

HW8_Jayapats

Swetha Jayapathy

12/2/2020

```
library(Sleuth3)
library(ggplot2)
```

```
head(ex0728)
```

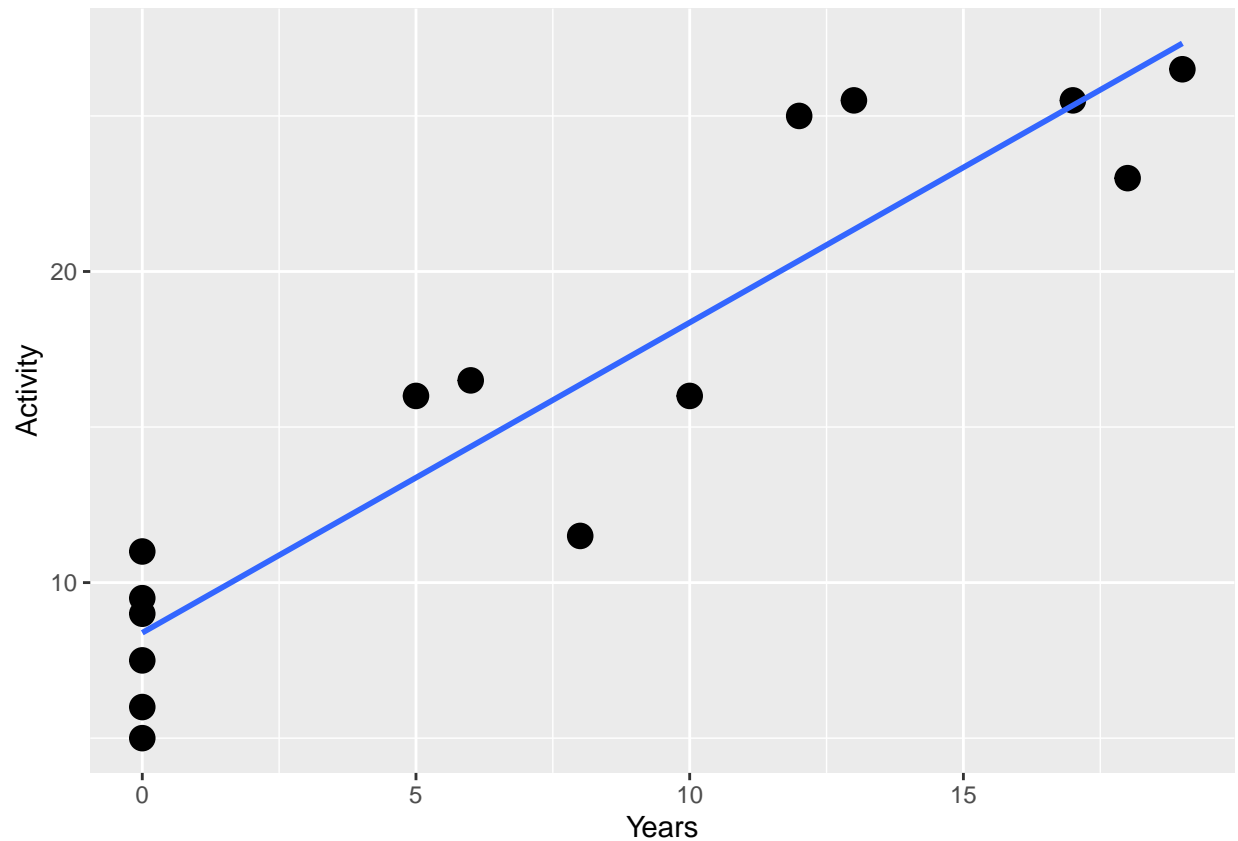
```
##   Years Activity
## 1     0      5.0
## 2     0      6.0
## 3     0      7.5
## 4     0      9.0
## 5     0      9.5
## 6     0     11.0
```

Question 1 Produce a scatterplot of Activity vs. Years with fitted regression line. Include R code and the plot. Does the linearity assumption appear to be met?

Yes, from the below plot we can say that the linearity assumption is met.

```
ggplot(ex0728, aes(x=Years, y=Activity))+
  geom_point(size=I(4))+
  geom_smooth(method = lm, se=FALSE)
```

```
## 'geom_smooth()' using formula 'y ~ x'
```



Question 2

```
ex0728_lm <- lm(Activity~Years, data=ex0728)
summary(ex0728_lm)
```

```
ex0728_lm$coefficients
```

Estimated Regression equation: $\mu\{X_i|Y_i\} = 8.3873 + 0.9971(X_i)$

(1.1149) (0.1110)

X_i = Years,

Y_i = Activity

Question 3

```
confint(ex0728_lm)
```

Confidence Interval for Intercept =5.9786877 to 10.79582

Confidence Interval for Slope parameters = 0.7572415 to 1.23704

Question 4

Statistical Conclusion: We estimate the population mean neuronal activity index after 0 years of playing string instrument is 5.9786877 to 10.79582 units (95% CI, SLR).

Question 5

```
predict(ex0728_lm, data.frame(Years= 15), se.fit = TRUE,interval = "confidence")
```

```
## $fit
##      fit      lwr      upr
## 1 23.34436 20.83057 25.85816
##
## $se.fit
## [1] 1.163595
##
## $df
## [1] 13
##
## $residual.scale
## [1] 3.00931
```

Statistical Conclusion: We estimate the population mean neuronal activity index after 15 years of playing a string instrument is 20.83057 to 25.85816 units (95% CI, SLR).

Question 6

```
predict(ex0728_lm, data.frame(Years= 15), se.fit = TRUE,interval = "prediction")
```

```
## $fit
##      fit      lwr      upr
## 1 23.34436 16.37407 30.31466
##
## $se.fit
## [1] 1.163595
##
## $df
## [1] 13
##
## $residual.scale
## [1] 3.00931
```

Statistical Conclusion: It is predicted that the neuronal index after 15 years of playing a string instrument is 16.37407 to 30.31466 units (95% PI, SLR).