Basic Data Exploration using Iris

2024-01-19

```
data(iris)
dim(iris) #you can view the dimensions, which are also shown in the top-right pane
```

```
## [1] 150   5
```

```
summary(iris) #provides a brief summary of each variable
```

```
##   Sepal.Length    Sepal.Width     Petal.Length    Petal.Width
##  Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100
##  1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300
##  Median :5.800   Median :3.000   Median :4.350   Median :1.300
##  Mean   :5.843   Mean   :3.057   Mean   :3.758   Mean   :1.199
##  3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
##  Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
##        Species
##  setosa    :50
##  versicolor:50
##  virginica :50
##
##
##
```

```
names(iris) #this allows you to view the column names easily
```

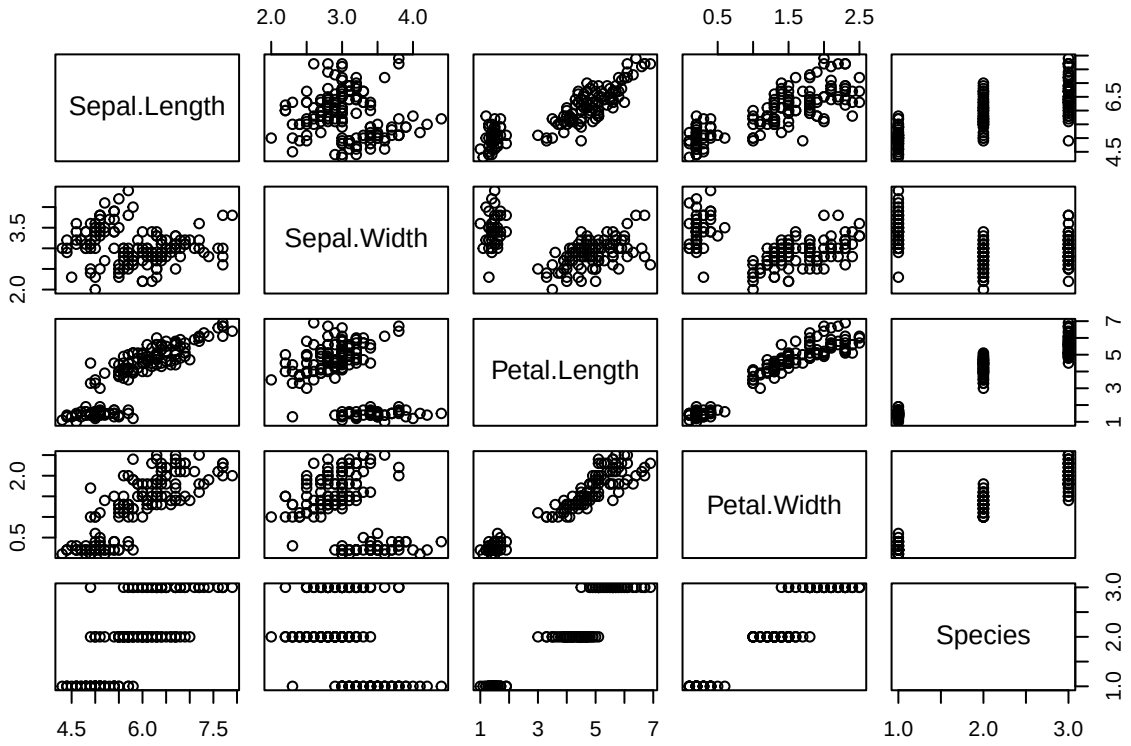
```
## [1] "Sepal.Length" "Sepal.Width"  "Petal.Length" "Petal.Width"  "Species"
```

```
str(iris) #this provides a quicker alternative to looking at the data
```

```
## 'data.frame':    150 obs. of  5 variables:
##  $ Sepal.Length: num  5.1 4.9 4.7 4.6 5 5.4 4.6 5 4.4 4.9 ...
##  $ Sepal.Width : num  3.5 3 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 ...
##  $ Petal.Length: num  1.4 1.4 1.3 1.5 1.4 1.7 1.4 1.5 1.4 1.5 ...
##  $ Petal.Width : num  0.2 0.2 0.2 0.2 0.2 0.4 0.3 0.2 0.2 0.1 ...
##  $ Species     : Factor w/ 3 levels "setosa","versicolor",..: 1 1 1 1 1 1 1 1 1 1 ...
```

Let's try plotting

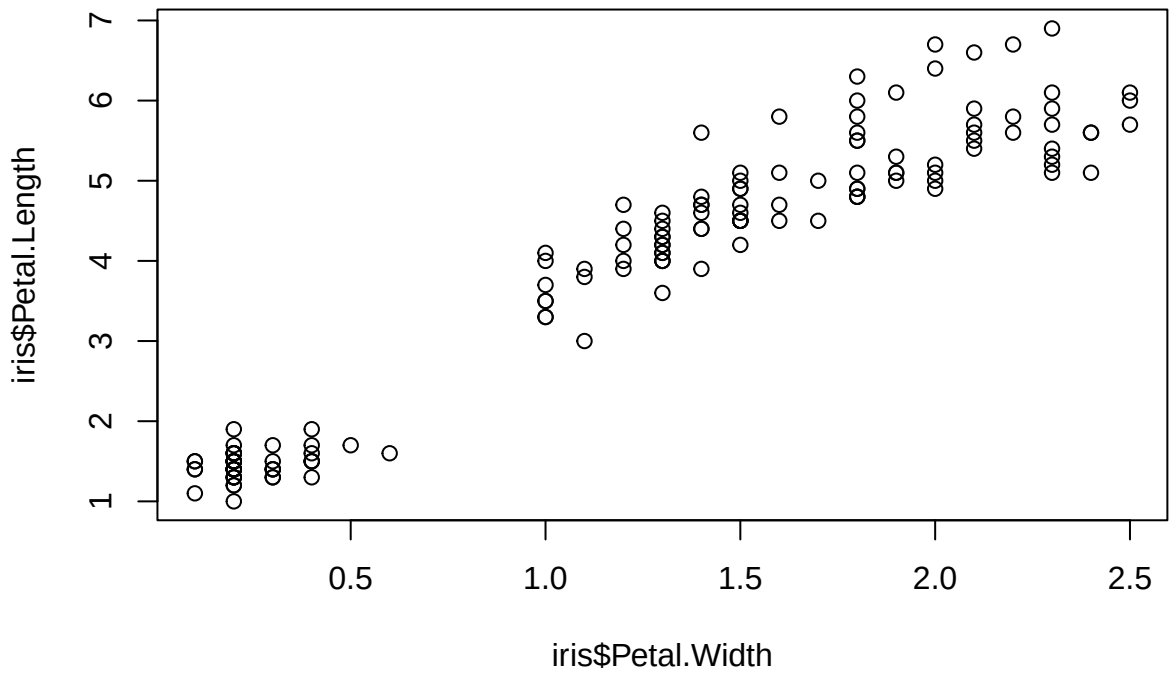
```
plot(iris)
```



Not very useful! It's important that we get more specific when we tell R to plot something. R is a wonderful tool to master, but it doesn't come with the intuitive training wheels that some other programs have. If we just say "plot this dataset", it's not going to give us some hodge podge of nice plots for each reasonable relationship in the dataset. We have to tell it exactly what we want it to do.

Now, I don't know much about flowers, but I would assume that petal length and width are correlated.

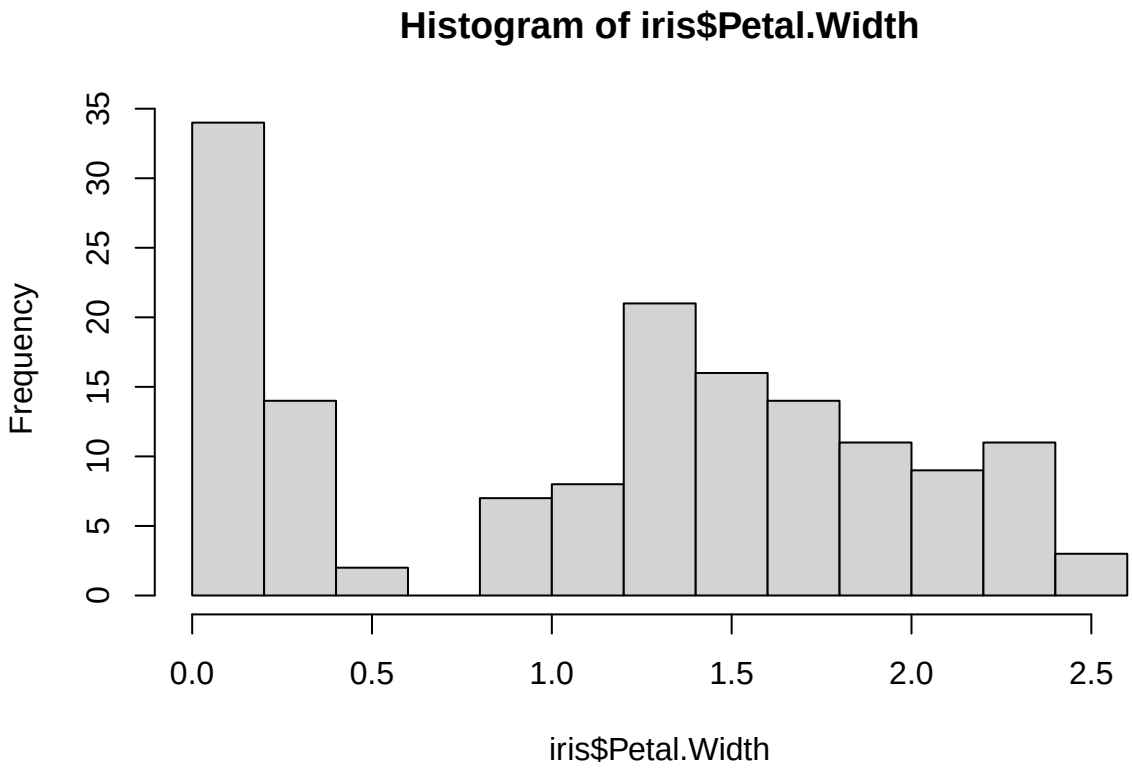
```
plot(iris$Petal.Width, iris$Petal.Length)
```



We can clearly see a positive correlation between the two.

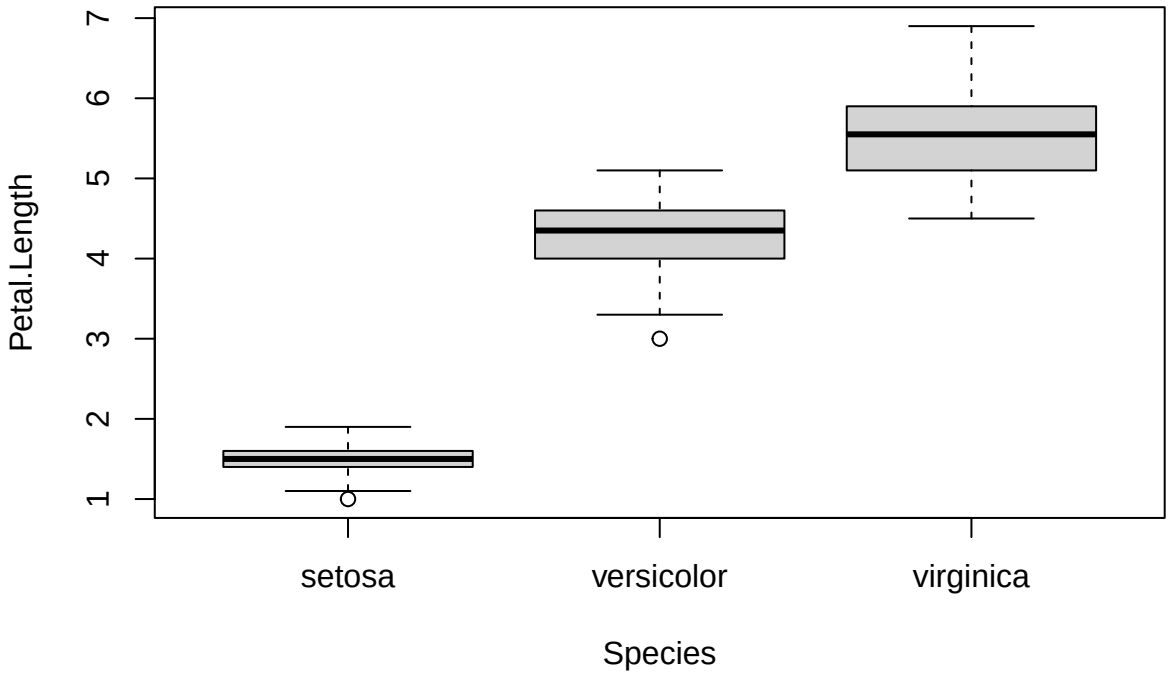
Let's see how our variables are distributed. You may note that when you knit a chunk to create multiple figures, it will print them out individually with each line above the exact figure it creates.

```
hist(iris$Petal.Width)
```

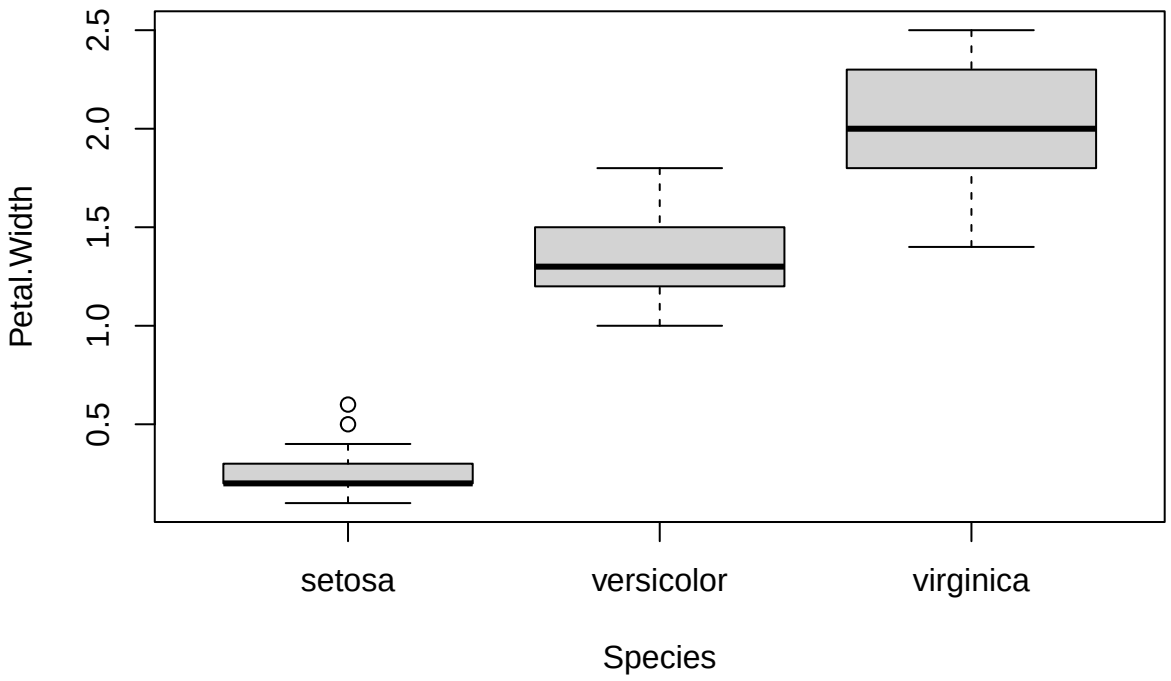


The species of Iris are categories, to compare categorical variables to something numeric, we use boxplot. We will tell boxplot to show us petal and sepal length and width as a function of the species.

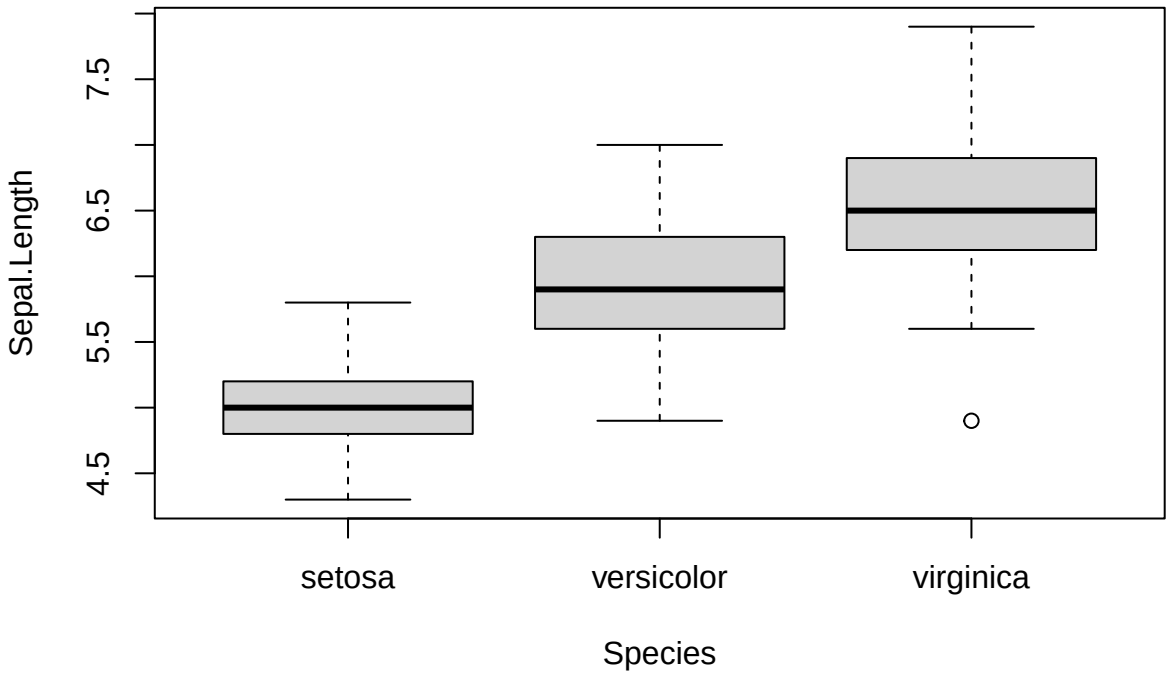
```
boxplot(Petal.Length ~ Species, data=iris)
```



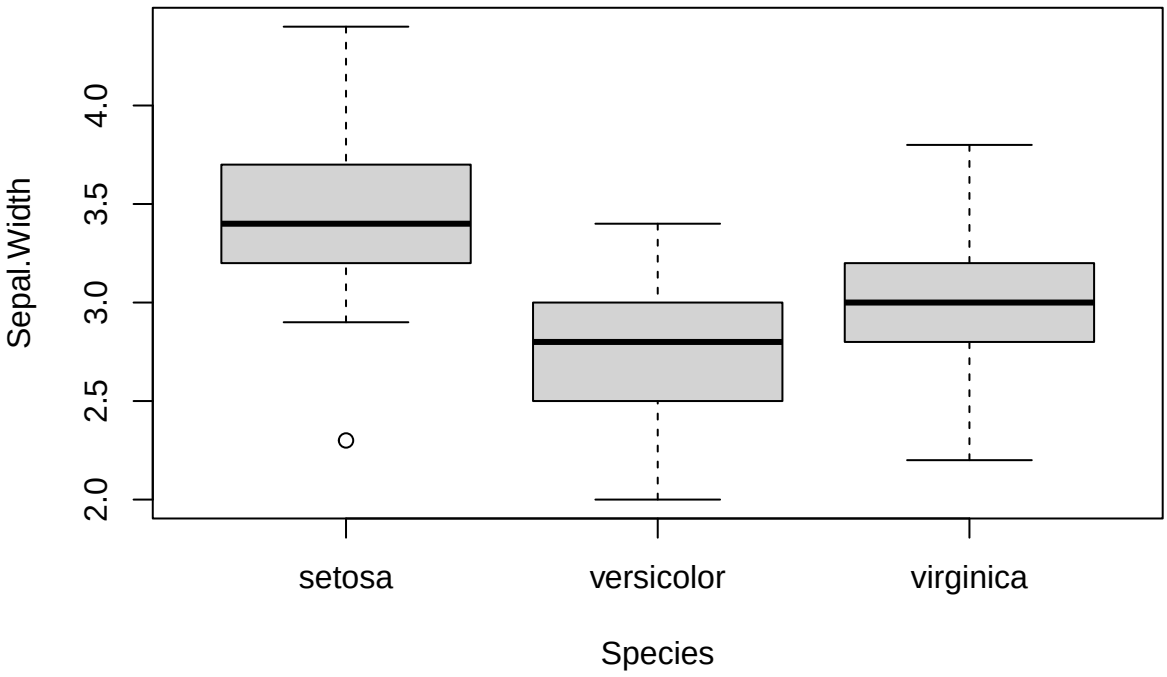
```
boxplot(Petal.Width ~ Species, data=iris)
```




```
boxplot(Sepal.Length ~ Species, data=iris)
```

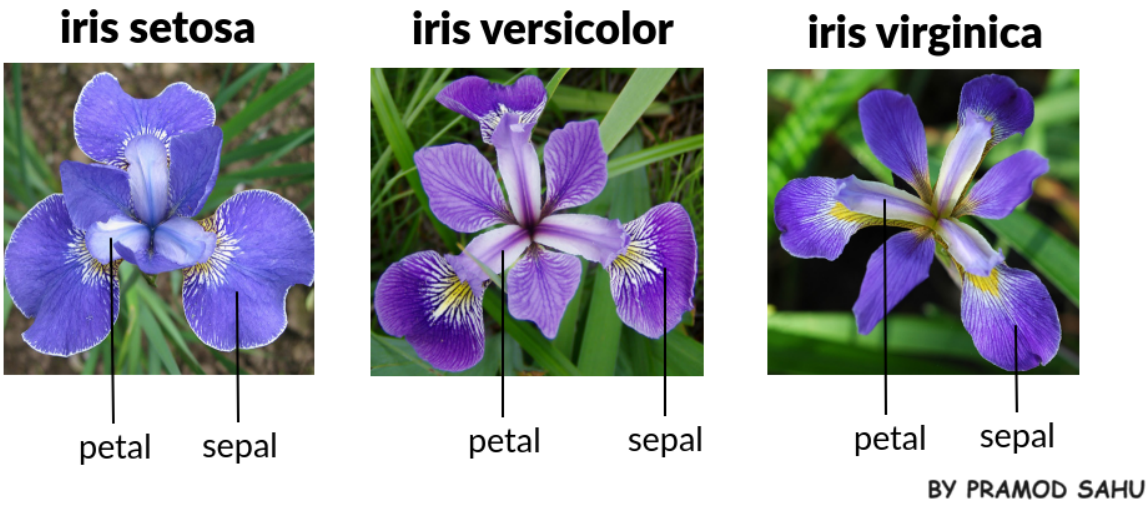



```
boxplot(Sepal.Width ~ Species, data=iris)
```



Our data analyses must be informed by the actual context of the "data generating process".

Our data tells us about the various dimensions of various types of irises, but how is that data generated? It's generated by a process of people actually measuring real irises. Let's see what an iris looks like.



Is our data analysis congruent with what we see here? What are some observations we can make about irises from the picture? Do these align with what we found?

Exercise.

In the empty chunk below, I want you all to come up with **four unique lines of code** that involve checking conditions or logic or whatever you want regarding the irises. One example is something like `iris$Sepal.Width > iris$Petal.Width"`. What do we expect to get from this command and why? Make sure the dimensions of the irises align with what you expect from the pictures (they generally should).

```
#fill this in with stuff
table(iris$Sepal.Width[iris$Species=="setosa"] > iris$Sepal.Width[iris$Species=="virginica"])
```

```
##
## FALSE  TRUE
##     8    42
```

```
table(iris$Petal.Length > iris$Sepal.Length)
```

```
##
## FALSE
##   150
```