# Rapport package team

Bartlett's test

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## Contents



## Description

This template will run the Bartlett's test to check the equality of variances between groups.

### Introduction

Bartlett's test is used to test the homogeneity of the variances, in other words the equality of the tested variable's variances across the groups. With checking that we want to find if the two groups are coming from the same population.

Homogeneity is useful to being tested, because that is an assumption of the One-Way ANOVA.

### References


- Snedecor, George W. and Cochran, William G. (1989). *Statistical Methods*. Iowa State University Press


### Normality assumption

The Bartlett's test has an assumption of normality, thus one should obtain the information if the distribution of the tested variable had a normal distribution.

We will use *Shapiro-Wilk*, *Lilliefors* and *Anderson-Darling* tests to screen departures from normality in the response variable.

| Method | Statistic | p-value |
|---|---|---|
| Lilliefors (Kolmogorov-Smirnov) normality test | 0.17 | 6.193e-54 |
| Anderson-Darling normality test | 32.16 | 1.26e-71 |
| Shapiro-Wilk normality test | 0.8216 | 9.445e-27 |

So, the conclusions we can draw with the help of test statistics:

- based on *Lilliefors test*, distribution of *Age* is not normal
- *Anderson-Darling test* confirms violation of normality assumption
- according to *Shapiro-Wilk test*, the distribution of *Age* is not normal

As you can see, the applied tests confirm departures from normality.

### Test results

After checking the assumptions let's see what the test shows us!

| Method | Statistic | p-value |
|---|---|---|
| Bartlett test of homogeneity of variances | 0.233 | 0.6293 |

According to the *Bartlett's test*, the variance of the *Age* across the groups of *Gender* does not differs significantly.

We can conclude that, because the p-value is higher than 0.05.

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### Normality assumption

The Bartlett's test has an assumption of normality, thus one should obtain the information if the distribution of the tested variable had a normal distribution.

We will use *Shapiro-Wilk*, *Lilliefors* and *Anderson-Darling* tests to screen departures from normality in the response variable.

| Method | Statistic | p-value |
|---|---|---|
| Lilliefors (Kolmogorov-Smirnov) normality test | 0.2223 | 2.243e-92 |
| Anderson-Darling normality test | 42.04 | 3.31e-90 |
| Shapiro-Wilk normality test | 0.7985 | 6.366e-28 |

So, the conclusions we can draw with the help of test statistics:

- based on *Lilliefors test*, distribution of *Internet usage for educational purposes (hours per day)* is not normal
- *Anderson-Darling test* confirms violation of normality assumption
- according to *Shapiro-Wilk test*, the distribution of *Internet usage for educational purposes (hours per day)* is not normal

As you can see, the applied tests confirm departures from normality.

### Test results

After checking the assumptions let's see what the test shows us!

| Method | Statistic | p-value |
|---|---|---|
| Bartlett test of homogeneity of variances | 36.11 | 1.863e-09 |

According to the *Bartlett's test*, the variance of the *Internet usage for educational purposes (hours per day)* across the groups of *Student* significantly differs.

We can conclude that, because the p-value is smaller than 0.05.

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Homogeneity is useful to being tested, because that is an assumption of the One-Way ANOVA.

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**Normality assumption**

The Bartlett's test has an assumption of normality, thus one should obtain the information if the distribution of the tested variable had a normal distribution.

We will use *Shapiro-Wilk*, *Lilliefors* and *Anderson-Darling* tests to screen departures from normality in the response variable.

| Method | Statistic | p-value |
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| Lilliefors (Kolmogorov-Smirnov) normality test | 0.17 | 6.193e-54 |
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So, the conclusions we can draw with the help of test statistics:

- based on *Lilliefors test*, distribution of *Age* is not normal
- *Anderson-Darling test* confirms violation of normality assumption
- according to *Shapiro-Wilk test*, the distribution of *Age* is not normal

As you can see, the applied tests confirm departures from normality.

**Test results**

After checking the assumptions let's see what the test shows us!

| Method | Statistic | p-value |
|---|---|---|
| Bartlett test of homogeneity of variances | 23.26 | 0.0001123 |

According to the *Bartlett's test*, the variance of the *Age* across the groups of *How often does your profession require Internet access?* significantly differs.

We can conclude that, because the p-value is smaller than 0.05.

This report was generated with R (3.0.1) and rapport (0.51) in *0.917* sec on x86_64-unknown-linux-gnu platform.