Linear Regression

FMU Biology Department

Analysis

This documents includes code for creating a data object in R, creating an informative plot, and running a linear regression. A description of the data can be found in the "Correlation" tutorial.

```
#Create data frame
dat3 = data.frame(sodium = c(95,104,88,97,102,89,104,105,111,88,
                             98,102,96,105,107,105,96,90,110,98),
                  elec = c(190,200,192,202,196,195,200,202,206,180,
                           205,199,193,205,208,210,204,197,206,200))
#Print data frame
dat3
```

```
##    sodium elec
## 1      95  190
## 2     104  200
## 3      88  192
## 4      97  202
## 5     102  196
## 6      89  195
## 7     104  200
## 8     105  202
## 9     111  206
## 10     88  180
## 11     98  205
## 12    102  199
## 13     96  193
## 14    105  205
## 15    107  208
## 16    105  210
## 17     96  204
## 18     90  197
## 19    110  206
## 20     98  200
```

```
#Summary statistics
#Average and standard deviation of sodium
mean(dat3$sodium)
```

```
## [1] 99.5
```

```r
sd(dat3$sodium)
```

```
## [1] 7.119284
```

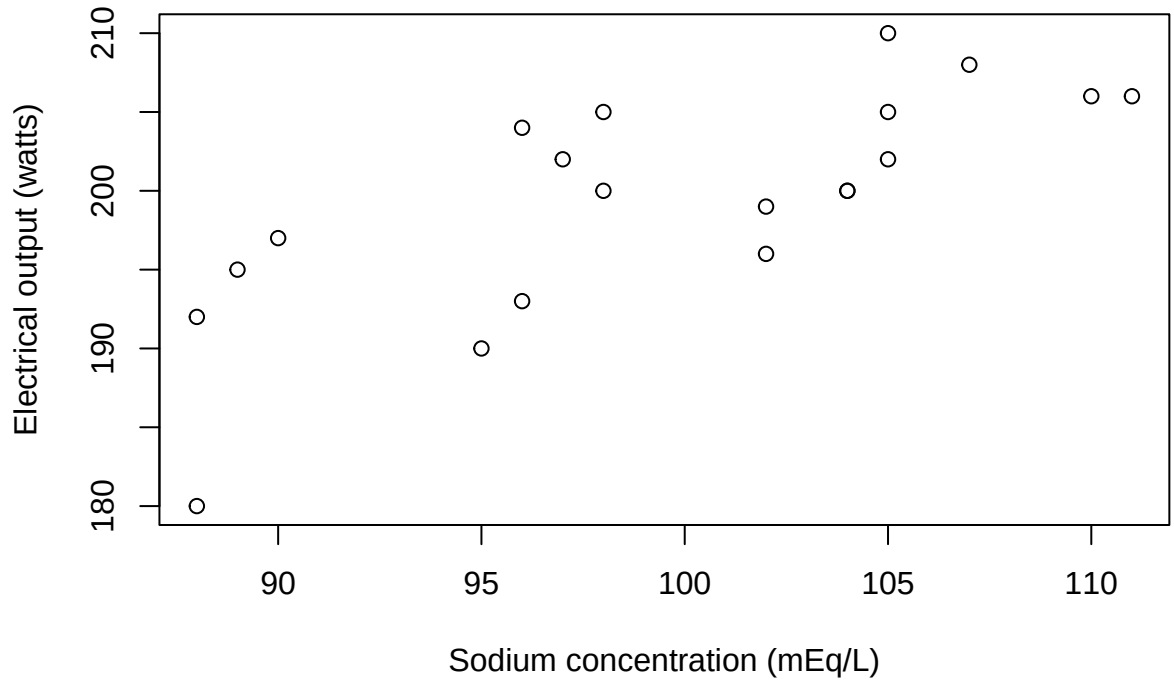
```r
#Average and standard deviation of elec
mean(dat3$elec)
```

```
## [1] 199.5
```

```r
sd(dat3$elec)
```

```
## [1] 7.141428
```

```r
#Create scatterplot
plot(dat3$elec~dat3$sodium,
        ylab = "Electrical output (watts)", xlab = "Sodium concentration (mEq/L)")
```




```r
#Perform a linear regression analysis
mod1=lm(dat3$elec ~ dat3$sodium)

summary(mod1)
```

```
##
## Call:
## lm(formula = dat3$elec ~ dat3$sodium)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -10.9138  -2.8598  -0.1267   3.5963   7.1132
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 125.2108    15.7492   7.950 2.68e-07 ***
## dat3$sodium   0.7466     0.1579   4.728 0.000168 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 4.9 on 18 degrees of freedom
## Multiple R-squared:  0.554,  Adjusted R-squared:  0.5292
## F-statistic: 22.36 on 1 and 18 DF,  p-value: 0.0001677
```

Full code block

```
#Create data frame
dat3 = data.frame(sodium = c(95,104,88,97,102,89,104,105,111,88,
                             98,102,96,105,107,105,96,90,110,98),
                  elec = c(190,200,192,202,196,195,200,202,206,180,
                           205,199,193,205,208,210,204,197,206,200))
#Print data frame
dat3

#Summary statistics
#Average and standard deviation of sodium
mean(dat3$sodium)
sd(dat3$sodium)

#Average and standard deviation of elec
mean(dat3$elec)
sd(dat3$elec)

#Create scatterplot
plot(dat3$elec~dat3$sodium,
        ylab = "Electrical output (watts)", xlab = "Sodium concentration (mEq/L)")

#Perform a linear regression analysis
mod1=lm(dat3$elec ~ dat3$sodium)

summary(mod1)
```