# Introduction

At the most time, we will can make the use of Fisher Test[1] to analysis variance of data from different treats. However, the data has to satisfy some assumptions:

1. **Normally distributed experimental errors**
2. **Equal variances between treatments**
3. **Independence of samples**

Sometimes, after relevant tests, the data fail to satisfy these above. So, Non-parametric ANOVA will show up on the stage.

Right now, some methods are not available in R packages. What’s more, different tests from different packages will have different Data Inputs, which gives rise to the programming difficulties.

Therefore, we sincerely hope our R package can help more people from different backgrounds can carry out their works more efficiently. Here we give the overview of our package including our suggestions towards how to conduct Variance Analysis:

# Data from One Block

## Brown-Mood Median Test

Compare two sets of data: ，where . Original Hypothesis is:

First, define the median of (which is mixed by and) as

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Total |
|  |  |  |  |
|  |  | D |  |
| Total |  |  |  |

In the condition of , A satisfies the hypergeometric distribution:

When the data size is large, use the Normal Approximation of the Hypergeometric Distribution to estimate:

## Mood ANOVA

When the data is scattered, it’s hard to distinguish two groups in the angel of Rank. In 1954, Mood[2] used variance to differ two groups: For two groups , where which satisfy the distribution:

;

And the hypothesis is:

Under the hypothesis, define the Statistics:

Where is the rank of data in after mixing and .

In the condition of **large sample**, has the following statistical properties:

Obviously,

In the condition of **small sample**, can be corrected:

## Moses Test

In 1963, Moses proposed one method where assuming equal mean is unnecessary to test the variance.

Here is the algorithm:

Given , the variances of two treats are .

The hypothesis is:

The core of Moses Test is T Statistics, and it’s defined as follows:

1. Divide data in Treat 1 into groups, while divide data in Treat 2 into groups. At the same time, they have observations in each group.
2. Define the SST of each group:
3. Mix all the and , and rank them.
4. Moses Statistics is:

Where

1. Then check Mann-Whitney value. If , accept .

# Data from Different Blocks

To test the effect of one work, sometimes the researchers would do experiments on different objects, which is defined as Blocks here. The most classical method is Kruskal-Wallis test. It has already installed inside R Language, and can be used in the form of *Kruskal.test()*. However, Kruskal’s cannot suit all kinds of condition, hence, the Statistics Scientists did some further works.

## Jonckheere–Terpstra Test

Sometimes, trend exists in the data like rising or descending, Jonckheere–Terpstra Test proposed one way to help check this. Users can use *JT.test()* to carry out the tasks.

## Hollander-Wolfe Camparasion

## Hodges-Lehmmann Test

## Cochran Test

## Durbin Test