

[HOME](#)[DOWNLOAD](#)[SALES](#)[EBOOK](#)[SITE MAP](#)

Significance Test for Linear Regression

Assume that the error term ϵ in the **linear regression model** is independent of x , and is **normally distributed**, with zero **mean** and constant **variance**. We can decide whether there is any **significant relationship** between x and y by testing the null hypothesis that $\beta = 0$.

Problem

Decide whether there is a significant relationship between the variables in the linear regression model of the data set **faithful** at .05 significance level.

Solution

We apply the `lm` function to a formula that describes the variable `eruptions` by the variable `waiting`, and save the linear regression model in a new variable `eruption.lm`.

```
> eruption.lm = lm(eruptions ~ waiting, data=faithful)
```

Then we print out the F-statistics of the significance test with the `summary` function.

```
> summary(eruption.lm)
```

Call:

```
lm(formula = eruptions ~ waiting, data = faithful)
```

Residuals:

Min	1Q	Median	3Q	Max
-1.2992	-0.3769	0.0351	0.3491	1.1933

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.87402	0.16014	-11.7	<2e-16 ***
waiting	0.07563	0.00222	34.1	<2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.497 on 270 degrees of freedom

Multiple R-squared: 0.811, Adjusted R-squared: 0.811

F-statistic: 1.16e+03 on 1 and 270 DF, p-value: <2e-16

Answer

As the p-value is much less than 0.05, we reject the null hypothesis that $\beta = 0$. Hence there is a significant relationship between the variables in the linear regression model of the data set **faithful**.

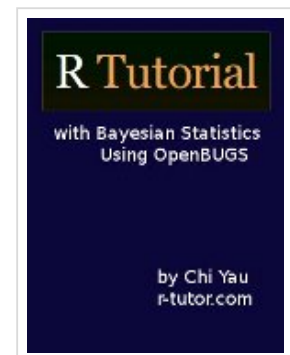
Note

Further detail of the `summary` function for linear regression model can be found in the R documentation.

Search this site:

Search

R Tutorial eBook



R Tutorials

R Introduction

Elementary Statistics with R

Qualitative Data

Quantitative Data

Numerical Measures

Probability Distributions

Interval Estimation

Hypothesis Testing

Type II Error

Inference About Two
Populations

Goodness of Fit

Analysis of Variance

Non-parametric Methods

Simple Linear Regression

Estimated Simple
Regression Equation

Coefficient of
Determination

9/28/2018

Significance Test for Linear Regression | R Tutorial

> help(summary.lm)

< Coefficient of Determination

up

Confidence Interval for Linear Regression >

Tags: Elementary Statistics with R error term linear regression significance test lm summary faithful

Significance Test for Linear Regression

Confidence Interval for Linear Regression

Prediction Interval for Linear Regression

Residual Plot

Standardized Residual

Normal Probability Plot of Residuals

Multiple Linear Regression

Logistic Regression

GPU Computing with R

Recent Articles

- [Deep Learning in R](#)
August 14, 2016
- [Installing CUDA Toolkit 7.5 on Fedora 21 Linux](#)
September 10, 2015
- [Installing CUDA Toolkit 7.5 on Ubuntu 14.04 Linux](#)
September 10, 2015
- [Hierarchical Linear Model](#)
July 22, 2013