R version 4.0.2 (2020-06-22) -- "Taking Off Again"

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Platform: x86\_64-w64-mingw32/x64 (64-bit)

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> # Assignment: WEEK 7 - EXERCISE 11

> # Name: Jena, Binay

> # Date: 2020-10-17

>

> ## Set the working directory to the root of your DSC 520 directory

> setwd("C:/Users/binay/Documents/GitHub/dsc520/")

>

> ## Load the `data/r4ds/heights.csv` to

> heights\_df <- read.csv("data/r4ds/heights.csv")

>

> # Fit a linear model

> earn\_lm <- lm(earn ~ ed + race + height + age + sex, data=heights\_df)

>

> # view model summary

> summary(earn\_lm)

Call:

lm(formula = earn ~ ed + race + height + age + sex, data = heights\_df)

Residuals:

Min 1Q Median 3Q Max

-39423 -9827 -2208 6157 158723

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -41478.4 12409.4 -3.342 0.000856 \*\*\*

ed 2768.4 209.9 13.190 < 2e-16 \*\*\*

racehispanic -1414.3 2685.2 -0.527 0.598507

raceother 371.0 3837.0 0.097 0.922983

racewhite 2432.5 1723.9 1.411 0.158489

height 202.5 185.6 1.091 0.275420

age 178.3 32.2 5.537 3.78e-08 \*\*\*

sexmale 10325.6 1424.5 7.249 7.57e-13 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 17250 on 1184 degrees of freedom

Multiple R-squared: 0.2199, Adjusted R-squared: 0.2153

F-statistic: 47.68 on 7 and 1184 DF, p-value: < 2.2e-16

>

> predicted\_df <- data.frame(

+ earn = predict(earn\_lm, heights\_df),

+ ed=heights\_df$ed, race=heights\_df$race,

+ height=heights\_df$height,

+ age=heights\_df$age, sex=heights\_df$sex

+ )

>

> ## Compute deviation (i.e. residuals)

> mean\_earn <- mean(heights\_df$earn)

> mean\_earn

[1] 23154.77

> ## Corrected Sum of Squares Total

> sst <- sum((mean\_earn - heights\_df$earn)^2)

> sst

[1] 451591883937

> ## Corrected Sum of Squares for Model

> ssm <- sum((mean\_earn - predicted\_df$earn)^2)

> ssm

[1] 99302918657

> ## Residuals

> residuals <- heights\_df$earn - predicted\_df$earn

> residuals

[1] 11333.890941 31140.911188 6698.099079 17810.164851

[5] 23192.609973 -11154.599443 13604.930235 -9263.321847

[9] -25288.836877 3238.413948 -34707.558926 8431.415457

[13] -10992.711766 -4515.869768 -2783.485318 -11560.980665

[17] 21278.601782 14792.164289 -7544.315052 27127.790515

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[961] -19113.594511 -12077.860738 -8454.682569 -10092.946296

[965] -14393.113111 -27844.193463 -6878.039480 -8682.948916

[969] -19261.677398 -10541.480469 250.025650 -799.798297

[973] -21770.041875 25641.423897 -2525.770185 -13248.429962

[977] -10544.958451 1423.253063 -15124.964139 -8275.057247

[981] -2202.414986 -9111.805064 -3745.760103 -14166.141448

[985] -21858.959274 4671.197553 -8150.748695 30393.979577

[989] 2045.918123 -6354.693501 -30810.329845 15410.782012

[993] -10789.511531 -5554.775891 13816.851878 21583.950499

[997] 2670.886278 -15855.293195 -920.921637 -13503.184687

[ reached getOption("max.print") -- omitted 192 entries ]

> ## Sum of Squares for Error

> sse <- sum(residuals^2)

> sse

[1] 3.52289e+11

> ## R Squared

> r\_squared <- ssm/sst

> r\_squared

[1] 0.2198953

>

> ## Number of observations

> n <- nrow(predicted\_df)

> n

[1] 1192

> ## Number of regression paramaters

> p <- 8

> ## Corrected Degrees of Freedom for Model

> dfm <- p-1

> dfm

[1] 7

> ## Degrees of Freedom for Error

> dfe <- n-p

> dfe

[1] 1184

> ## Corrected Degrees of Freedom Total: DFT = n - 1

> dft <- n-1

> dft

[1] 1191

> ## Mean of Squares for Model: MSM = SSM / DFM

> msm <- ssm/dfm

> msm

[1] 14186131237

> ## Mean of Squares for Error: MSE = SSE / DFE

> mse <- sse/dfe

> mse

[1] 297541356

> ## Mean of Squares Total: MST = SST / DFT

> mst <- sst/dft

> mst

[1] 379170348

> ## F Statistic

> f\_score <- msm/mse

> f\_score

[1] 47.67785

>

> ## Adjusted R Squared R2 = 1 - (1 - R2)(n - 1) / (n - p)

> adjusted\_r\_squared <- 1 - ((1-r\_squared)\*(n-1)/(n-p))

> adjusted\_r\_squared

[1] 0.2152832