Simple Linear Regression – Simple Demonstration

The maximum heart rate of a person is often said to be related to age by the equation

$$\text{Max} = 220 - \text{Age}$$

Suppose this hypothesis is to be empirically examined and 15 people of varying ages are tested for their maximum heart rate, with the results tabulated below.

Case	Age	Max Rate	Case	Age	Max Rate
1	18	202	9	72	153
2	23	186	10	19	199
3	25	187	11	23	193
4	35	180	12	42	174
5	65	156	13	18	198
6	54	169	14	39	183
7	34	174	15	37	178
8	56	172			

We can implement the regression model using the following code.

```
Age=c(18, 23, 25, 35, 65, 54, 34,
      56, 72, 19, 23, 42, 18, 39, 37)
MaxRate=c(202,186,187,180,156,169,174,
      172,153,199,193,174,198,183,178)
lm(MaxRate~Age)
```

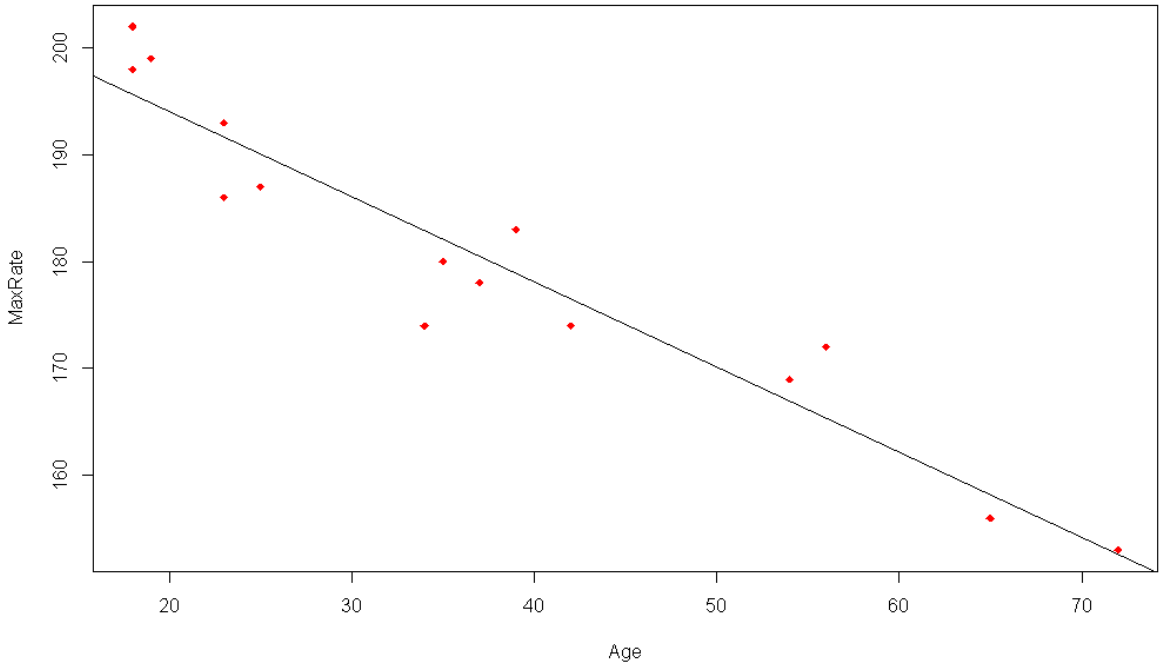
The regression coefficients are presented in the following code.
Also included is a summary of the distribution of ages (skewed towards low values).

```
Call:
lm(formula = MaxRate ~ Age)

Coefficients:
(Intercept)          Age
  210.0485      -0.7977

> summary(Age)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  18.00   23.00   35.00   37.33   48.00   72.00
```

The regression equation is therefore

$$\hat{y} = 210.05 - 0.797\,x$$

Where x is the observed value for age, and $\hat{y}$ is the predicted value for maximum heart rate




```
> confint(Fit)
                 2.5 %      97.5 %
(Intercept) 203.854813 216.2421034
Age          -0.948872  -0.6465811
```