Linear Regression in R workshop

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```
library("car")
library("caret")
library("gvlma")
library("predictmeans")
library("e1071")
library("lmtest")

#Predict happiness

## Testing Assumptions

### Test for Linearity

scatter.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Economy..GDP.per.Capita.)

scatter.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Family)

scatter.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Health..Life.Expectancy.)

scatter.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Freedom)

scatter.smooth(x=WorldHappiness$Happiness.Score,
y=WorldHappiness$Trust..Government.Corruption.)

scatter.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Generosity)

scatter.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Dystopia.Residual)

# The only ones that are linear are economy, dystopia, and generosity. Use those

### Homoscedasticity

lmMod <- lm(Happiness.Score~Economy..GDP.per.Capita. + Generosity, data=WorldHappiness)

par(mfrow=c(2,2))
plot(lmMod)

#### Shows apporximately straight across for 2/3, but the other one isn't - you may have an outlier issue
- but you'll get to that later

lmtest::bptest(lmMod)

#### You want it to be nonsignificant, and it is, so you're good to go!

### Homogeneity of Variance
```

Good on that too per the plot, try the assumption library

gvlma(lmMod)

All assumptions acceptable. Wahoo!

Screening for Outliers

CookD(lmMod, group=NULL, plot=TRUE, idn=3, newwd=TRUE)

Outliers on row 129, 143, and 156

lev = hat(model.matrix(lmMod))
plot(lev)

car::outlierTest(lmMod)

We have at least one outlier, the one that is 3 standard deviations away plus is row 156 (already showed on the other graph)

summary(influence.measures(lmMod))

Lots are outliers, but none in x and y space

Run the Model

summary(lmMod)

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