

R Tutorial

An R Introduction to Statistics

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Confidence Interval 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**. For a given value of x , the interval estimate for the mean of the dependent variable, \bar{y} , is called the **confidence interval**.

Problem

In the data set **faithful**, develop a 95% confidence interval of the mean eruption duration for the waiting time of 80 minutes.

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.

```
> attach(faithful)      # attach the data frame
> eruption.lm = lm(eruptions ~ waiting)
```

Then we create a new **data frame** that set the waiting time value.

```
> newdata = data.frame(waiting=80)
```

We now apply the `predict` function and set the predictor variable in the `newdata` argument. We also set the interval type as "confidence", and use the default 0.95 confidence level.

```
> predict(eruption.lm, newdata, interval="confidence")
      fit      lwr      upr
1 4.1762 4.1048 4.2476
> detach(faithful)      # clean up
```

Answer

The 95% confidence interval of the mean eruption duration for the waiting time of 80 minutes is between 4.1048 and 4.2476 minutes.

Note

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

```
> help(predict.lm)
```

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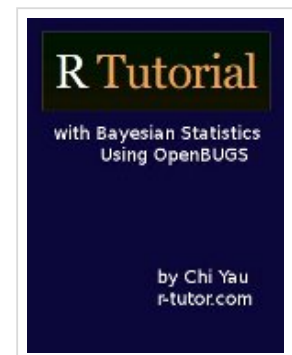
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