# F-Test: Compare Two Variances in R

## When to use the F-test

The F-test is used to assess whether the variances of two populations (A and B) are equal.

## Research questions and statistical hypotheses

Typical research questions are:

1. whether the variance of group A () is equal to the variance of group B ().
2. …

We can define the corresponding *null hypothesis* as follows:

## Formula of the F-test

The test statistic can be obtained by computing the ratio of the two variances and .

The degrees of freedom are (for the numerator) and (for the denominator).

## Compute the F-test in R

Here we use a built-in dataset:

# Store the data in the variable my\_data

my\_data <- ToothGrowth

head(my\_data, 6)

Index len supp dose

1 4.2 "VC" 0.5

2 11.5 "VC" 0.5

3 7.3 "VC" 0.5

4 5.8 "VC" 0.5

5 6.4 "VC" 0.5

6 10 "VC" 0.5

# F-test

res.ftest <- var.test(len ~ supp, data = my\_data)

res.ftest

$'statistic'

[1] 0.63859513776588

$'parameter'

[1] 29

[2] 29

$'p.value'

[1] 0.233143251197521

$'conf.int'

[1] 0.30394879062222

[2] 1.34168571338415

$'estimate'

[1] 0.63859513776588

$'null.value'

[1] 1

$'alternative'

[1] "two.sided"

$'method'

[1] "F test to compare two variances"

$'data.name'

[1] "len by supp"

|  |  |  |
| --- | --- | --- |
| Key |  | Value |
|  | res.ftest$'method'[1] | "F test to compare two variances" |
| data | res.ftest$'data.name'[1] | "len by supp" |
| F = | round(res.ftest$'statistic', 4) | [1] 0.6386 |
| Num df | res.ftest$'parameter'[1] | [1] 29 |
| Denom df | res.ftest$'parameter'[2] | [1] 29 |
| p-value | res.ftest$'p.value' | [1] 0.233143251197521 |

## Interpretation of the result

…