Chapter 6 Workshop

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Dataset `Prestige`

We will continue to use dataset `Prestige` from the `car` R package.

Exercise 6.1

Fit a resistant line of `prestige` against `education`. Show the fitted line on a scatterplot of `prestige ~ education`. Obtain the plot of the residuals against fitted values.

```
library(tidyverse)
library(car)

x <- Prestige$education
y <- Prestige$prestige
```

Median-median line Tukey line()

```
line(x,y)
```

Plotting Tukey line & residuals

```
Tline <- line(x,y)

PrestigeT <- Prestige |>
  mutate(Tline.residuals=residuals(Tline),
         Tline.fits=fitted(Tline)
         )

p1 <- PrestigeT |>
  ggplot() +
  aes(x=education, y=prestige) +
  geom_point() +
  geom_path(aes(x=education, y=Tline.fits))

p2 <- PrestigeT |>
  ggplot() +
  aes(y=Tline.residuals, x=Tline.fits) +
  geom_point() +
  geom_hline(yintercept = 0)

library(patchwork)

p1+p2
```

```
# Old style plotting
x <- Prestige$education
y <- Prestige$prestige

plot(y ~ x)
title(main = "Scatterplot prestige ~ education")
z = line(x,y)  # slightly different Rline
abline(coef(z), lty=2, col= "blue")
legend("topleft", legend ="Resistant (Tukey) line",
       lty=2, col = "blue")
```

```
plot(residuals(z) ~ fitted(z))
```

The robust regression (which is similar to the robust line) function in the `MASS` package along with the `visreg` package is done with the following codes:

```
library(visreg)
library(car)
library(MASS)

fit1 <- rlm(prestige ~ education, data = Prestige)
visreg(fit1)
```

Exercise 6.2

Fit a simple regression line of `prestige` against `education`. Show the fitted regression line on a scatterplot of `prestige ~ education`. Obtain the plot of the residuals against fitted values.

```
x <- Prestige$education
y <- Prestige$prestige

simplereg <- lm(y~x) # Fits the simple regression

summary(simplereg)

anova(simplereg)
```

```
PrestigeReg <- Prestige |>
  mutate(Residuals=residuals(simplereg),
         Fits=fitted(simplereg))

PrestigeReg |>
  ggplot() +
  aes(x=education, y=prestige) +
  geom_point() +
  geom_line(aes(x=education, y=Fits))
```

```
PrestigeReg |>
  ggplot() +
  aes(y=Residuals, x=Fits) +
  geom_point() +
  geom_hline(yintercept = 0)
```

```
# Old style plotting
plot(y ~ x)
abline(simplereg, lty=1, col = "blue")
abline(h=mean(y), lty=2)
```

```
abline(v=mean(x), lty=2)
legend("topleft", legend =c("Regression line"),
       lty=1, col = "blue")
```

```
Fitted = fitted.values(simplereg)
Residuals = residuals(simplereg)
plot(Fitted, Residuals, xlab = "Fitted Values")
abline(h = 0)
title("Residuals Vs Fitted Values")
```

Using the `visreg` package.

```
fit1<- lm(prestige ~ education, data = Prestige)
visreg(fit1)
```

Note:

- More R code examples are here