Modeling in R and Tidying Results

linear models and broom

2022-08-14

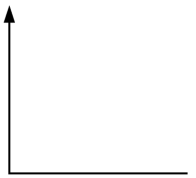
⚠️ This is not a course in a regression

Modeling in R

```
lm(y ~ x + z, data = df)
```

Modeling in R

```
lm(y ~ x + z, data = df)
```



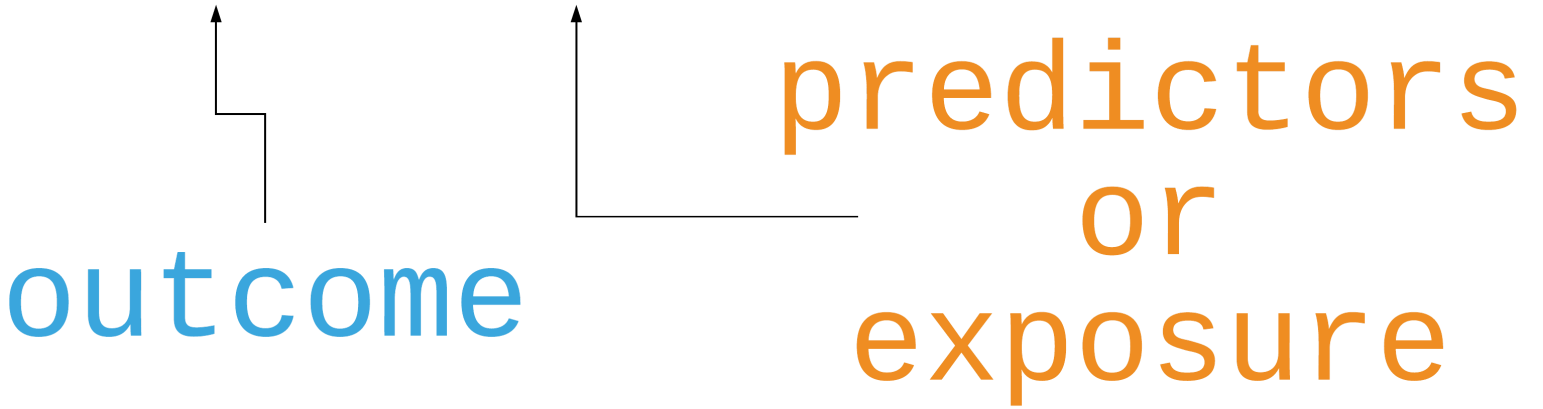
model function

Modeling in R

```
lm(y ~ x + z, data = df)
```

Modeling in R

```
lm(y ~ x + z, data = df)
```



Modeling in R

lm() = **Linear Regression (OLS)**

Modeling in R

lm() = **Linear Regression (OLS)**

glm() = **Generalized Linear Model (default family = Gaussian)**

Modeling in R

```
lm(price ~ carat, data = diamonds)
```

Modeling in R

```
lm(price ~ carat, data = diamonds)
```

```
##
## Call:
## lm(formula = price ~ carat, data = diamonds)
##
## Coefficients:
## (Intercept)        carat
##       -2256         7756
```

Modeling in R

```
lm(price ~ carat, data = diamonds) %>%
  summary()
```

Modeling in R

```
##
## Call:
## lm(formula = price ~ carat, data = diamonds)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -18585.3   -804.8    -18.9    537.4  12731.7
##
## Coefficients:
##             Estimate Std. Error t value
## (Intercept) -2256.36      13.06  -172.8
## carat        7756.43      14.07   551.4
##                         Pr(>|t|)
## (Intercept) <0.0000000000000002 ***
## carat       <0.0000000000000002 ***
## ---
## Signif. codes:
## 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1549 on 53938 degrees of freedom
## Multiple R-squared:  0.8493,    Adjusted R-squared:  0.8493
```

Modeling in R

```
##
## Call:
## lm(formula = price ~ carat, data = diamonds)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -18585.3   -804.8    -18.9    537.4  12731.7
##
## Coefficients:
##             Estimate Std. Error t value
## (Intercept) -2256.36      13.06  -172.8
## carat        7756.43      14.07   551.4
##                         Pr(>|t|)
## (Intercept) <0.0000000000000002 ***
## carat       <0.0000000000000002 ***
## ---
## Signif. codes:
## 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1549 on 53938 degrees of freedom
## Multiple R-squared:  0.8493,    Adjusted R-squared:  0.8493
```

broom: **tidy models**

tidy()

glance()

augment()

broom: **tidy models**

tidy() = **model coefficients**

glance()

augment()

broom: **tidy models**

tidy()

glance() = **model fit**

augment()

broom: **tidy models**

tidy()

glance()

augment() = **model predictions**

broom: **tidy models**

tidy()

glance()

augment()

NOT a core member of the tidyverse. Need to load with library(broom)

Modeling in R

```
library(broom)
lm(price ~ carat, data = diamonds) %>%
  tidy()
```

Modeling in R

```
library(broom)
lm(price ~ carat, data = diamonds) %>%
  tidy()
```

```
## # A tibble: 2 × 5
##   term        estimate std.error statistic
##   <chr>          <dbl>     <dbl>     <dbl>
## 1 (Intercept)   -2256.      13.1     -173.
## 2 carat          7756.      14.1      551.
##   p.value
##     <dbl>
## 1       0
## 2       0
```

Modeling in R

```
lm(price ~ carat, data = diamonds) %>%
  glance()
```

Modeling in R

```
lm(price ~ carat, data = diamonds) %>%
  glance()
```

```
## # A tibble: 1 × 12
##   r.squared adj.r…¹ sigma stati…² p.value    df
##       <dbl>   <dbl> <dbl>   <dbl>   <dbl> <dbl>
## 1     0.849   0.849 1549. 304051.       0     1
##     logLik     AIC    BIC devia…³ df.re…⁴  nobs
##      <dbl>   <dbl>  <dbl>   <dbl>   <int> <int>
## 1 -472730. 945467. 9.45e5 1.29e11   53938 53940
## # … with abbreviated variable names ¹adj.r.squared,
## #   ²statistic, ³deviance, ⁴df.residual
```

Modeling in R

```
lm(price ~ carat, data = diamonds) %>%
  augment()
```

Modeling in R

```
lm(price ~ carat, data = diamonds) %>%
  augment()
```

```
## # A tibble: 53,940 × 8
##    price carat .fitted .resid      .hat .sigma
##    <int> <dbl>   <dbl>  <dbl>     <dbl>  <dbl>
##  1   326  0.23 -472.     798. 0.0000452  1549.
##  2   326  0.21 -628.     954. 0.0000471  1549.
##  3   327  0.23 -472.     799. 0.0000452  1549.
##  4   334  0.29   -7.00   341. 0.0000398  1549.
##  5   335  0.31  148.     187. 0.0000382  1549.
##  6   336  0.24 -395.     731. 0.0000442  1549.
##  7   336  0.24 -395.     731. 0.0000442  1549.
##  8   337  0.26 -240.     577. 0.0000424  1549.
##  9   337  0.22 -550.     887. 0.0000461  1549.
## 10   338  0.23 -472.     810. 0.0000452  1549.
##        .cooksd .std.resid
##          <dbl>      <dbl>
##  1 0.00000600       0.516
##  2 0.00000892       0.616
```

Try it yourself

Work your way through the exercises. If anything in particular is giving you trouble, we'll work through it together.

Resources

R for Data Science: A comprehensive but friendly introduction to the tidyverse. Free online.

UCLA IDRE: Useful resources on modeling in R and other languages