

Rapport package team

ANOVA Template

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Contents

Description	1
Introduction	1
Model Overview	2
Descriptives	2
Diagnostics	2
ANOVA Summary	4
Description	5
Introduction	5
Model Overview	5
Descriptives	5
Diagnostics	6
ANOVA Summary	8

Description

An ANOVA report with table of descriptives, diagnostic tests and ANOVA-specific statistics.

Introduction

Analysis of Variance or **ANOVA** is a statistical procedure that tests equality of means for several samples. It was first introduced in 1921 by famous English statistician Sir Ronald Aylmer Fisher.

Model Overview

One-Way ANOVA was carried out, with *Gender* as independent variable, and *Internet usage in leisure time (hours per day)* as a response variable. Factor interaction was taken into account.

Descriptives

In order to get more insight on the model data, a table of frequencies for ANOVA factors is displayed, as well as a table of descriptives.

Frequency Table Below lies a frequency table for factors in ANOVA model. Note that the missing values are removed from the summary.

gender	N	%	Cumul. N	Cumul. %
male	410	60.92	410	60.92
female	263	39.08	673	100.00
Total	673	100.00	673	100.00

Descriptive Statistics The following table displays the descriptive statistics of ANOVA model. Factor levels and/or their combinations lie on the left hand side, while the corresponding statistics for response variable are given on the right-hand side.

Gender	Min	Max	Mean	Std.Dev.	Median	IQR
male	0	12	3.270	1.953	3	3
female	0	12	3.064	2.355	2	3

Skewness	Kurtosis
0.9443	0.9858
1.3979	1.8696

Diagnostics

Before we carry out ANOVA, we'd like to check some basic assumptions. For those purposes, normality and homoscedascity tests are carried out alongside several graphs that may help you with your decision on model's main assumptions.

Diagnostics

Univariate Normality We will use *Shapiro-Wilk*, *Lilliefors* and *Anderson-Darling* tests to screen departures from normality in the response variable (*Internet usage in leisure time (hours per day)*).

Method	Statistic	p-value
Shapiro-Wilk normality test	0.9001	1.617e-20
Lilliefors (Kolmogorov-Smirnov) normality test	0.1680	3.000e-52
Anderson-Darling normality test	18.7530	7.261e-44

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

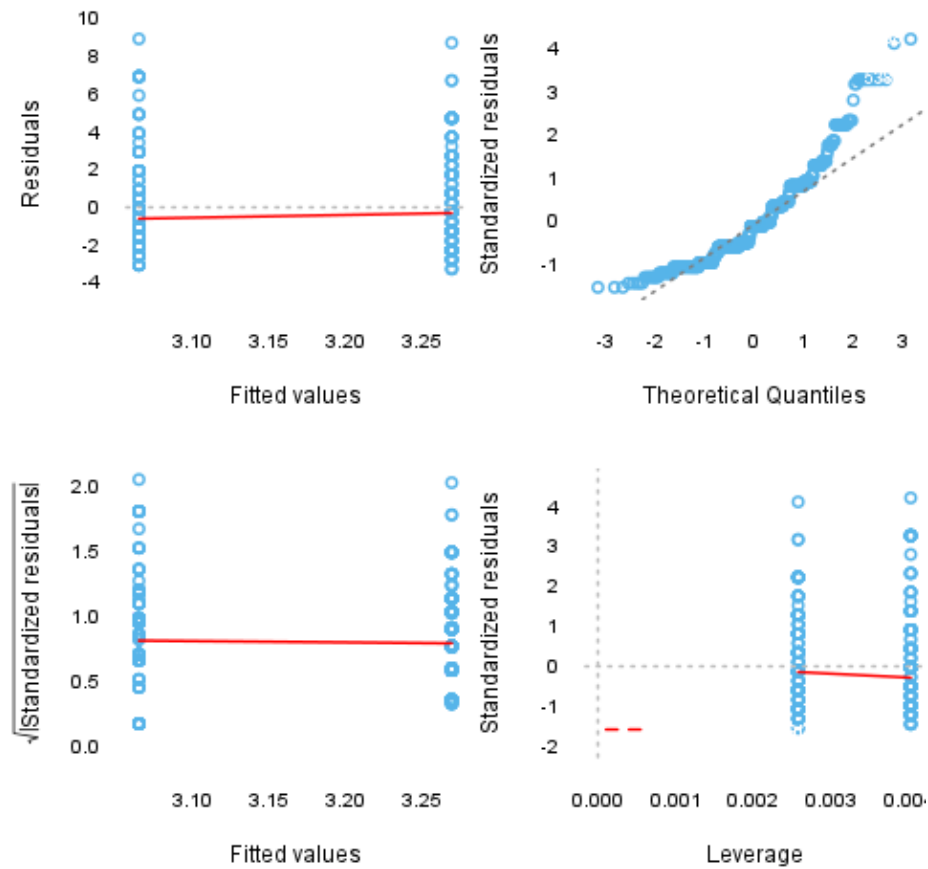
Homoscedascity In order to test homoscedascity, *Bartlett* and *Fligner-Kileen* tests are applied.

Method	Statistic	p-value
Fligner-Killeen test of homogeneity of variances	0.4629	0.496287
Bartlett test of homogeneity of variances	10.7698	0.001032

When it comes to equality of variances, applied tests yield inconsistent results. While *Fligner-Kileen test* confirmed the hypotheses of homoscedascity, *Bartlett's test* rejected it.

Diagnostic Plots Here you can see several diagnostic plots for ANOVA model:

- residuals against fitted values
- scale-location plot of square root of residuals against fitted values
- normal Q-Q plot
- residuals against leverages



ANOVA Summary

	Df	Sum.Sq	Mean.Sq	F.value	Pr..F.
gender	1	6.422	6.422	1.43	0.2322
Residuals	636	2855.630	4.490	NA	NA

ANOVA Table *F*-test for *Gender* is not statistically significant, which implies that there is no Gender effect on response variable.

Description

An ANOVA report with table of descriptives, diagnostic tests and ANOVA-specific statistics.

Introduction

Analysis of Variance or **ANOVA** is a statistical procedure that tests equality of means for several samples. It was first introduced in 1921 by famous English statistician Sir Ronald Aylmer Fisher.

Model Overview

Two-Way ANOVA was carried out, with *Gender* and *Relationship status* as independent variables, and *Internet usage in leisure time (hours per day)* as a response variable. Factor interaction was taken into account.

Descriptives

In order to get more insight on the model data, a table of frequencies for ANOVA factors is displayed, as well as a table of descriptives.

Frequency Table Below lies a frequency table for factors in ANOVA model. Note that the missing values are removed from the summary.

gender	partner	N	%	Cumul. N	Cumul. %
male	in a relationship	150	23.697	150	23.70
female	in a relationship	120	18.957	270	42.65
male	married	33	5.213	303	47.87
female	married	29	4.581	332	52.45
male	single	204	32.227	536	84.68
female	single	97	15.324	633	100.00
Total	Total	633	100.000	633	100.00

Descriptive Statistics The following table displays the descriptive statistics of ANOVA model. Factor levels and/or their combinations lie on the left hand side, while the corresponding statistics for response variable are given on the right-hand side.

Gender	Relationship status	Min	Max	Mean	Std.Dev.
male	in a relationship	0.5	12	3.058	1.969
male	married	0.0	8	2.985	2.029
male	single	0.0	10	3.503	1.936
female	in a relationship	0.5	10	3.044	2.216
female	married	0.0	10	2.481	1.967
female	single	0.0	12	3.323	2.679

Median	IQR	Skewness	Kurtosis
2.5	2.00	1.3239	2.64881
3.0	2.00	0.8620	0.15095
3.0	3.00	0.7574	0.08749
3.0	3.00	1.3833	1.83058
2.0	1.75	2.0626	5.58575
3.0	3.50	1.1851	0.92806

Diagnostics

Before we carry out ANOVA, we'd like to check some basic assumptions. For those purposes, normality and homoscedascity tests are carried out alongside several graphs that may help you with your decision on model's main assumptions.

Diagnostics

Univariate Normality We will use *Shapiro-Wilk*, *Lilliefors* and *Anderson-Darling* tests to screen departures from normality in the response variable (*Internet usage in leisure time (hours per day)*).

Method	Statistic	p-value
Shapiro-Wilk normality test	0.9001	1.617e-20
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As you can see, applied tests confirm departures from normality.

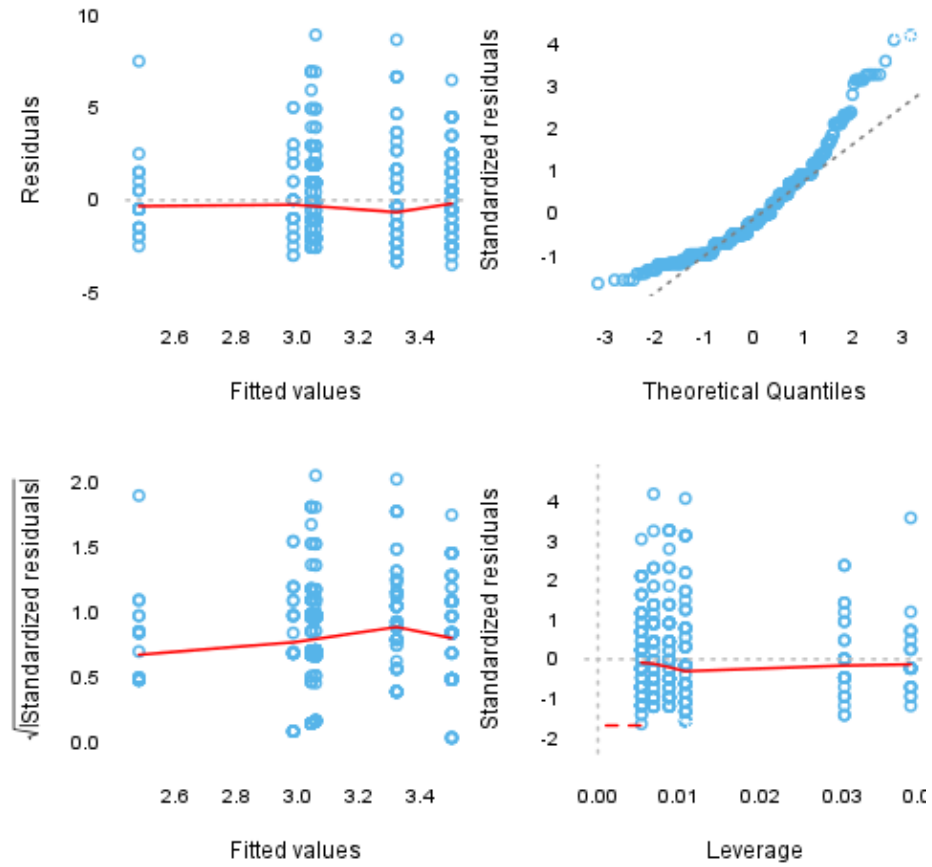
Homoscedascity In order to test homoscedascity, *Bartlett* and *Fligner-Kileen* tests are applied.

Method	Statistic	p-value
Fligner-Killeen test of homogeneity of variances	1.123	0.2891837
Bartlett test of homogeneity of variances	11.127	0.0008509

When it comes to equality of variances, applied tests yield inconsistent results. While *Fligner-Kileen test* confirmed the hypotheses of homoscedascity, *Bartlett's test* rejected it.

Diagnostic Plots Here you can see several diagnostic plots for ANOVA model:

- residuals against fitted values
- scale-location plot of square root of residuals against fitted values
- normal Q-Q plot
- residuals against leverages



ANOVA Summary

	Df	Sum.Sq	Mean.Sq
gender	1	4.947	4.947
partner	2	31.212	15.606
gender:partner	2	3.038	1.519
Residuals	593	2703.090	4.558

	F.value	Pr..F.
gender	1.0853	0.29793
partner	3.4237	0.03324
gender:partner	0.3332	0.71677
Residuals	NA	NA

ANOVA Table *F-test* for *Gender* is not statistically significant, which implies that there is no Gender effect on response variable. Effect of *Relationship status* on response variable is significant. Interaction between levels of *Gender* and *Relationship status* wasn't found significant ($p = 0.717$).

This report was generated with [R](#) (2.15.1) and [rapport](#) (0.4) in 1.999 sec on x86_64-unknown-linux-gnu platform.



Figure 1: