

Design and Analysis of Experiments

10 - Analysis of Variance

Version 2.11

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*“Nothing in life is to be feared,
it is only to be understood.
Now is the time to understand more,
so that we may fear less.”*

Marie Skłodowska Curie
1867–1934
Polish-French physicist and chemist.



Comparison of multiple means

Introduction

In the previous sections, we have (hopefully) developed a solid understanding of the main concepts associated with comparing the means of two groups;

There are many cases, however, in which one may want to perform inferences about differences of the means of multiple populations;

Simple comparisons

Non-normal data

The most common strategies to deal with non-normal samples are:

- Data transformation;
- Rank-based methods;
- Bootstrap-based methods;
- Distribution-specific methods.

In this lecture we'll introduce the first three approaches. The use of distribution-specific methods (e.g., generalized linear models) will be discussed in future versions of this course.

Data transformations

Main concepts

It is very common for phenomena to present behaviors that can be characterized by distributions other than the normal;

Data transformations

Log transformation

Data transformations

Square root transformation

Data transformations

Other transformations

Rank-based methods

Main concepts

Rank-based methods

Inference on one median

Rank-based methods

Inference on two medians

Rank-based methods

Paired design

Bootstrap

Main concepts

Bootstrap

Confidence intervals

Bootstrap

Inference using bootstrap

Final remarks

Some considerations

Bibliography

Required reading

1

Recommended reading

1

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About this material

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