REPRODUCIBLE RESEARCH

R MARKDOWN + KNITR

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VISUAL ANALYTICS

based on slides by Roger Peng
(Reproducible Research MOOC)

MARKDOWN

"Markdown is a text-to-HTML conversion tool for web writers. Markdown allows you to write using an easy-to-read, easy-to-write plain text format, then convert it to structurally valid XHTML (or HTML).“

John Gruber, creator of Markdown

EXAMPLE

```
*This text will appear italicized!*
```

This text will appear italicized!

EXAMPLE

```
**This text will appear bold!**
```

This text will appear bold!

EXAMPLE

```
## This is a secondary heading
### This is a tertiary heading
```

This is a secondary heading

This is a tertiary heading

RESOURCES

- http://daringfireball.net/projects/markdown

R MARKDOWN

- R markdown files can be used to generate reproducible reports
- Text and R code are integrated
- Very easy to create in Rstudio

→ no need to generate Readme files

R MARKDOWN

- R markdown is the integration of R code with markdown
- Allows one to create documents containing "live" R code
- R code is evaluated as part of the processing of the markdown
- Results from R code are inserted into markdown document
- A core tool in **literate statistical programming**

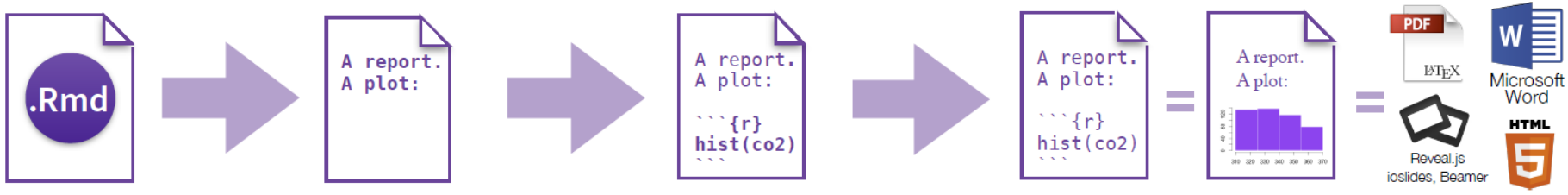
WORKFLOW

i. Open - Open a file that uses the .Rmd extension.

ii. Write - Write content with the easy to use R Markdown syntax

iii. Embed - Embed R code that creates output to include in the report

iv. Render - Replace R code with its output and transform the report into a slideshow, pdf, html or ms Word file.



OPEN FILE

- In Rstudio
  - File -> New File -> R Markdown…
  - Give it a title, leave defaults, click OK

RStudio

File Edit Code View Plots Session Build Debug Tools Help

Go to file/function

Source Viewer | PA1_template.Rmd | logfileReader.R | ExtendingData.R | Code.R | DinoFunWorldExample.Rmd

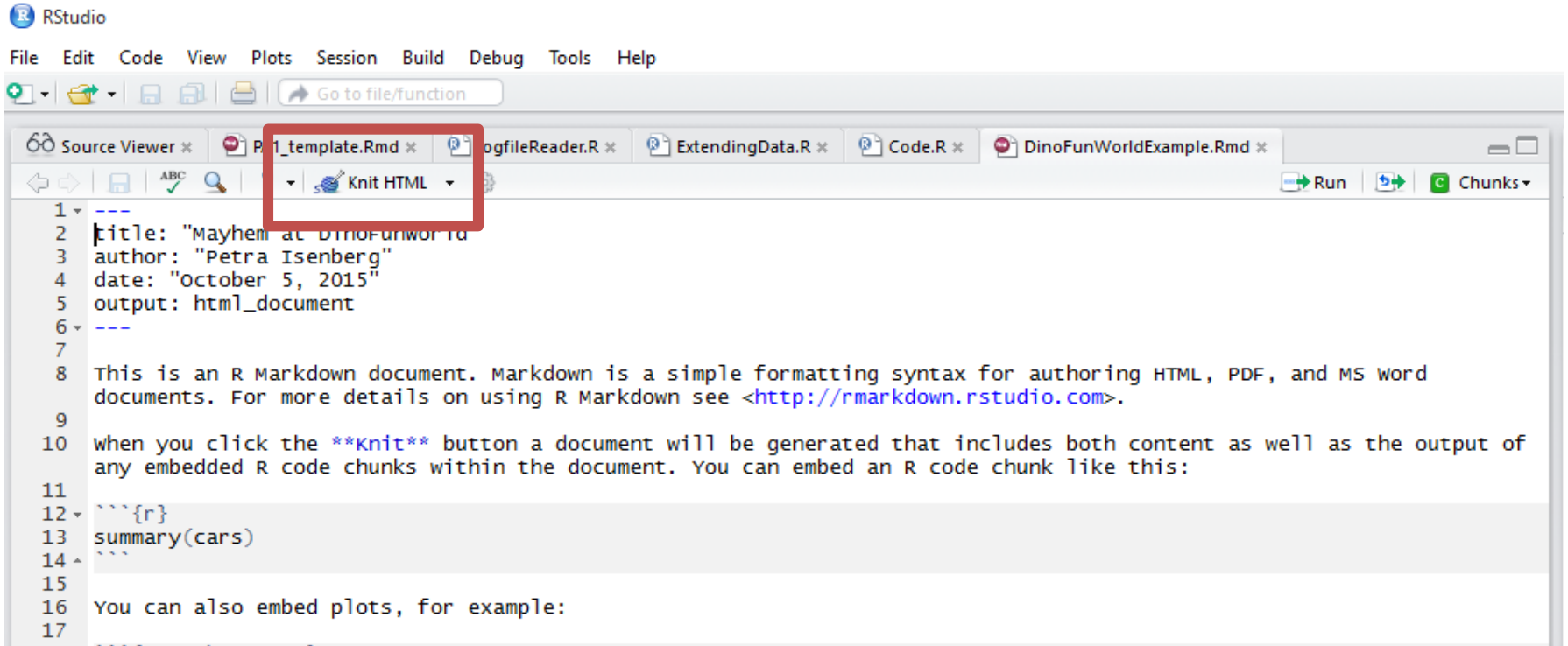
Knit HTML | Run | Chunks

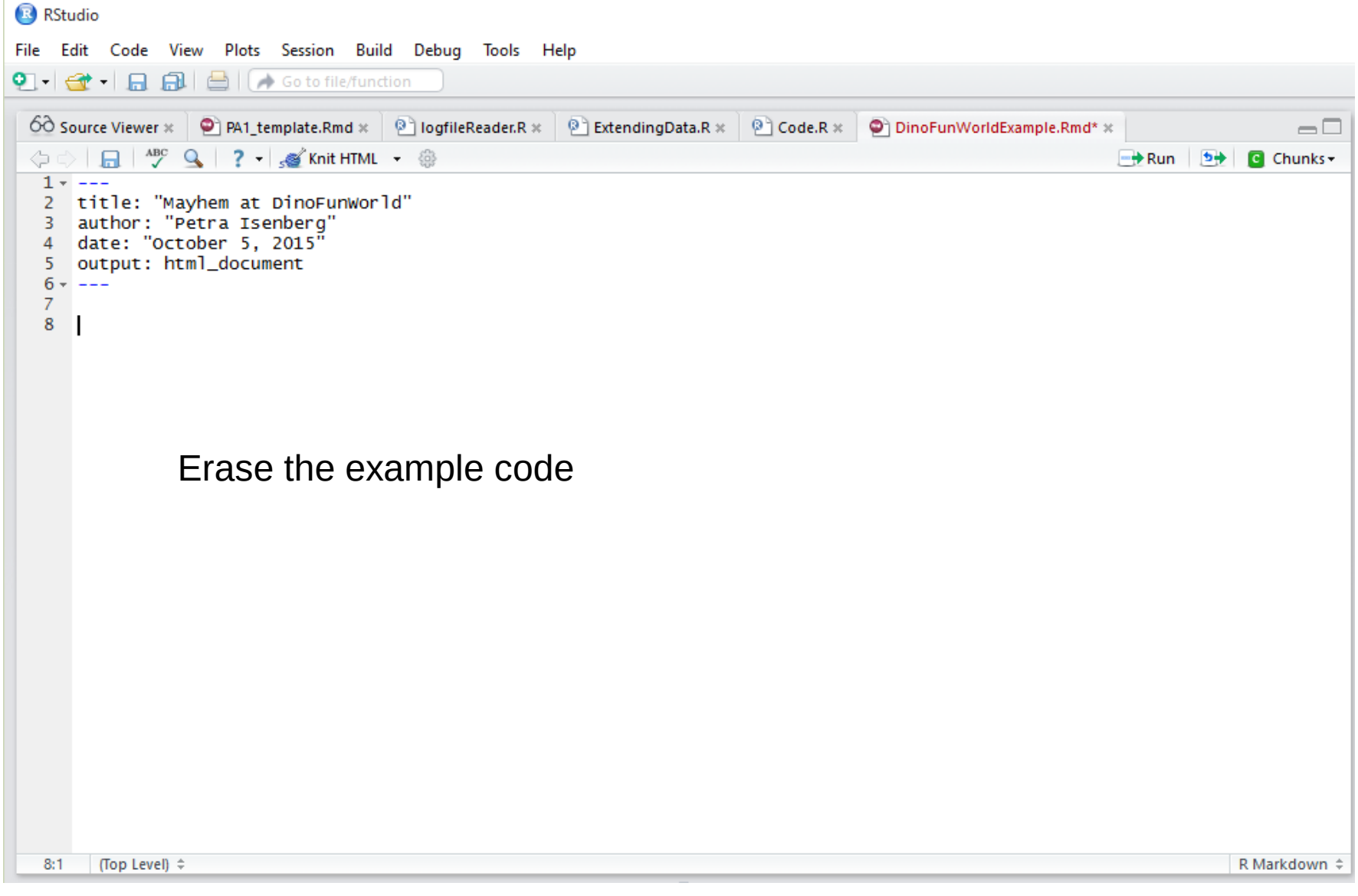
```
1  ---
2  title: "Mayhem at DinoFunWorld"
3  author: "Petra Isenberg"
4  date: "October 5, 2015"
5  output: html_document
6  ---
7
8  This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word
   documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.
9
10 When you click the **Knit** button a document will be generated that includes both content as well as the output of
   any embedded R code chunks within the document. You can embed an R code chunk like this:
11
12 ```{r}
13 summary(cars)
14 ```
15
16 You can also embed plots, for example:
17
18 ```{r, echo=FALSE}
19 plot(cars)
20 ```
21
22 Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated
   the plot.
23
```

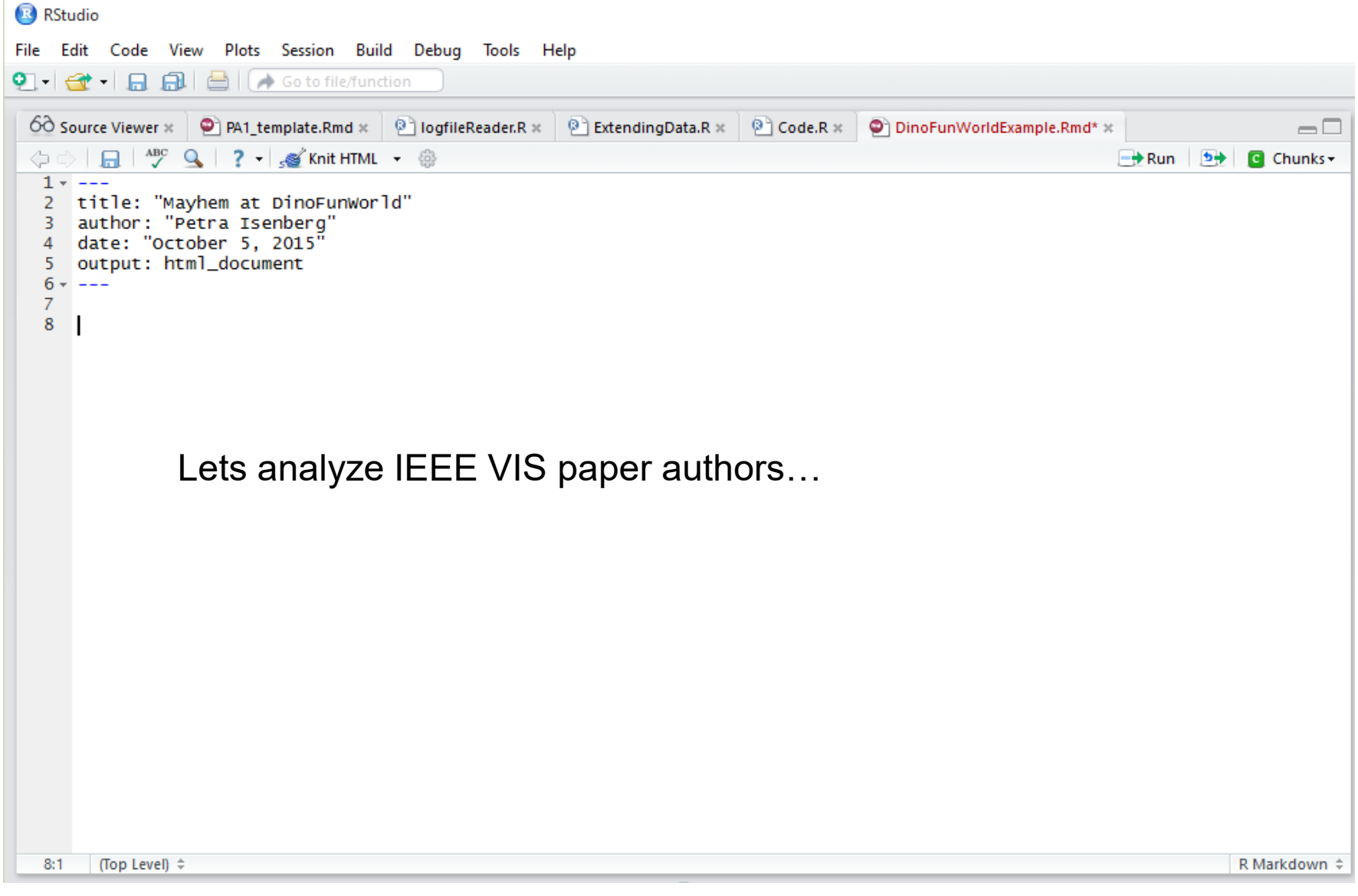
2:1 (Top Level) R Markdown

NEXT

- Click on the Knit HTML Button




RStudio
File Edit Code View Plots Session Build Debug Tools Help
Go to file/function
Source Viewer
PA1_template.Rmd
logfileReader.R
ExtendingData.R
Code.R
DinoFunWorldExample.Rmd*
Knit HTML
Run
Chunks
1 ---
2 title: "Mayhem at DinoFunWorld"
3 author: "Petra Isenberg"
4 date: "October 5, 2015"
5 output: html_document
6 ---
7
8
Erase the example code
8:1
(Top Level)
R Markdown


RStudio
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DinoFunWorldExample.Rmd*
Knit HTML
Run
Chunks
1 ---
2 title: "Mayhem at DinoFunWorld"
3 author: "Petra Isenberg"
4 date: "October 5, 2015"
5 output: html_document
6 ---
7
8
Lets analyze IEEE VIS paper authors…
8:1
(Top Level)
R Markdown

EXPLORATORY DATA ANALYSIS

```
#Exploratory Data Analysis with RMarkdown

##Loading the Data

```{r}
data <- read.csv("Paper-Author.csv")
```
```

D:/Google Drive/Teaching/VisualAnalytics Class/2016/Assignments/4_Tutorial-RMarkdown/Tutorial4-RMarkdown.html

Tutorial4-RMarkdown.html | Open in Browser | Find | Publish

Exploratory Analysis Tutorial 4

Petra Isenberg

September 28, 2016

Exploratory Data Analysis with RMarkdown

Loading the Data

```
data <- read.csv("Paper-Author.csv")
```

```
##Inspecting the Data with R

###The first few lines of the dataset

```{r}
head(data)
```


###A summary of the dataset
```{r}
str(data)
```
```

Loading the Data

```
data <- read.csv("Paper-Author.csv")
```

Inspecting the Data with R

The first few lines of the dataset

```
head(data)
```

```
##                   Paper.DOI Deduped.author.names
## 1 10.1109/TVCG.2015.2467324    Rubio-Sanchez, M.
## 2 10.1109/TVCG.2015.2467324              Raya, L.
## 3 10.1109/TVCG.2015.2467324              Diaz, F.
## 4 10.1109/TVCG.2015.2467324           Sanchez, A.
## 5 10.1109/TVCG.2015.2467471            Setlur, V.
## 6 10.1109/TVCG.2015.2467471           Stone, M.C
```

ARE THE FIELDS CORRECT?

WHAT ABOUT THE VALUES?

WHAT ABOUT THE DATA TYPES?

A summary of the dataset

```
str(data)
```

```
## 'data.frame':    9667 obs. of  2 variables:
##  $ Paper.DOI           : Factor w/ 2752 levels "10.0000/00000001",..: 1166 1166 1166 1166 1182 1182 1220 122
0 1229 1229 ...
##  $ Deduped.author.names: Factor w/ 4890 levels "","Abbasloo, A.",..: 3528 3379 882 3598 3756 4018 1937 1785
3860 115 ...
```

SOME FIRST STEPS TO START WITH

1. Plot the raw data
2. **Plot simple statistics**
3. Look at plots together

```
##Some Simple Statistics

```{r}
summary(data)
```
```

Some Simple Statistics

```
summary(data)
```

```
##                          Paper.DOI        Deduped.author.names
##  10.1109/VAST.2011.6102498  :  17   Groller, E.    :  58
##  10.1109/VISUAL.2005.1532845:  17   Kaufman, A.    :  57
##  10.1109/VISUAL.2002.1183812:  15   Kwan-Liu Ma    :  51
##  10.1109/TVCG.2009.164      :  14   Ertl, T.       :  45
##  10.1109/TVCG.2012.278      :  14   Keim, D.A.     :  44
##  10.1109/TVCG.2014.2346911  :  14   van Wijk, J.J.:  38
##  (Other)                    :9576   (Other)        :9374
```

##Some Simple Statistics

```{r}
summary(data)

countTable <- as.data.frame(table(data$Deduped.author.names))
colnames(countTable) <- c("Author","Freq")



median <- c(median(countTable$Freq))
mean <- c(mean(countTable$Freq))
stdev <- c(sd(countTable$Freq))

measures <- c("mean","stdev","median")
values <- c(mean,stdev,median)

descriptiveStats <-data.frame(measures,values)
descriptiveStats
```

```
###Plotting some simple statistics

The average and standard deviation of average paper counts per author


```{r}


library(ggplot2)


ggplot(descriptiveStats,aes(x=measures,y=values))
+ geom_bar(stat="identity")
```
```

Next, let's look at the distribution

```{r}
qplot(countTable$Freq,
binwidth=1,geom="histogram")

boxplot(countTable$Freq,data=countTable)
```

Now try to find out how many authors are on a paper on average

RESOURCE

- https://www.rstudio.com/wp-content/uploads/2015/02/rmarkdown-cheatsheet.pdf