Multiple Comparison Procedures To A Control

For AN(C)OVA Models

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Basic Information

Automatic statistics for the file:

File
recovery.csv

Your selection for the encoding: UTF-8
Your selection for the decimal character: .
Observations (rows with at least one non-missing value): 41
Variables (columns with at least one non-missing value): 2
Variables considered continuous: 1

Variables considered continuous
minutes

Variables considered categorical: 1

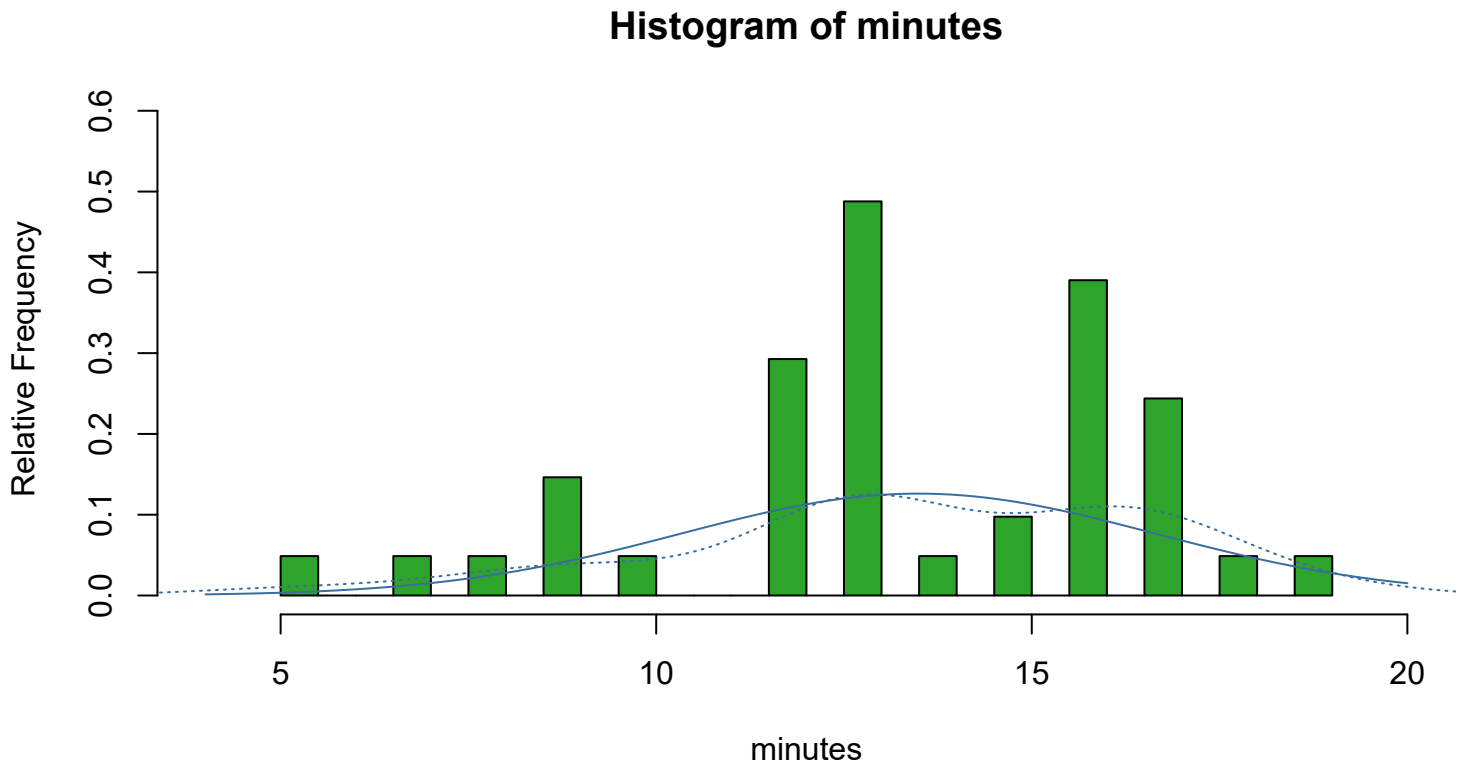
Variables considered categorical
blanket

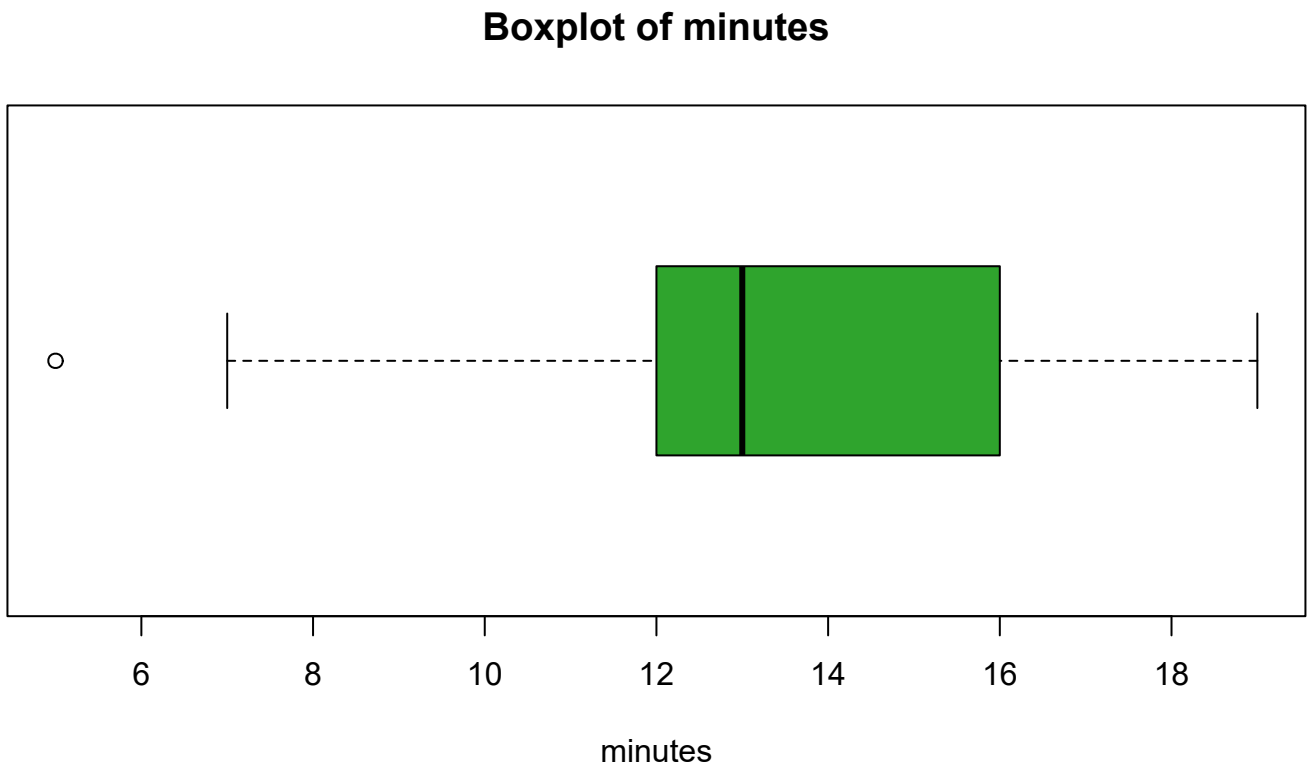
Model Information

You defined the following linear model: minutes~blanket
You are interested in the factor: blanket
You are interested in pairwise comparisons to the reference level: b0

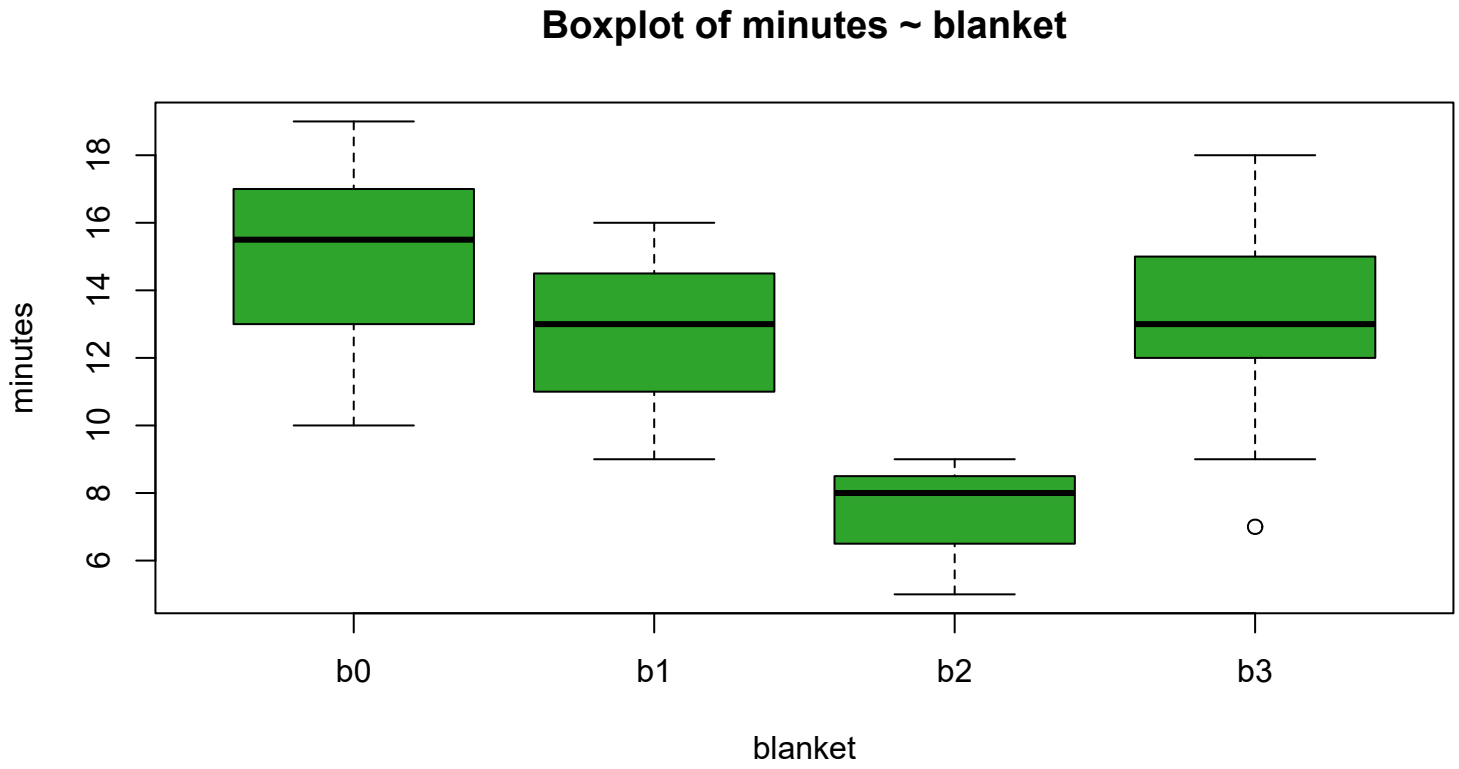
Descriptive Plots

Dependent Variable




Boxplot of minutes
6
8
10
12
14
16
18
minutes

Dependent Against Categorical Factors



Analysis of variance

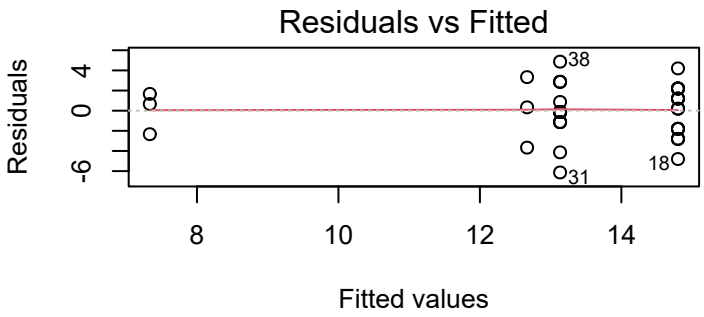
Effect of the separate expressions of the given variables (Parameter Estimates)

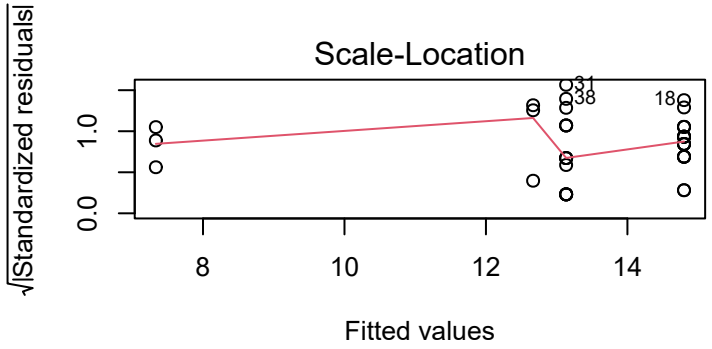
Variable	Value	Std.Error	T.value	P.value	sign. level[1]	Significance at 5 percent error
(Intercept)	11.98	0.57	20.91	<0.001	***	Intercept Significant.
blanket1	2.82	0.70	4.00	<0.001	***	Significant. A Difference between the effect of blanket1 and its reference.
blanket2	0.68	1.20	0.57	0.573		Not Significant. No difference between the effect of blanket2 and its reference.
blanket3	-4.65	1.20	-3.87	<0.001	***	Significant. A Difference between the effect of blanket3 and its reference.

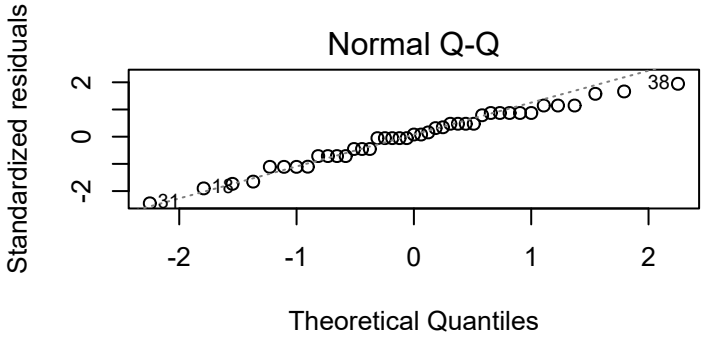
[1] '***': sign. to 0.1% error. '**': sign. to 1% error. '*': sign. to 5% error. ' . ': sign. to 10% error. ' ': not sign. ' - ': no statement.

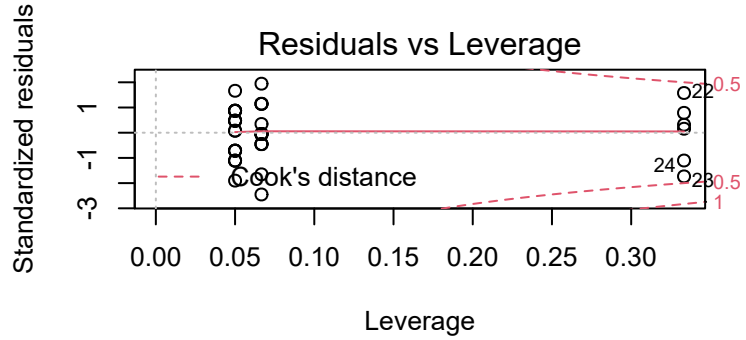
Total influence of factors (ANOVA Type III)

Variable	Sum.Sq	Df	F.value	P.value	Interpretation (5% error)
(Intercept)	2933.11	1	437.13	<0.001	Intercept significantly different from zero.
blanket	151.98	3	7.55	<0.001	There exist significant differences between the levels of factor 2.
Residuals	248.27	37			


Residuals vs Fitted
Residuals
Fitted values
38
31
18


Scale-Location
√|Standardized residuals|
Fitted values
31
38
18


Normal Q-Q
Standardized residuals
Theoretical Quantiles
38
18
31


Residuals vs Leverage
Standardized residuals
Leverage
Cook's distance
0.5
0.5
1
22
24
28

Multiple Comparisons of Means to a Control

Theoretical background: Testing multiple hypotheses simultaneously and each at the same pre-specified significance level, increases the probability of false positive effects. The probability to commit at least one false positive decision increases with the number of hypotheses. A solution to overcome this problem is given by multiple comparisons procedures. Here, we do not control the per-hypothesis Type I error but the probability of committing at least one Type I error over all hypotheses. Using p-values adjusted for multiplicity, individual hypotheses can be finally compared with the pre-specified significance level.

Dunnet

Multiple Comparison: Dunnet Contrasts

Test whether the factor level b0 of the factor blanket is different from the other levels. The Null Hypothesis is for example b1 - b0 =0.

Null Hypothesis	Value	Std.Error	T.value	adjusted P.value	Sign. level[1]	Significance at 5 percent Type I error
b1 - b0 = 0	-2.13	1.60	-1.33	0.456		Not Significant. Level b0 of factor blanket is not different than b1[2]
b2 - b0 = 0	-7.47	1.60	-4.66	<0.001	***	Significant. Level b2 of factor blanket is significantly different than b0[3]
b3 - b0 = 0	-1.67	0.88	-1.88	0.182		Not Significant. Level b0 of factor blanket is not different than b3[2]

[1] '***': sign. to 0.1% error. '**': sign. to 1% error. '*': sign. to 5% error. ' . ': sign. to 10% error. ' ': not sign. ' - ': no statement.

[2] H1 does not hold significantly.

[3] H1 holds significantly.

Simoultaneous Confidence Intervals: Dunnet Contrasts

Simultaneous Confidence Intervals which includes the true value of the difference between the reference level b0 and the other levels of blanket

Null Hypothesis	Value	Lower bound	Upper bound	Interpretation
b1 - b0 = 0	-2.13	-6.12	1.86	The interval (-6.12, 1.86) traps the true difference b1-b0 with probability 95 percent.[2]
b2 - b0 = 0	-7.47	-11.46	-3.48	The interval (-11.46, -3.48) traps the true difference b2-b0 with probability 95 percent.[1]
b3 - b0 = 0	-1.67	-3.87	0.53	The interval (-3.87, 0.53) traps the true difference b3-b0 with probability 95 percent.[2]

[1] Remark: Zero is not in the conidence interval.

[2] Remark: Zero is in the confidence interval.

References

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