape.

Example

- ▶ Example 15