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UNIVERSIDAD COMPLUTENSE DE MADRID

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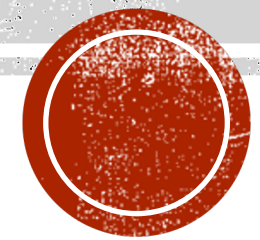
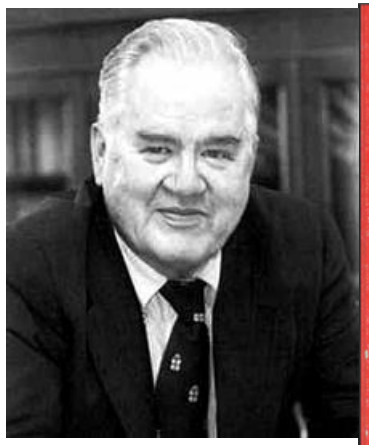
revolucionamos la comunicación

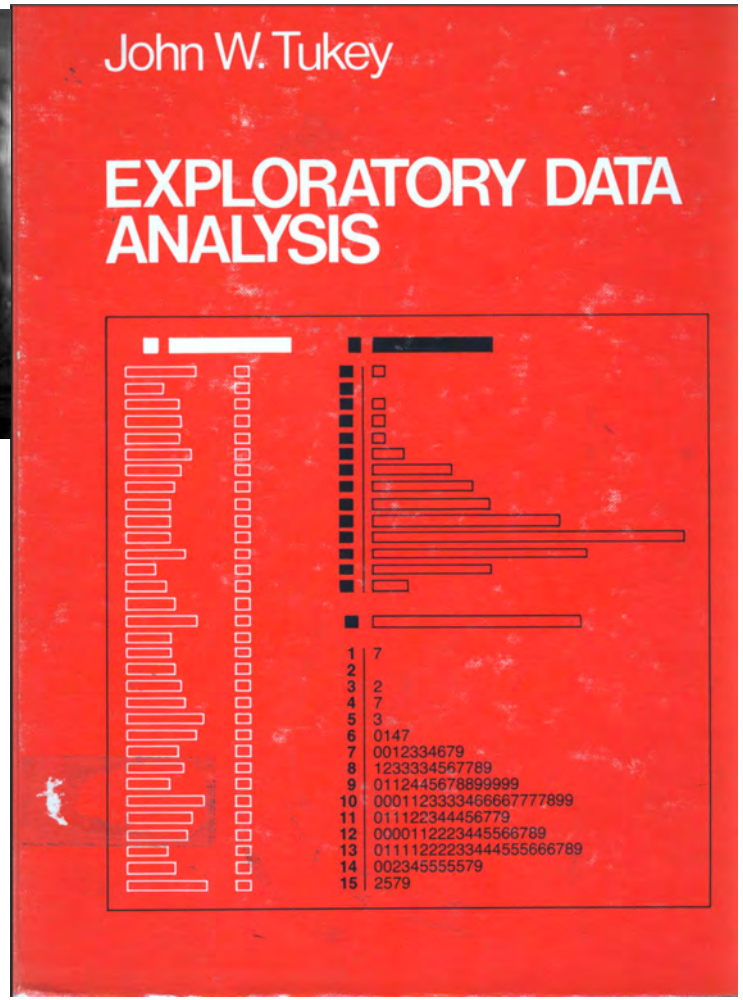
ORIENTACIONES PARA LA VISUALIZACIÓN EFECTIVA DE DATOS



¿EDA?
¿De qué hablamos?

ESTO SERÁ NUEVO, ¿NO?





Preface

This book is based on an important principle:

It is important to understand what you CAN DO before you learn to measure how WELL you seem to have DONE it.

Learning first what you can do will help you to work more easily and effectively.

This book is about exploratory data analysis, about looking at data to see what it seems to say. It concentrates on simple arithmetic and easy-to-draw pictures. It regards whatever appearances we have recognized as partial descriptions, and tries to look beneath them for new insights. Its concern is with appearance, not with confirmation.

Examples, NOT case histories

The book does not exist to make the case that exploratory data analysis is useful. Rather it exists to expose its readers and users to a considerable variety of techniques for looking more effectively at one's data. The examples are not intended to be complete case histories. Rather they show isolated techniques in action on real data. The emphasis is on general techniques, rather than specific problems.

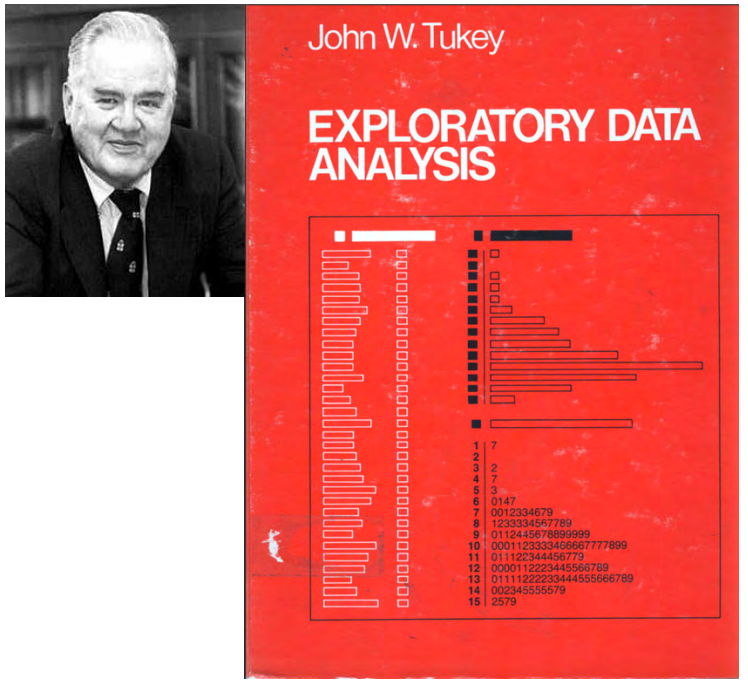
It is important to understand what you CAN DO before you learn to measure how WELL you seem to have DONE it.

John W. Tukey 1976

In particular:

- to be able to say that we looked one layer deeper, and found nothing, is a definite step forward--though not as far as to be able to say that we looked deeper and found thus-and-such.
- to be able to say that "if we change our point of view in the following way . . . things are simpler" is always a gain--though not quite as much as to be able to say "if we don't bother to change our point of view (some other) things are equally simple".

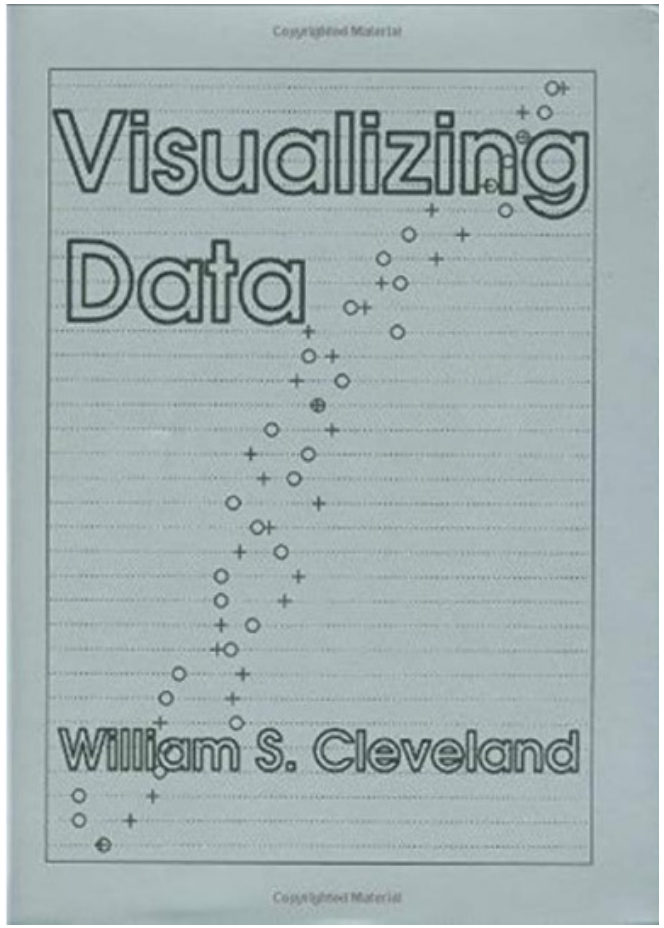
ESTO SERÁ NUEVO, ¿NO?



"'Exploratory data analysis' is an attitude, a state of flexibility, a willingness to look for those things that we believe are not there, as well as those we believe to be there."

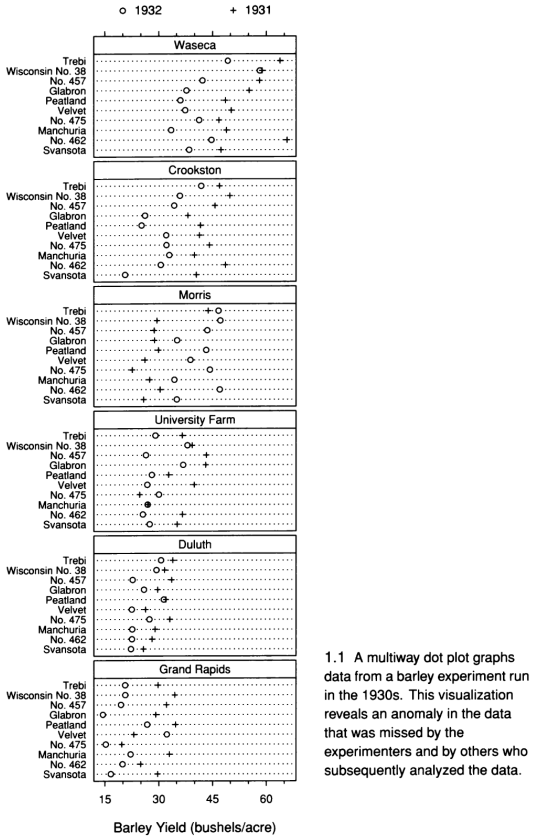
— John Tukey, Author of Exploratory Data Analysis

A HOMBROS DE GIGANTES



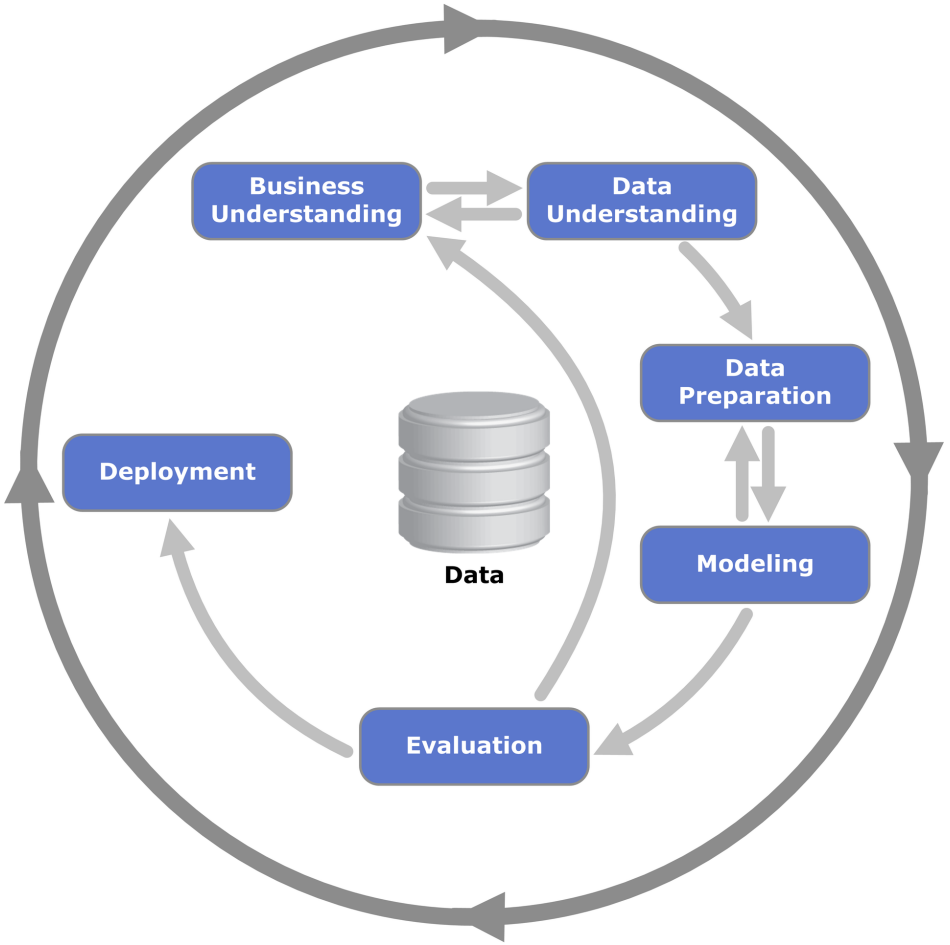
1993

Visualization is critical to data analysis. It provides a front line of attack, revealing intricate structure in data that cannot be absorbed in any other way. We discover unimagined effects, and we challenge imagined ones.



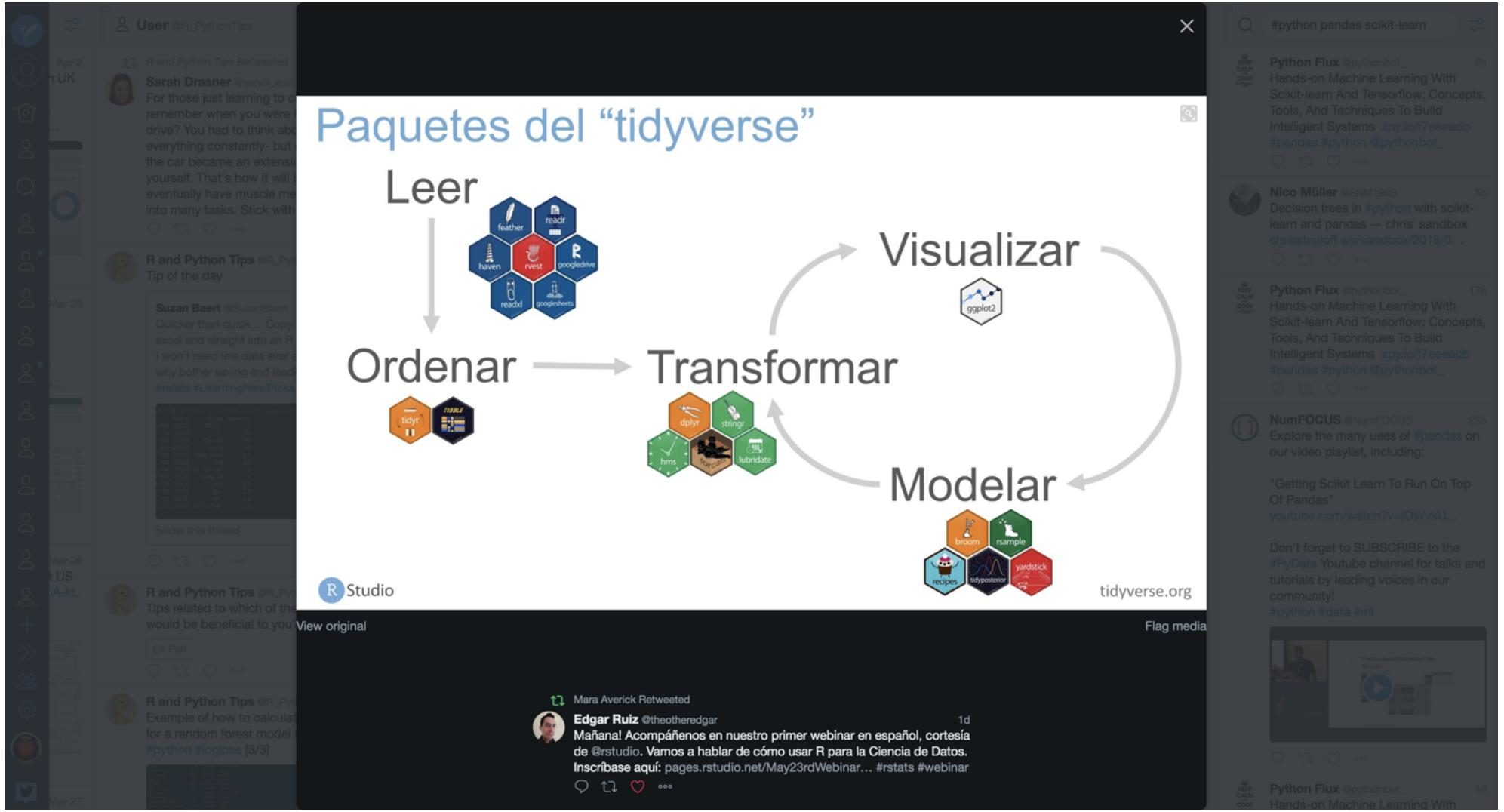
1.1 A multiway dot plot graphs data from a barley experiment run in the 1930s. This visualization reveals an anomaly in the data that was missed by the experimenters and by others who subsequently analyzed the data.

¿EDA? ¿ESTO QUÉ ES? – CICLO METODOLÓGICO (1 DE 3)

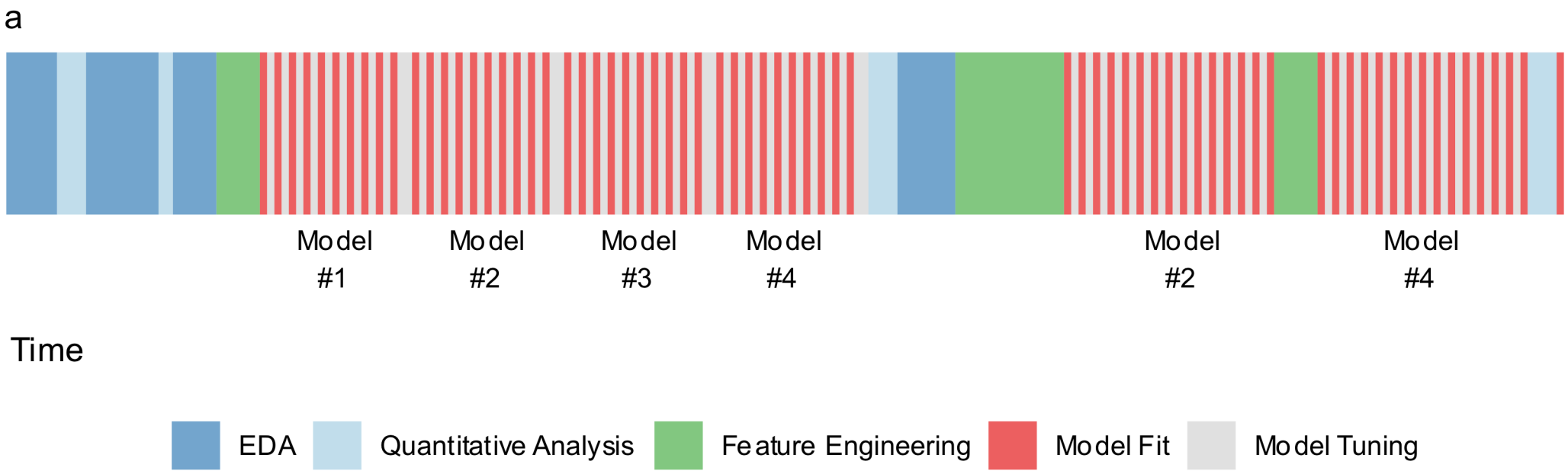


https://es.wikipedia.org/wiki/Cross_Industry_Standard_Process_for_Data_Mining

¿EDA? ¿ESTO QUÉ ES? – UN POCO MÁS CLARO… (2 DE 3)

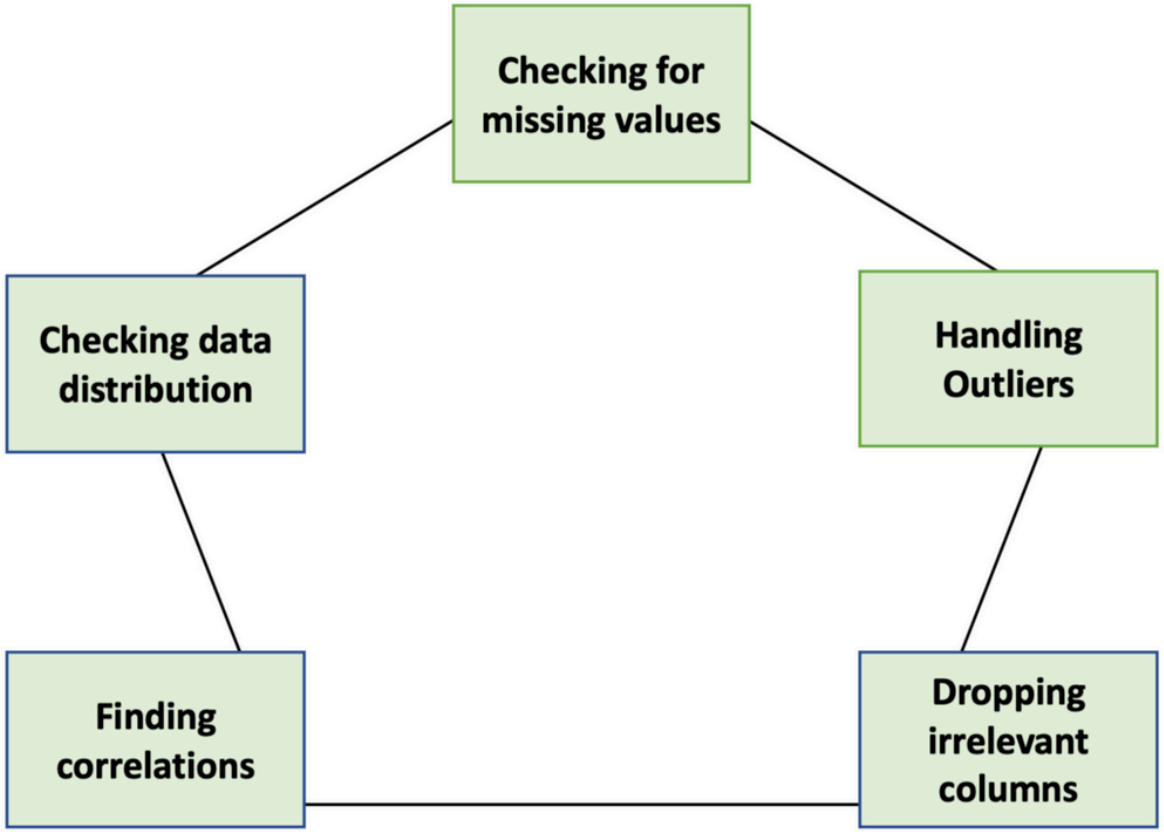


¿EDA? ¿ESTO QUÉ ES?... A MÍ ME GUSTA ESTE ... (3 DE 3)



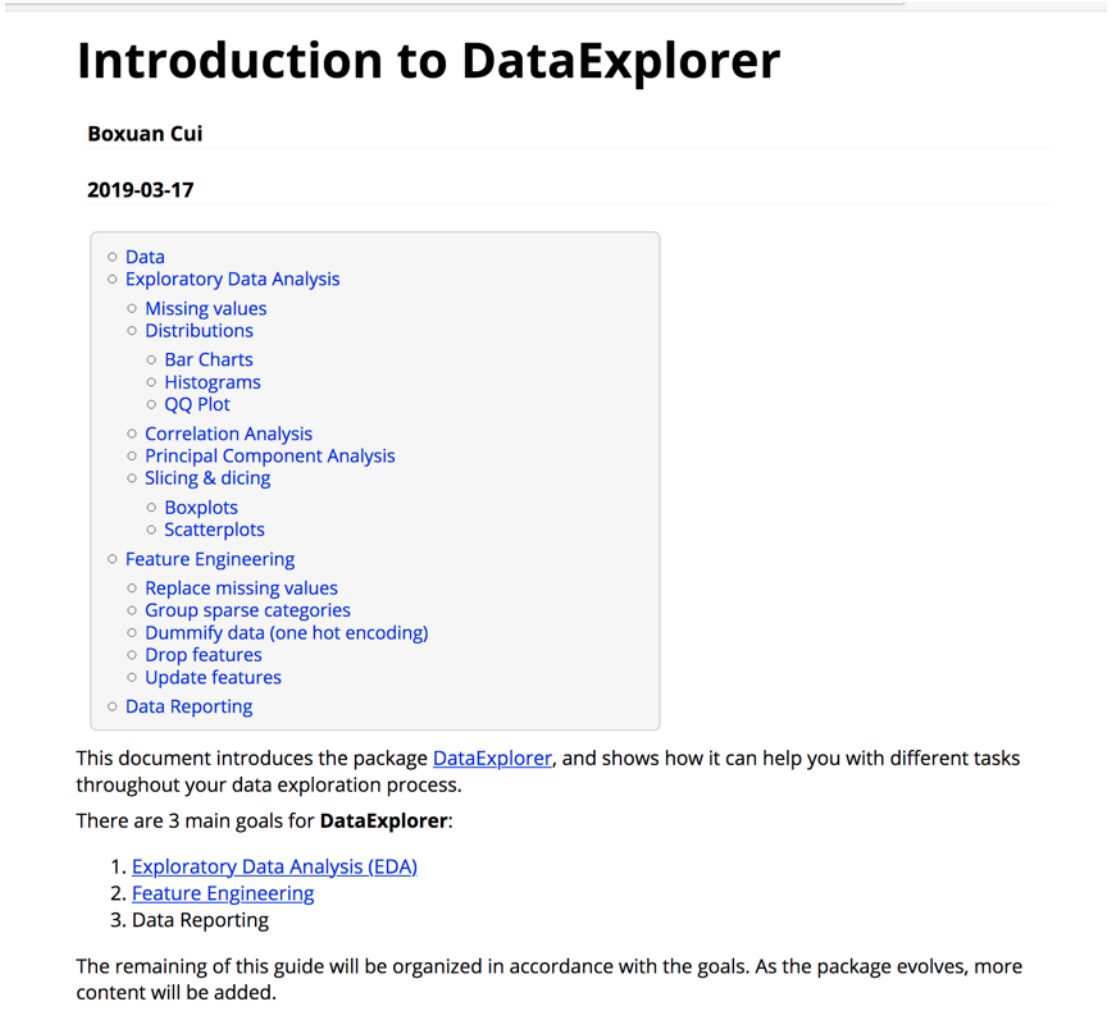
Feature Engineering (Max Kuhn and Kjell Johnson - 2019-06-21)
http://www.feat.engineering/index.html

EN LA FASE DE EDA, ¿QUÉ VAMOS A COMPROBAR?



Ejemplo - R
DataExplorer

DATAEXPLORER UNA LIBRERÍA DE R PARA EDA



Introduction to DataExplorer

Boxuan Cui

2019-03-17

This document introduces the package DataExplorer, and shows how it can help you with different tasks throughout your data exploration process.

There are 3 main goals for **DataExplorer**:

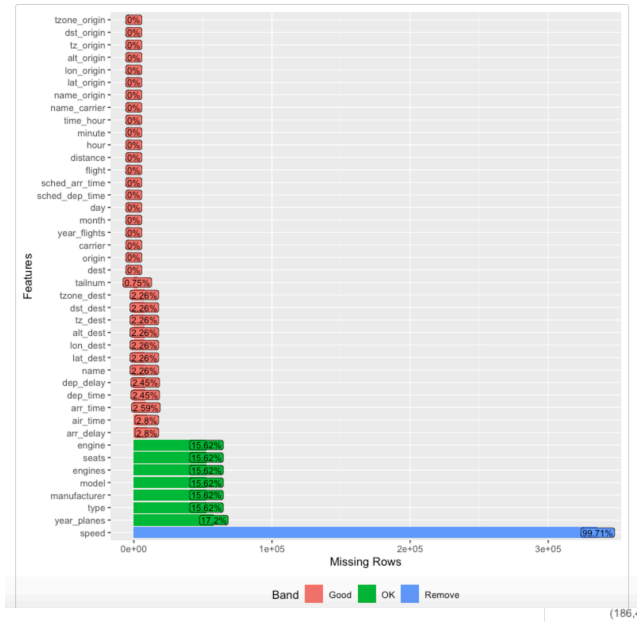
1. Exploratory Data Analysis (EDA)
2. Feature Engineering
3. Data Reporting

The remaining of this guide will be organized in accordance with the goals. As the package evolves, more content will be added.

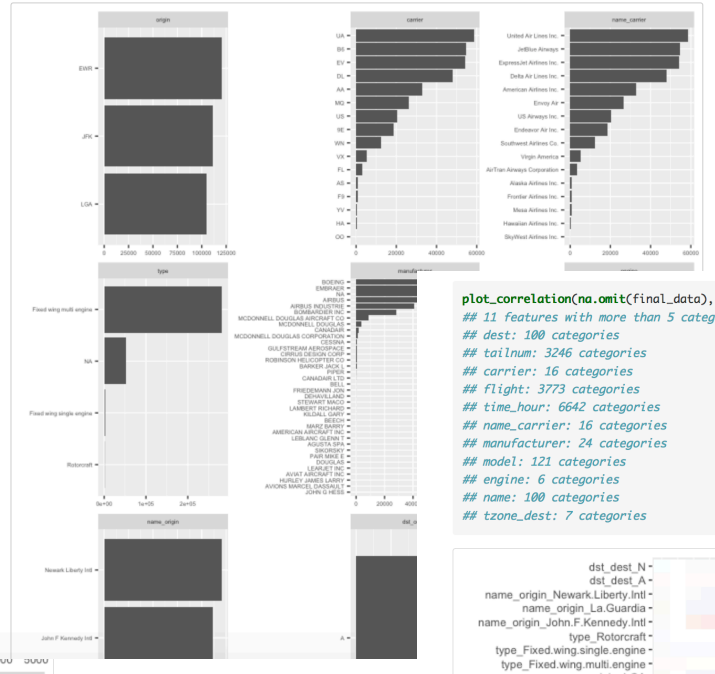
https://cran.r-project.org/web/packages/DataExplorer/vignettes/dataexplorer-intro.html

DATAEXPLORER UNA LIBRERÍA DE R PARA EDA

```
plot_missing(final_data)
```



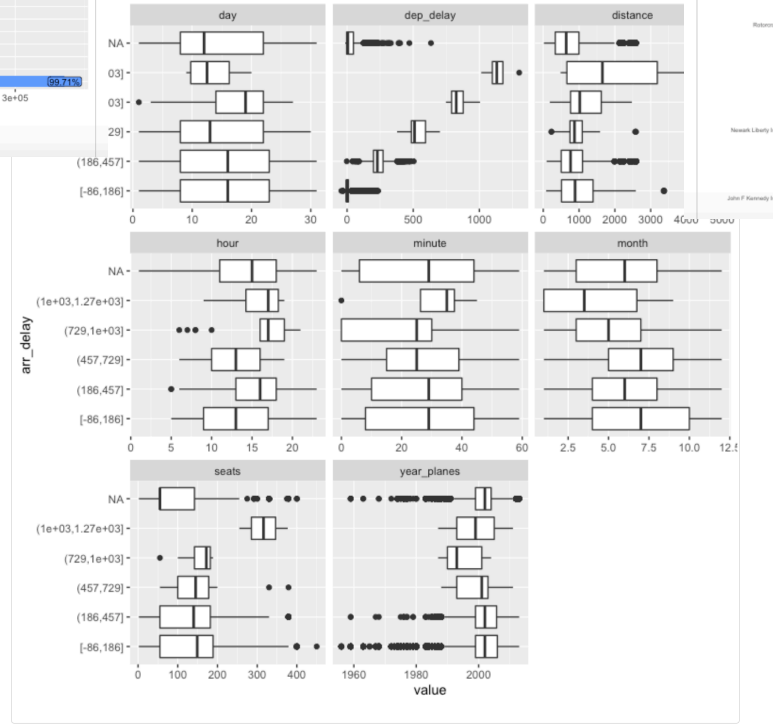

```
## 5 columns ignored with more than 50 categories.
## dest: 105 categories
## tailnum: 4044 categories
## time_hour: 6936 categories
## model: 128 categories
## name: 102 categories
```



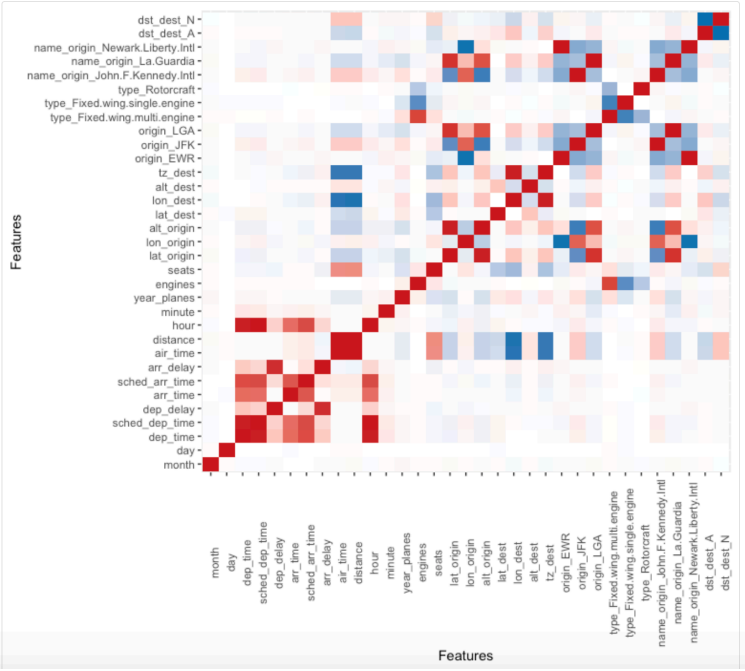
```
plot_correlation(na.omit(final_data), maxcat = 5L)
## 11 features with more than 5 categories ignored!
## dest: 100 categories
## tailnum: 3246 categories
## carrier: 16 categories
## flight: 3773 categories
## time_hour: 6642 categories
## name_carrier: 16 categories
## manufacturer: 24 categories
## model: 121 categories
## engine: 6 categories
## name: 100 categories
## tzone_dest: 7 categories
```

```
a size for demo purpose
<- final_data[, c("arr_delay", "month", "day", "hour", "minute", "dep_delay", "distc

ot function
arr_delay_df, by = "arr_delay")
```



Among all the subtle changes in correlation with arrival delays, you could immediately spot that planes with 300+ seats tend to have much longer delays (16 ~ 21 hours). You may now drill down further to verify or generate more hypotheses.



HAY OTRAS...

DITCH THE OLD WAYS. THE FUTURE IS AUTOMATED.

Modern Exploratory Data Analysis

Review of 4 libraries for automatic EDA

Karim Lahrichi Follow

May 2 · 6 min read ★

https://towardsdatascience.com/modern-exploratory-data-analysis-29fdbecec957

Ejemplo - Python
Pandas-profiling

PANDAS-PROFILING UNA LIBRERÍA DE PYTHON PARA EDA

Overview

Overview | Reproduction | Warnings 6

Dataset statistics

Number of variables	14
Number of observations	32561
Missing cells	4262
Missing cells (%)	0.9%
Duplicate rows	25
Duplicate rows (%)	0.1%
Total size in memory	18.1 MiB
Average record size in memory	583.0 B

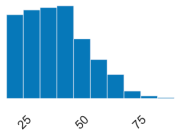
Variable types

CAT	8
NUM	6

Variables

age
Real number ($\mathbb{R}_{\geq 0}$)

Distinct count	73	Mean	38.58164675532078
Unique (%)	0.2%	Minimum	17
Missing	0	Maximum	90
Missing (%)	0.0%	Zeros	0
Infinite	0	Zeros (%)	0.0%



https://pandas-profiling.github.io/pandas-profiling/examples/census/census_report.html

PANDAS-PROFILING UNA LIBRERÍA DE PYTHON PARA EDA

Acceleration
Numeric

Distinct count	87	**Mean**	64.614
Unique (%)	0.5%	**Minimum**	12
Missing (%)	0.3%	**Maximum**	97
Missing (n)	48	**Zeros (%)**	0.0%
Infinite (%)	0.0%		
Infinite (n)	0		

Toggle details

Age
Numeric

Distinct count	29	**Mean**	25.122
Unique (%)	0.2%	**Minimum**	16
Missing (%)	0.0%	**Maximum**	45
Missing (n)	0	**Zeros (%)**	0.0%
Infinite (%)	0.0%		
Infinite (n)	0		

Toggle details

Aggression
Numeric

Distinct count	86	**Mean**	55.869
Unique (%)	0.5%	**Minimum**	11
Missing (%)	0.3%	**Maximum**	95
Missing (n)	48	**Zeros (%)**	0.0%
Infinite (%)	0.0%		
Infinite (n)	0		

Toggle details

Agility
Numeric

Distinct count	82	**Mean**	63.504
Unique (%)	0.5%	**Minimum**	14
Missing (%)	0.3%	**Maximum**	96
Missing (n)	48	**Zeros (%)**	0.0%
Infinite (%)	0.0%		
Infinite (n)	0		

Toggle details

PANDAS-PROFILING PERO HAY NUEVAS…"DATAPREP.EDA"

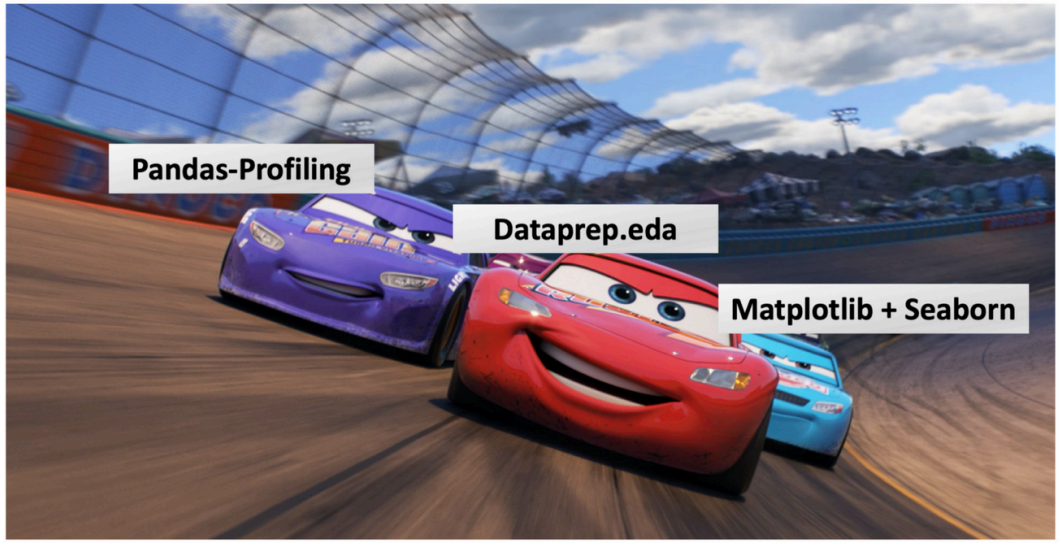
Dataprep.eda: Accelerate your EDA

Everything you need to know about dataprepare.eda.

Slavvy Coelho Following

Apr 14 · 7 min read ★

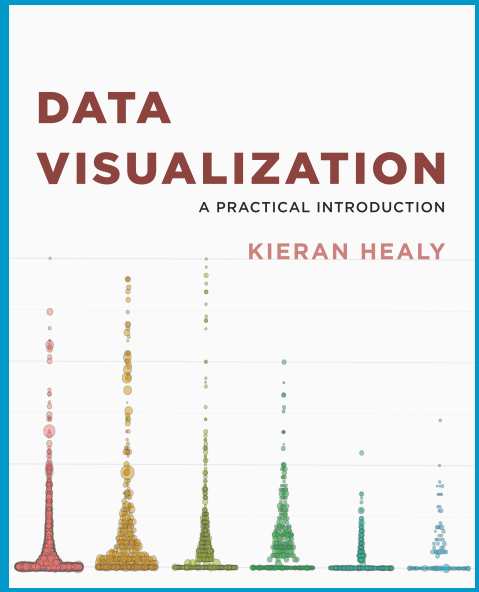
source: MicroStockHub, via: Getty Images/iStockphoto



https://towardsdatascience.com/dataprep-eda-accelerate-your-eda-eb845a4088bc

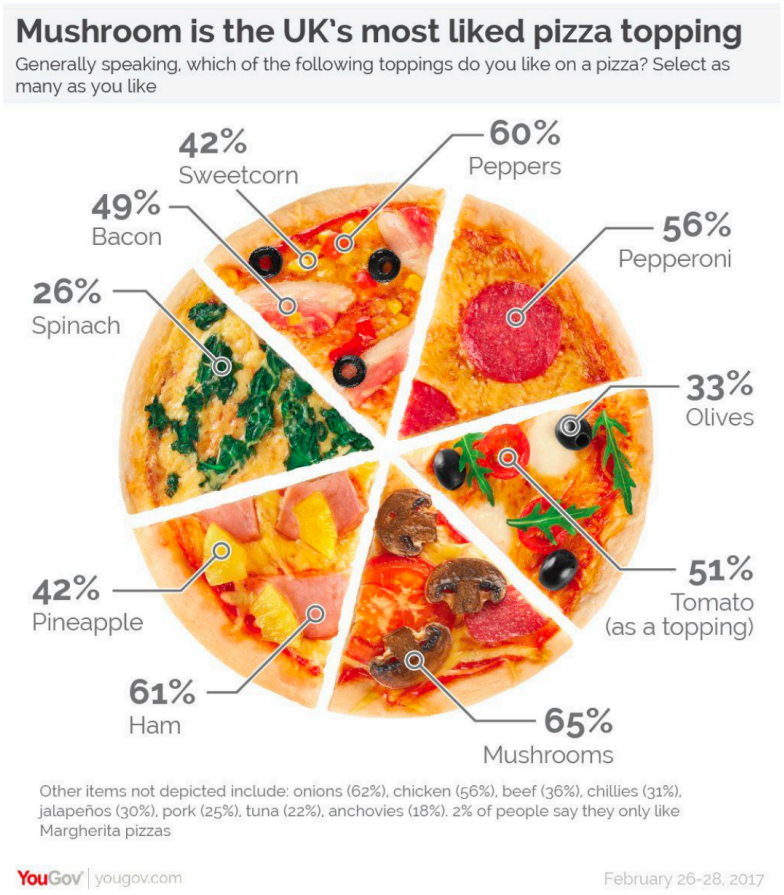
¿Qué estilo de Gráficos ?

Una guía de estilo

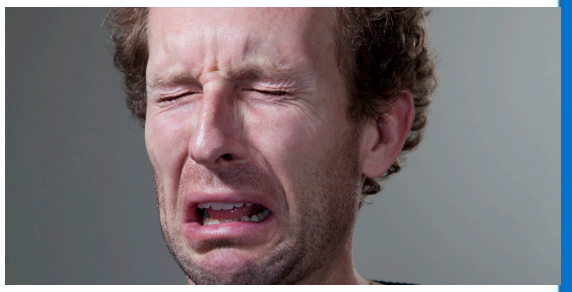


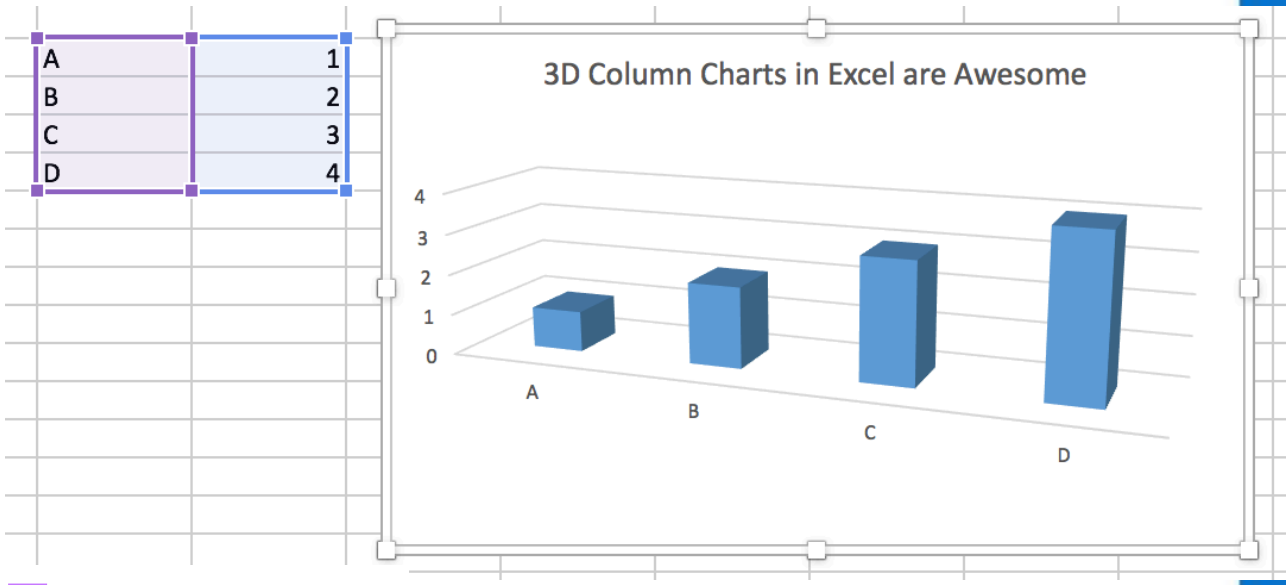
https://socviz.co/index.html

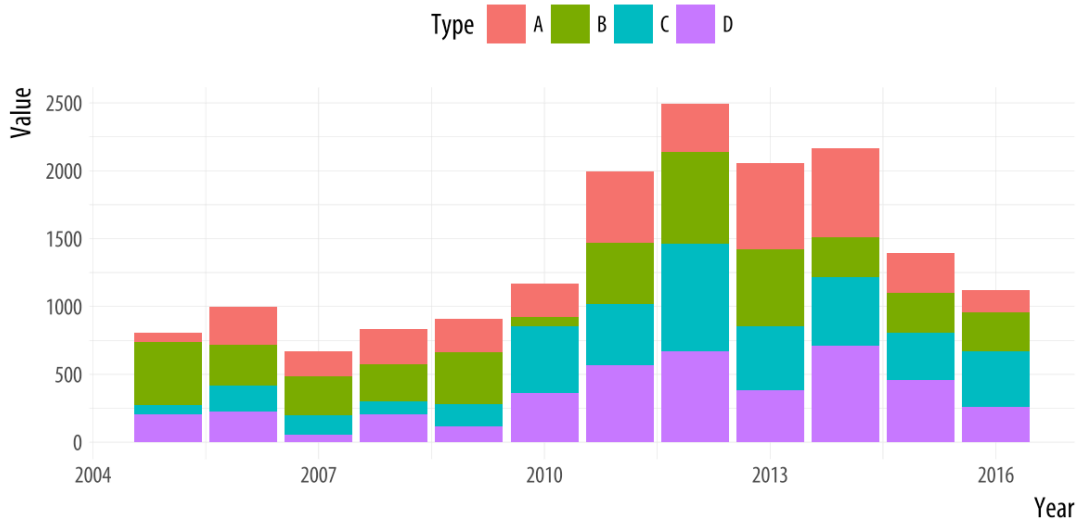
“¡ UN POCO DE POR FAVOR !”



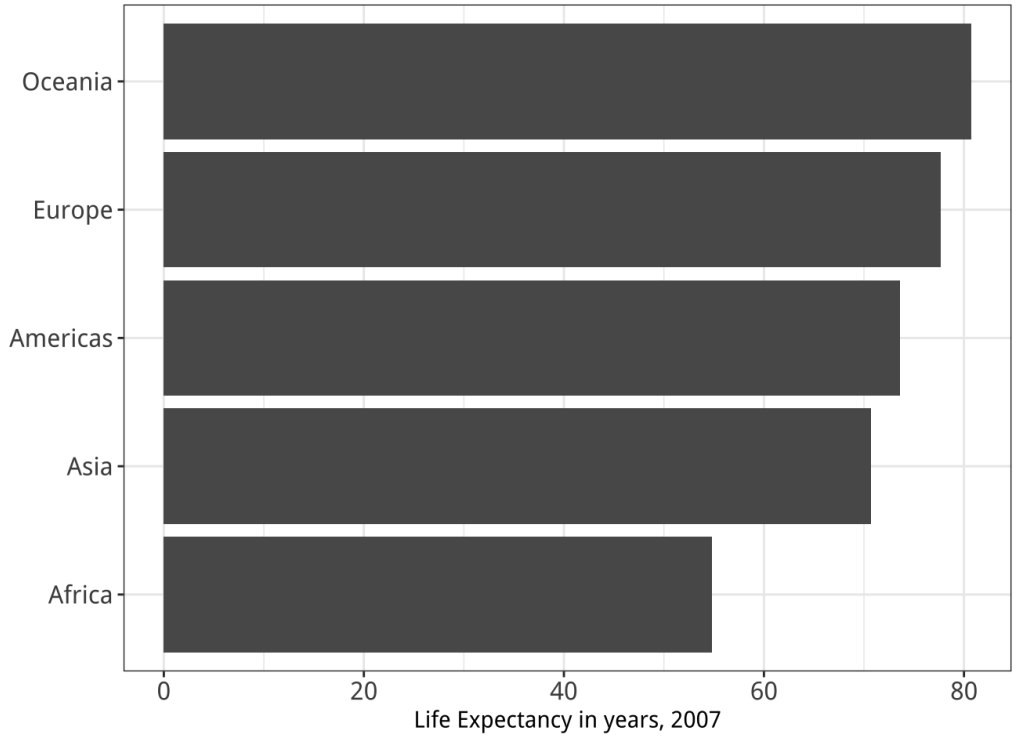
“¡ UN POCO DE POR FAVOR !”

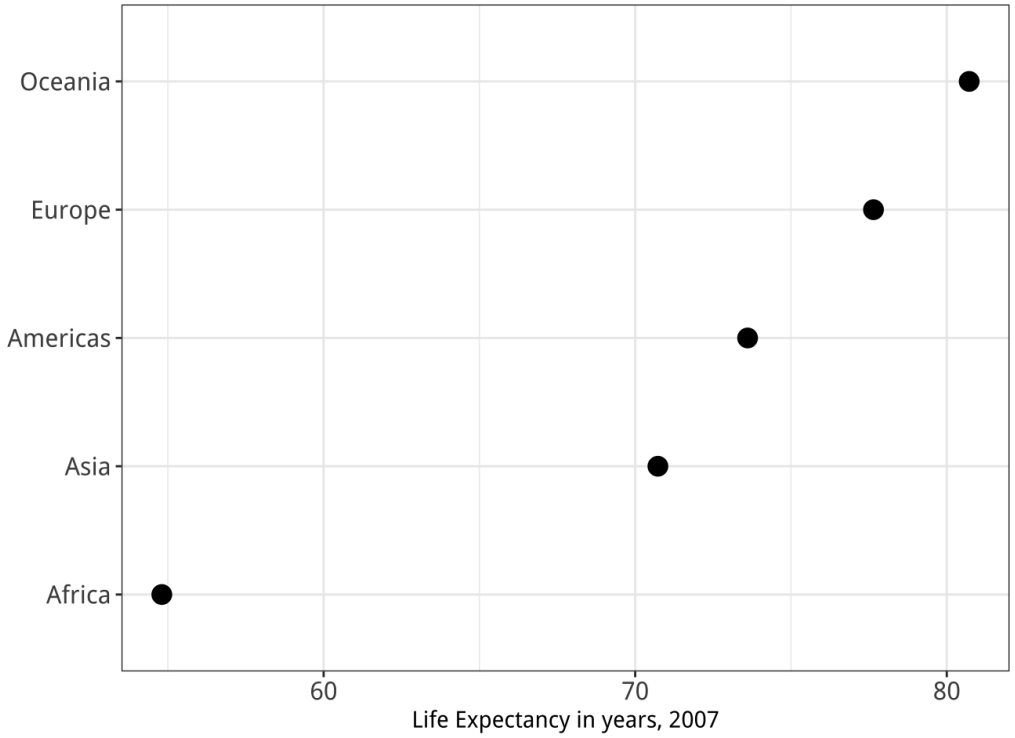




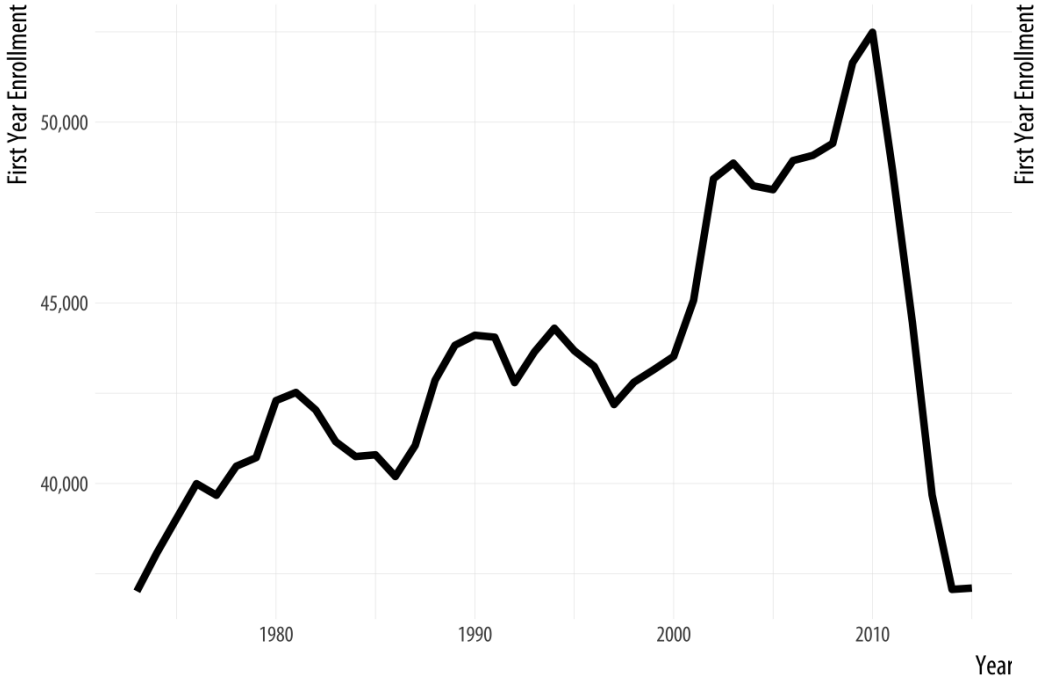


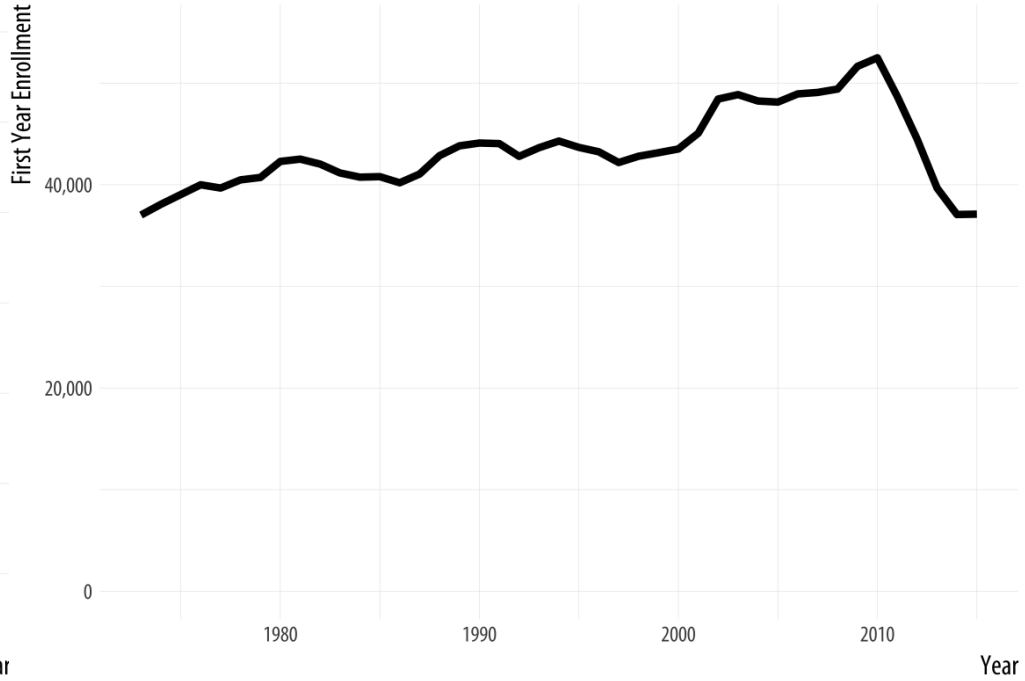
ATENCIÓN AL CERO (1 DE 2)



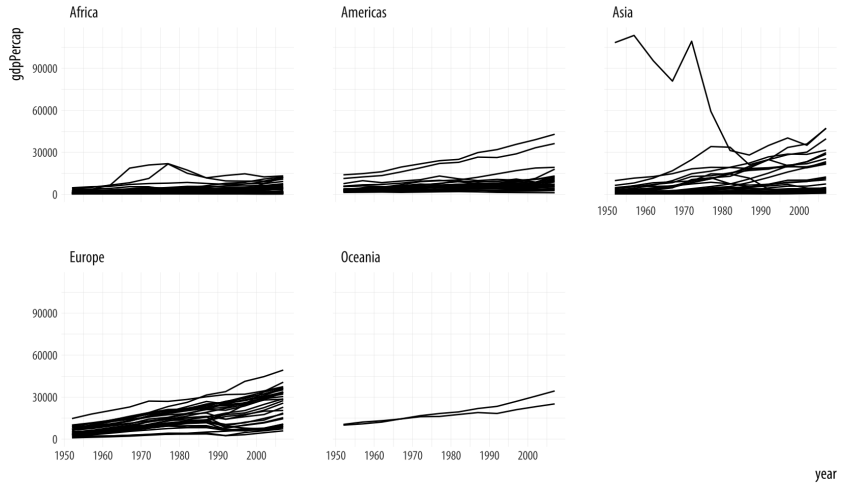


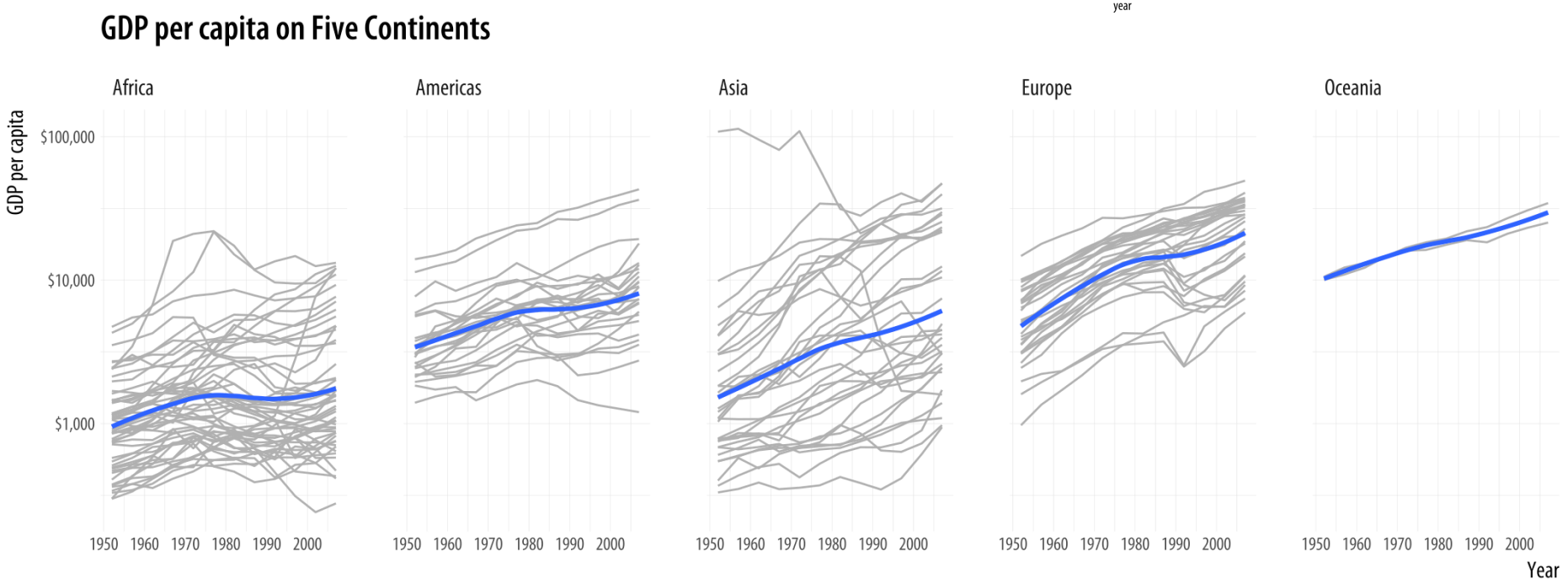
Atención al cero (2 de 2)



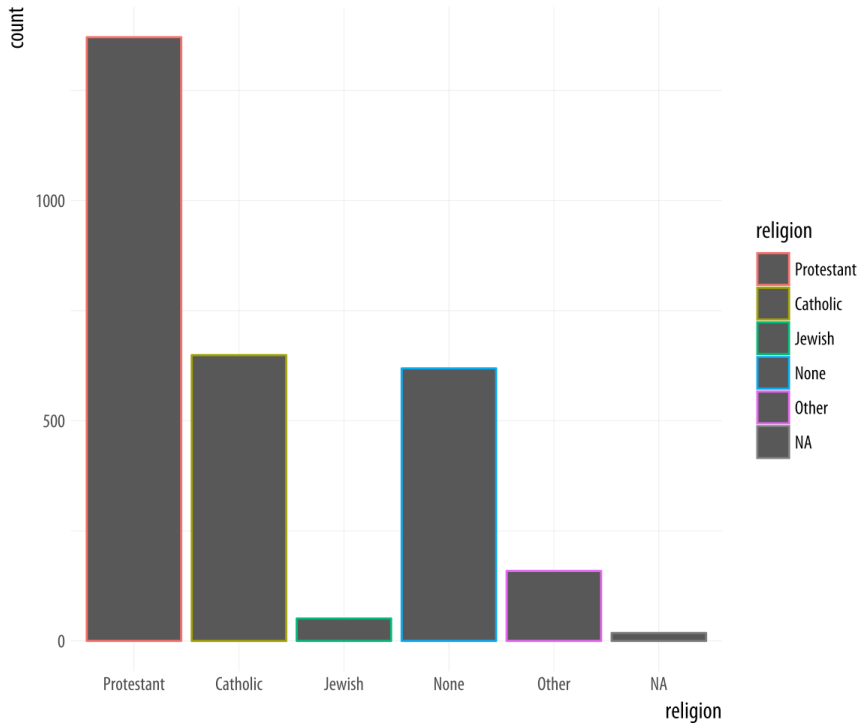


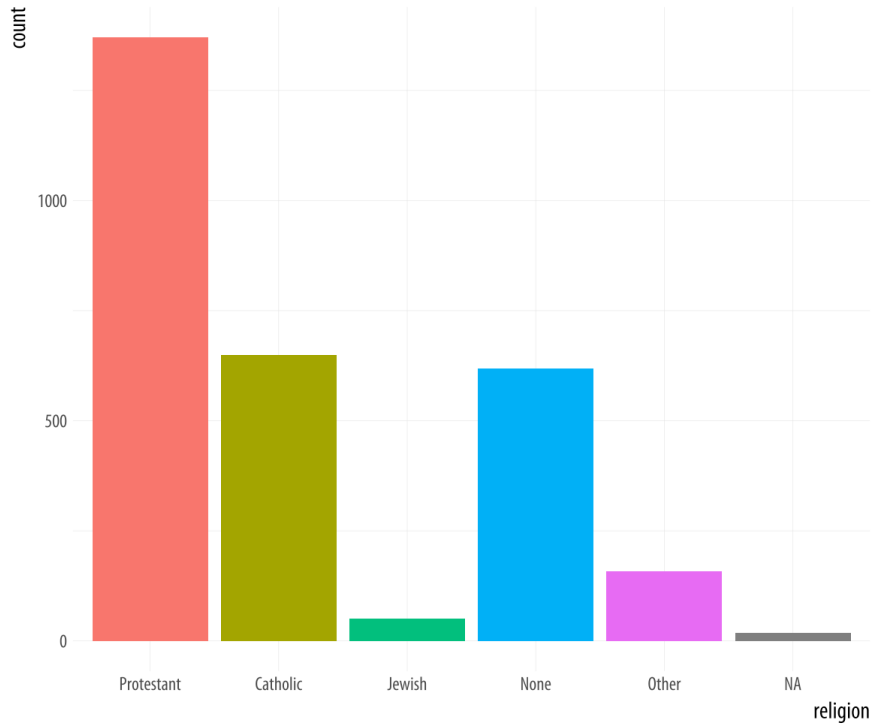
GRÁFICOS MÚLTIPLES



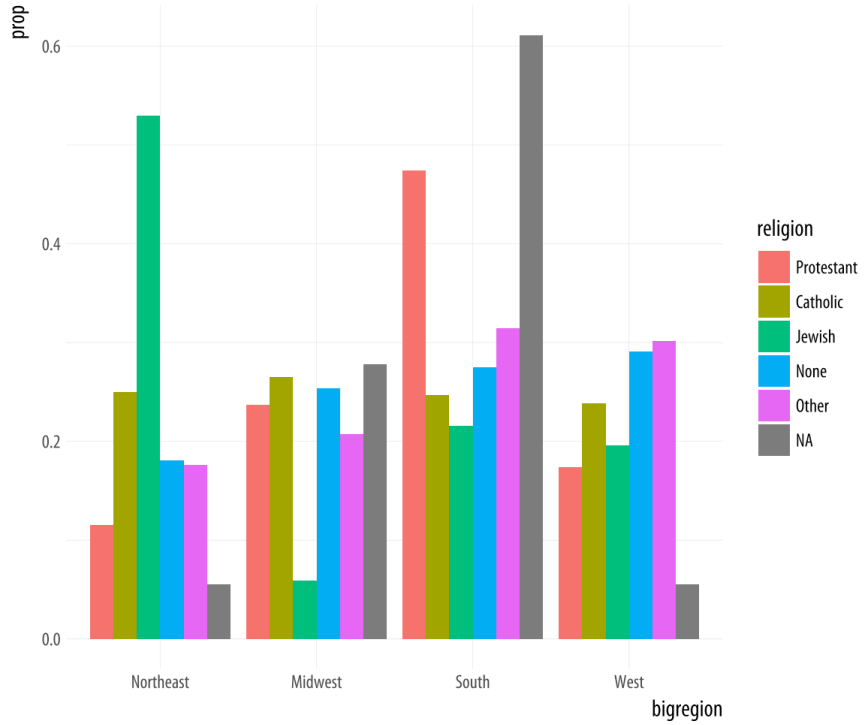


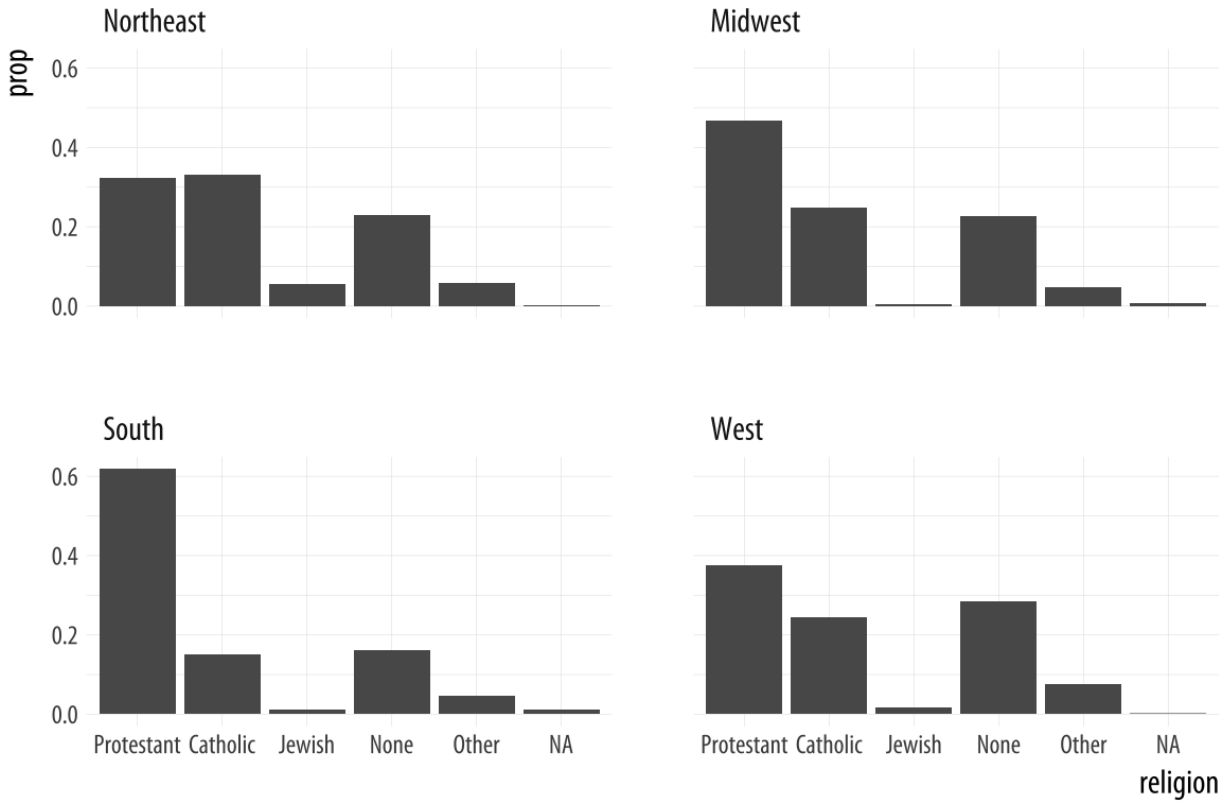
EL "COLOR" AYUDA, ÚSALO!.



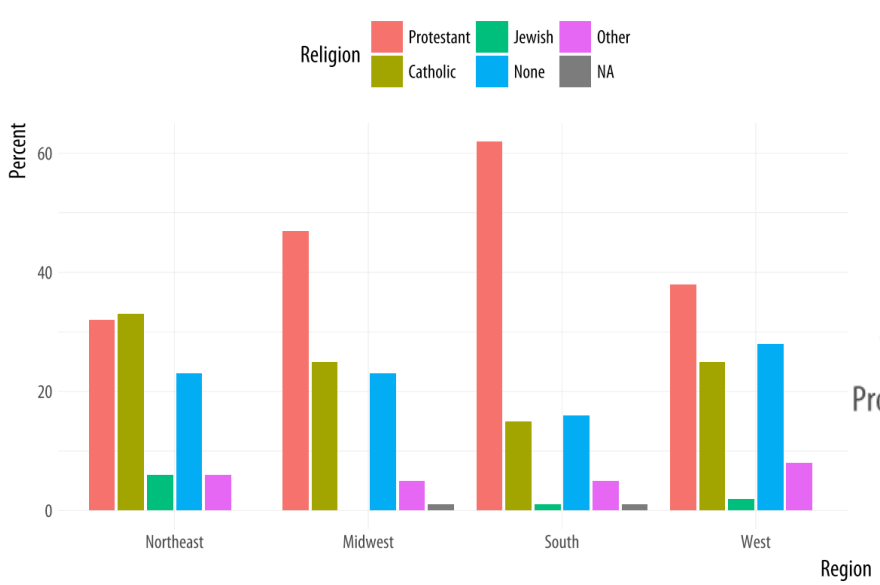


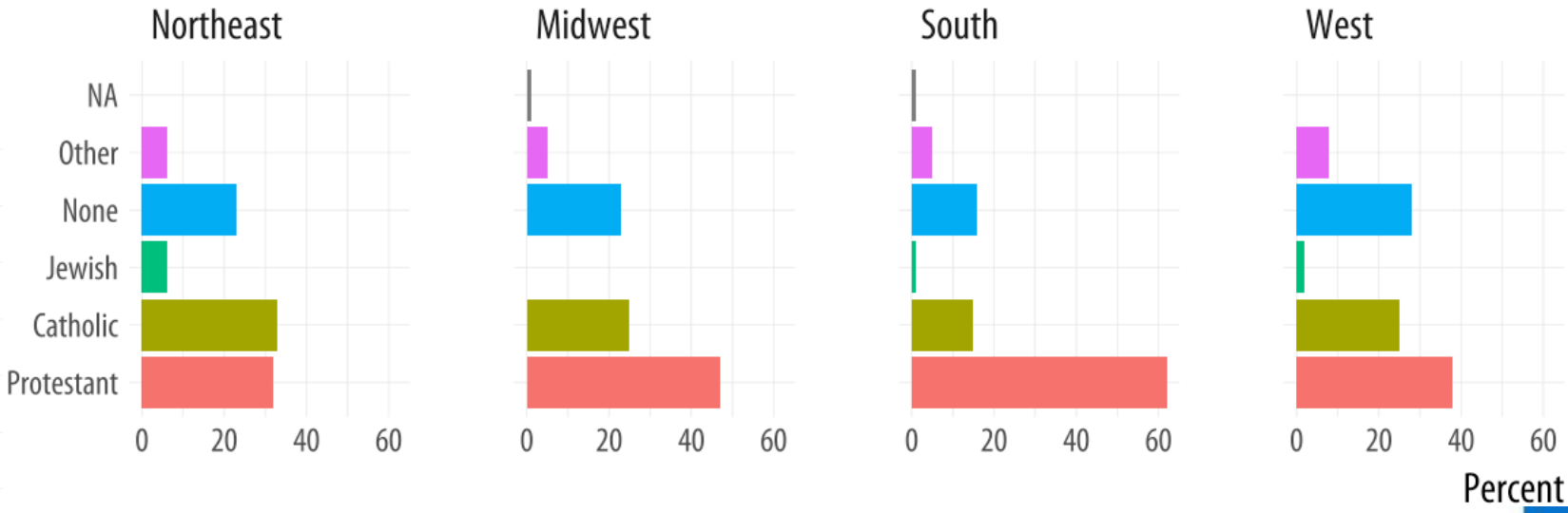
POR FAVOR, NO MUCHAS BARRAS JUNTAS... "SMALL MULTIPLES".



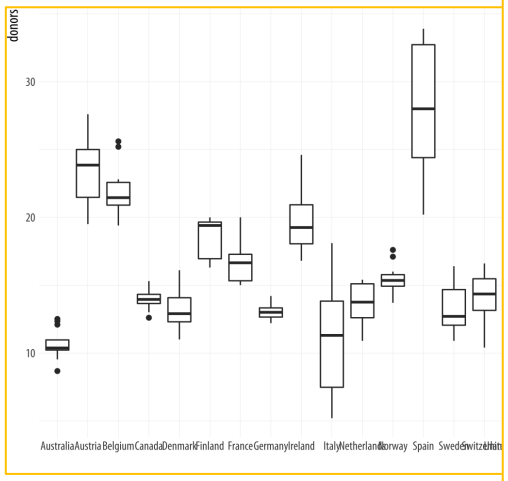


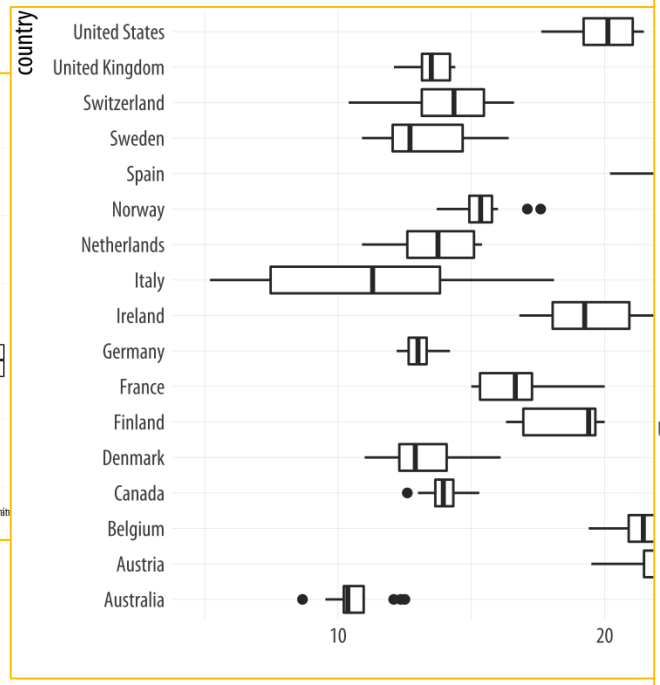
SE PUEDE HACER UN POCO MEJOR... (1 DE 2)

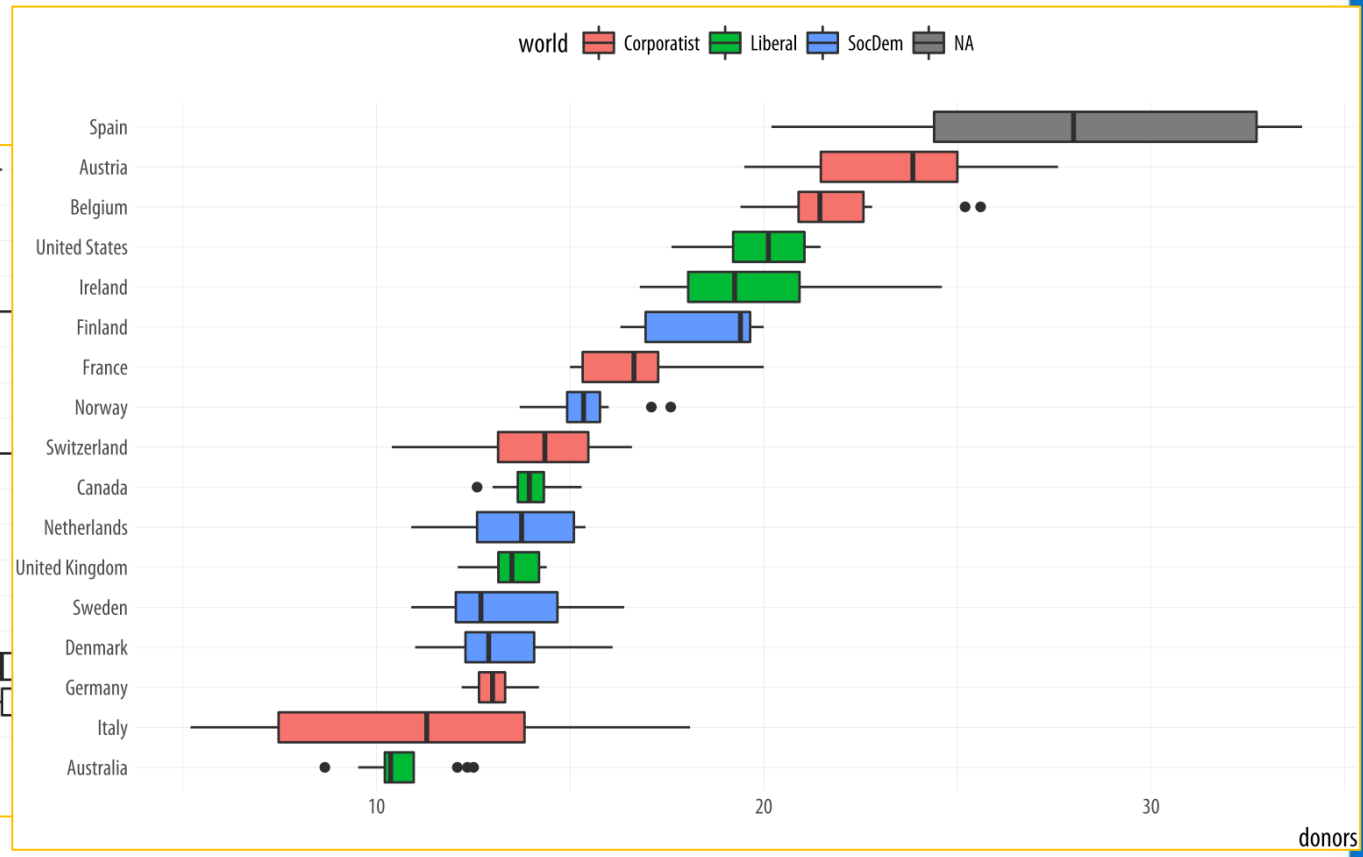




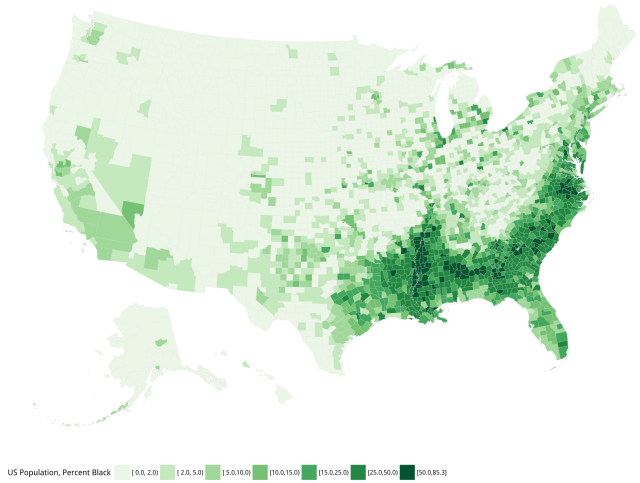
SE PUEDE HACER UN POCO MEJOR... (2 DE 2)

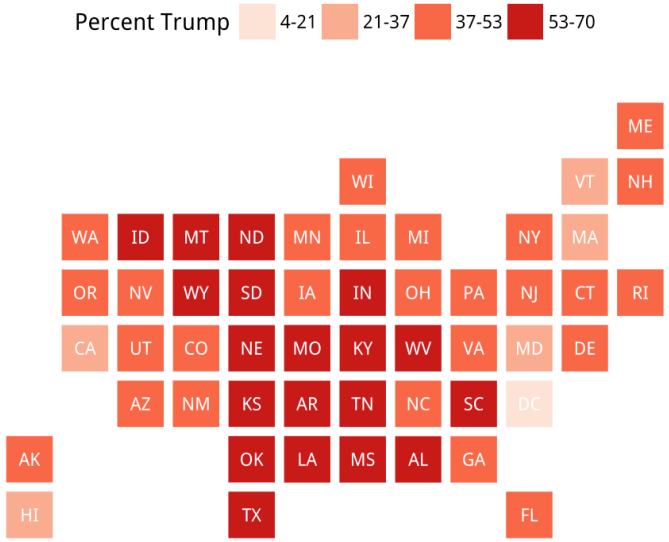


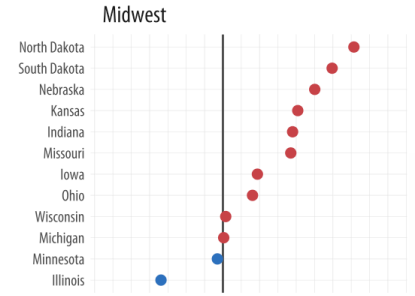


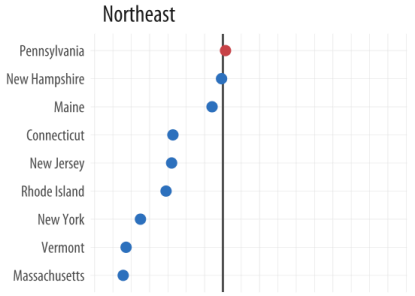


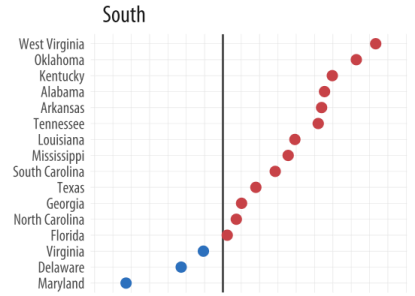
MAPAS...

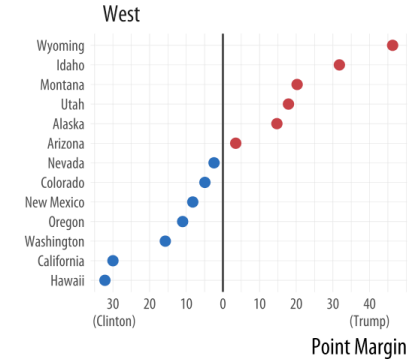












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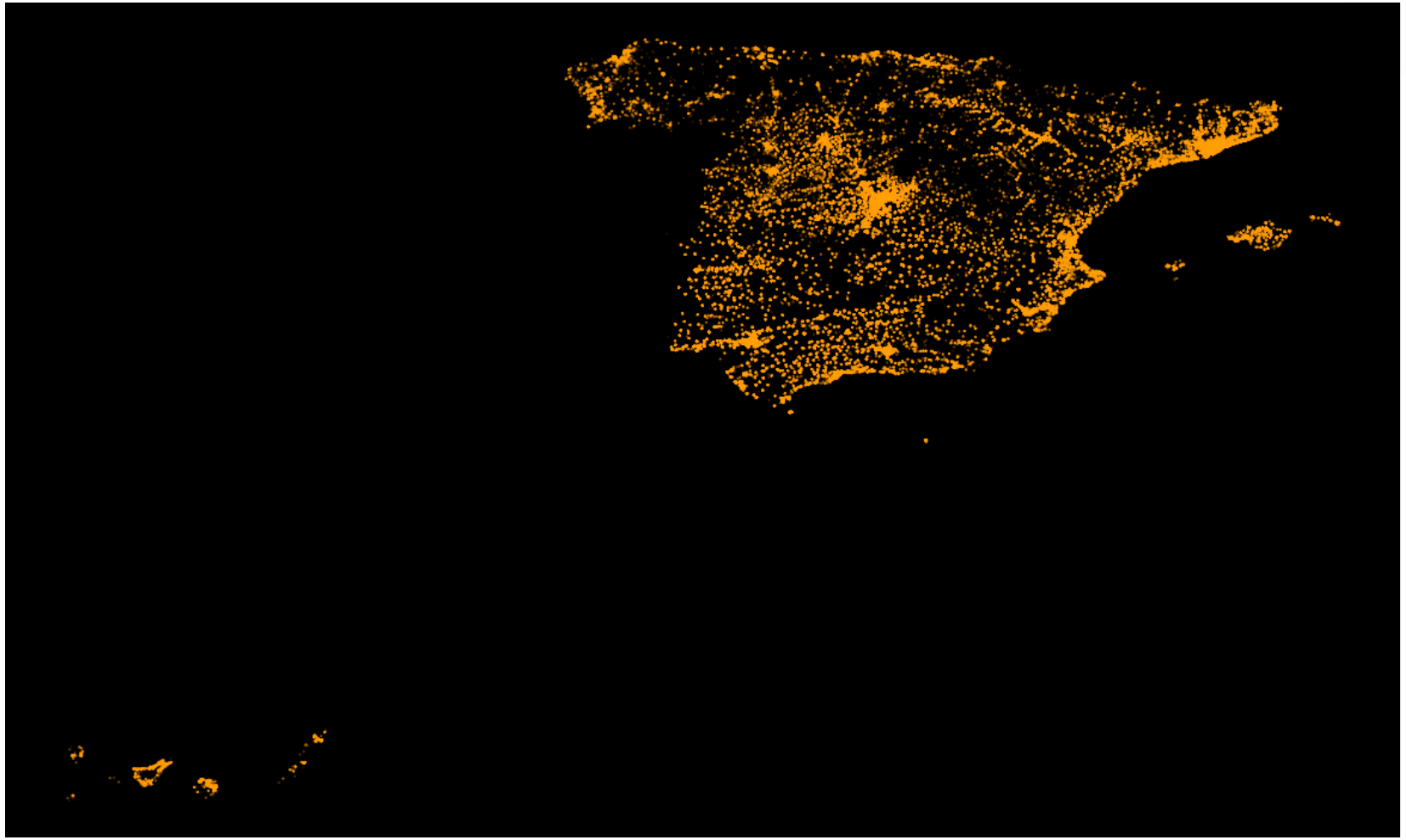
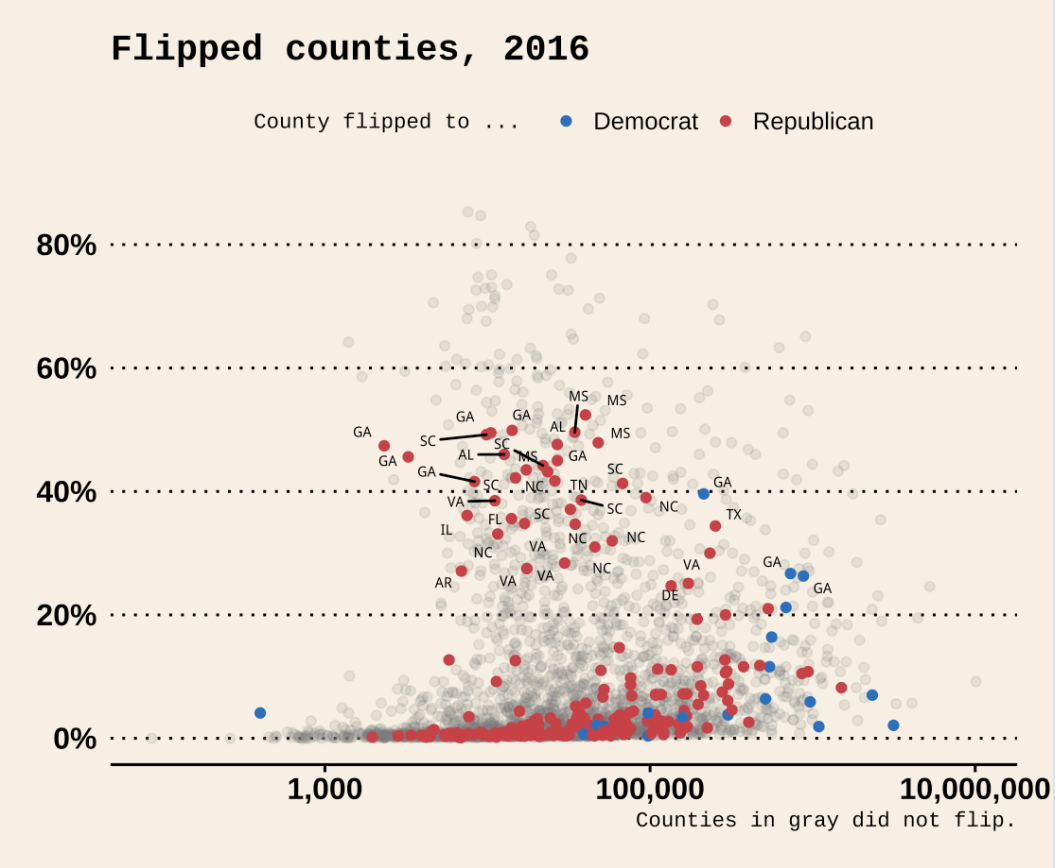
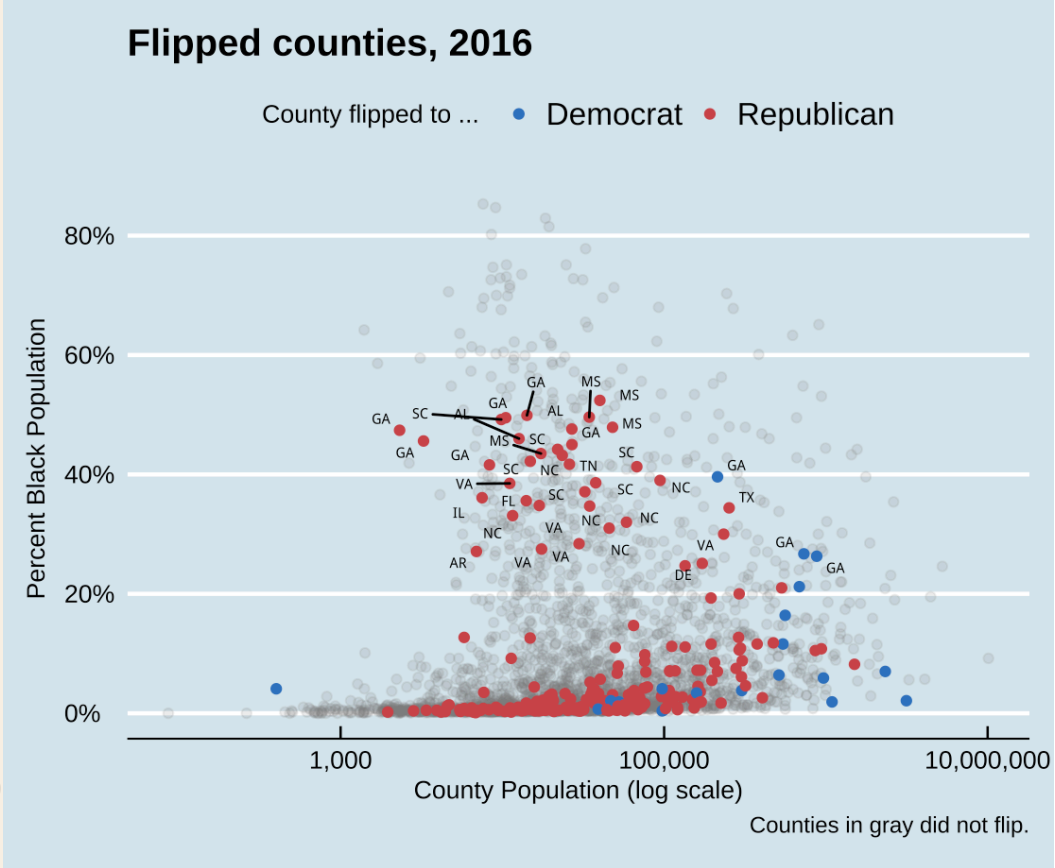
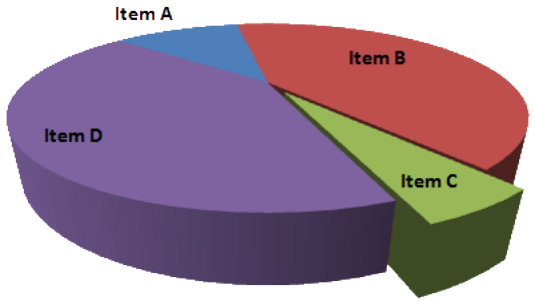


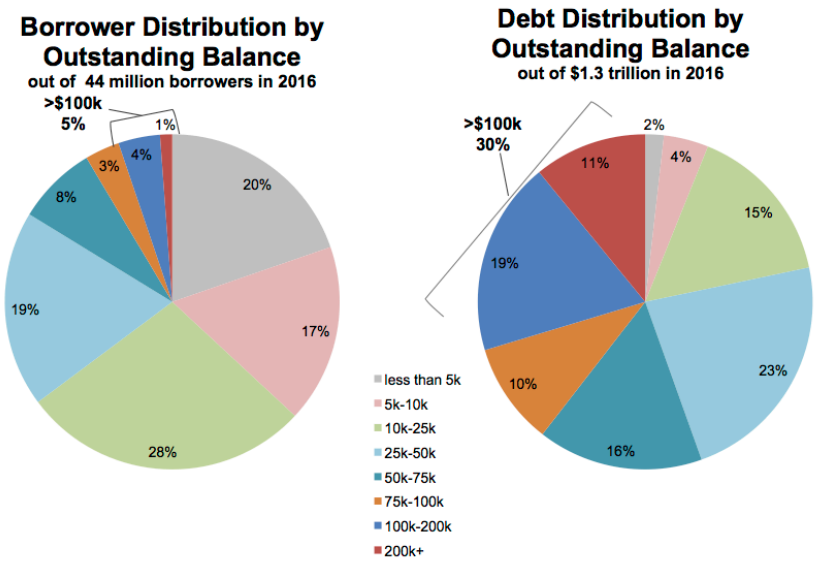
COLORES, FONDOS... GRACIAS POR LA BELLEZA....

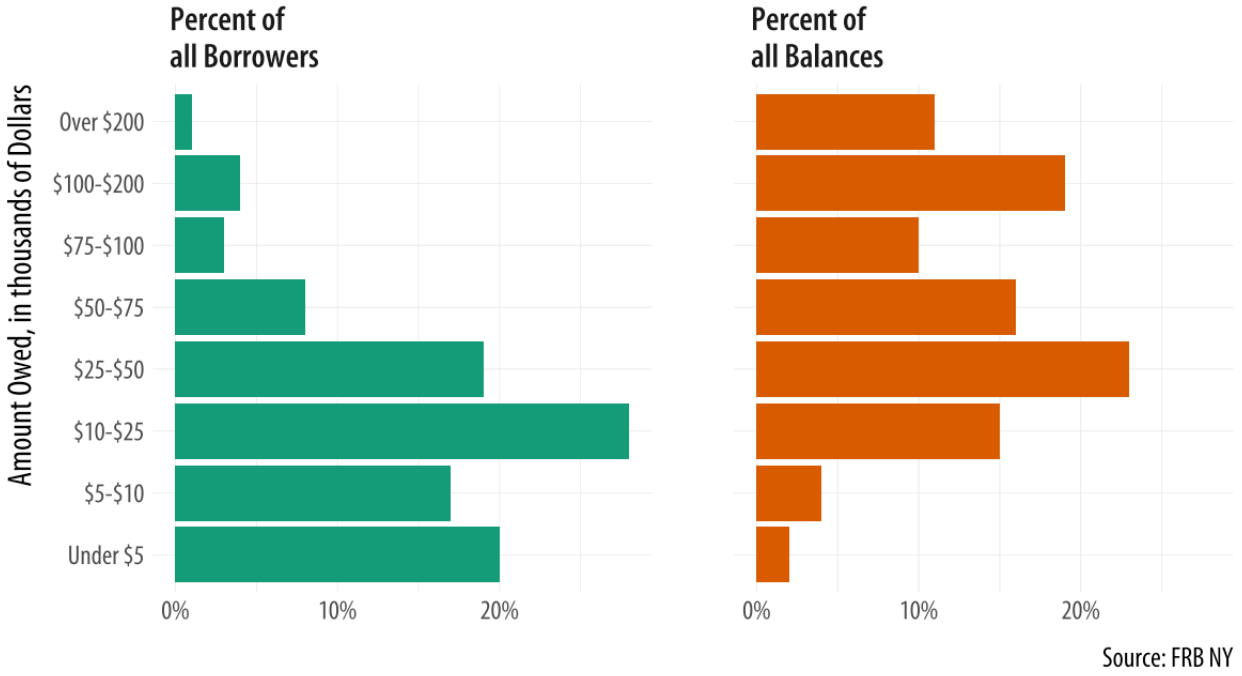




NOOOOOOOO!!!!!!!!







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ENTONCES… PROPÓSITO, CLARIDAD Y MENSAJE..

Three laws for improving **visual** communication

Have a clear purpose

- Know the purpose of creating the graph
- Identify the quantitative evidence to support the purpose
- Identify the audience and focus the design to support their needs

Show the data clearly

- Avoid misrepresentation (use appropriate scales)
- Choose the appropriate graph type to display your data
- Maximize data to ink ratio (reduce distraction, less is more)

Make the message obvious

- Use proximity and alignment to aid in comparisons
- Minimize mental arithmetic (e.g. plot the difference)
- Use colors and annotations to highlight important details

https://rstudio.com/assets/img/visR-Rviews-slides.pdf

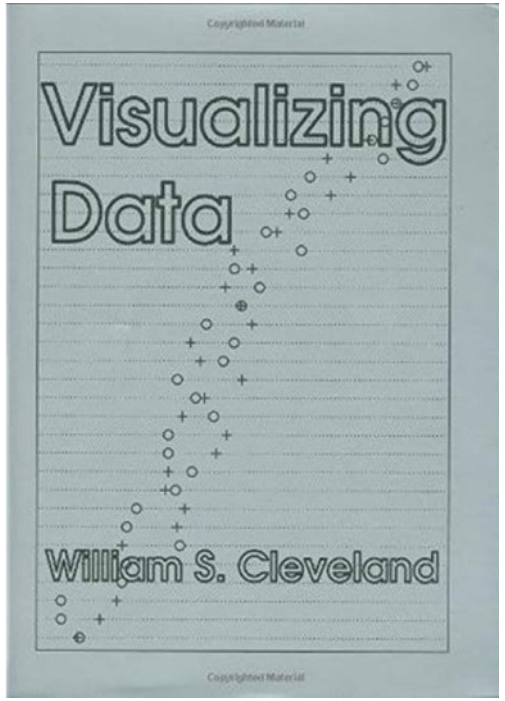
https://rstudio.com/resources/webinars/effective-visualizations-for-data-driven-decisions/

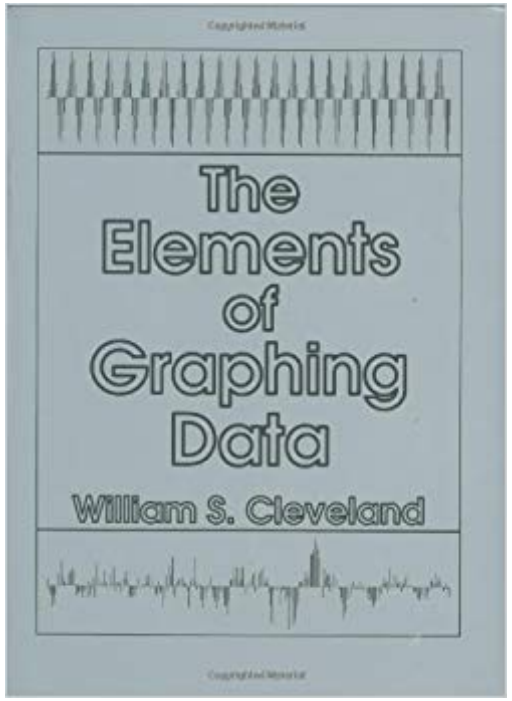
https://github.com/GraphicsPrinciples/CheatSheet/blob/master/NVSCheatSheet.pdf

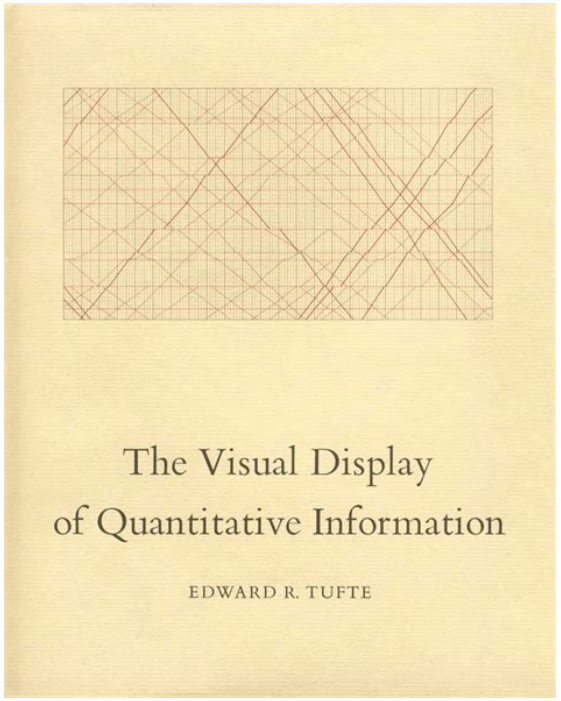
Referencias

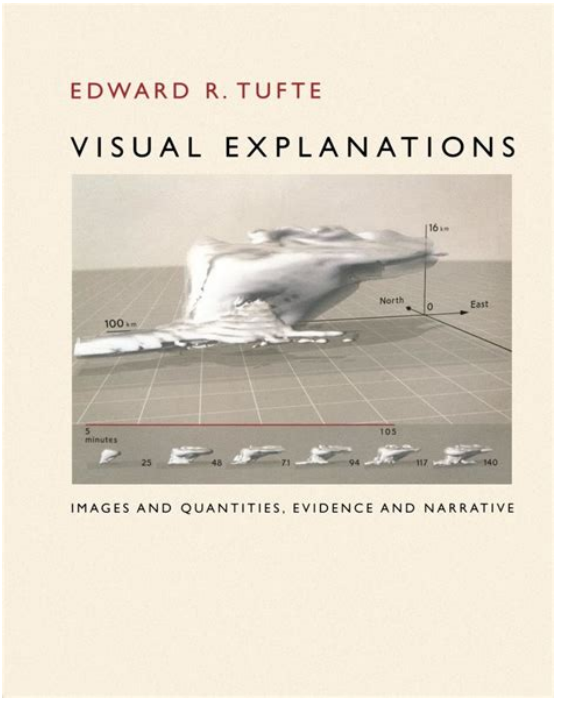
Visualización - EDA

LIBROS – VISUALIZACIÓN (CLÁSICOS)

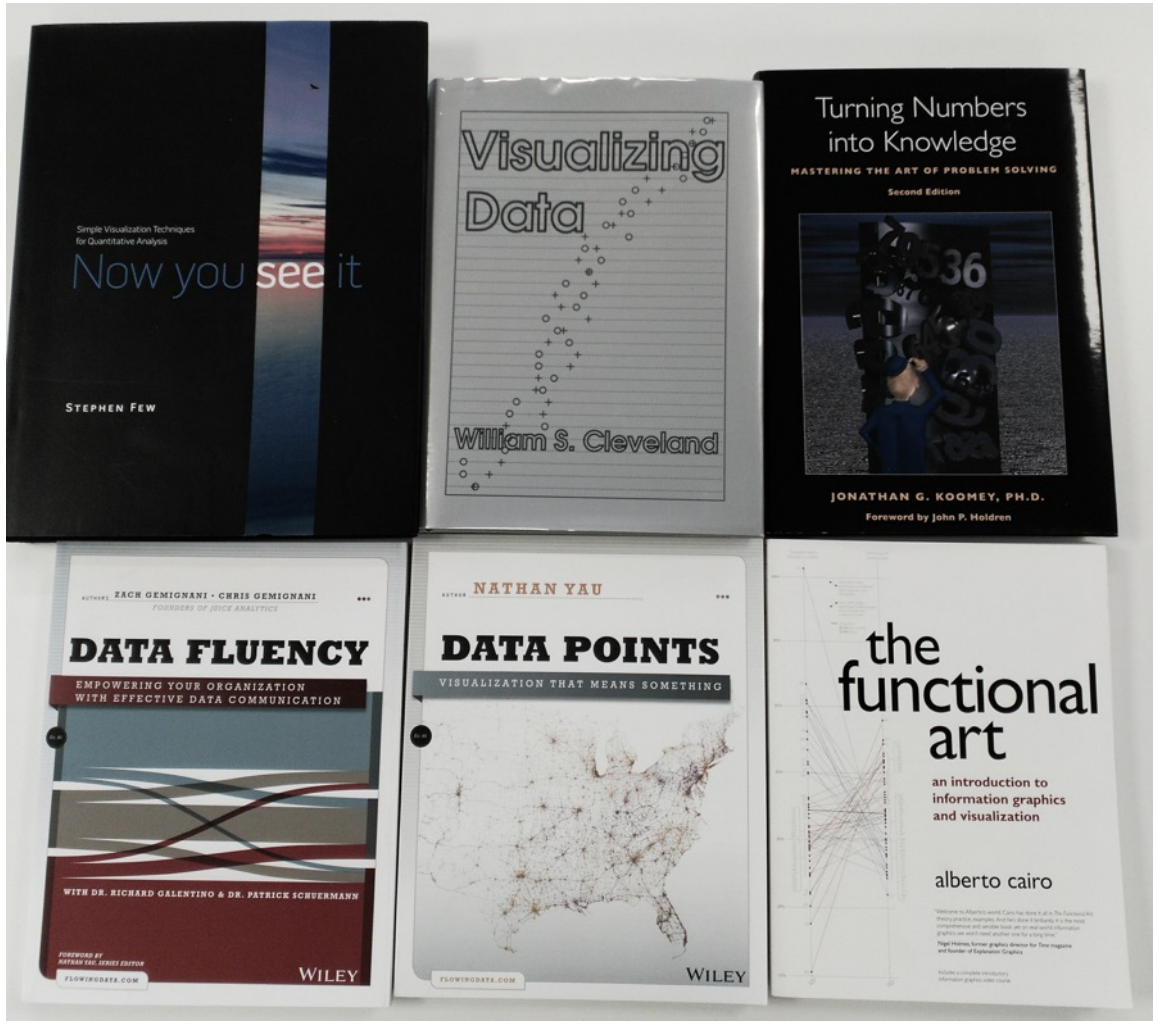


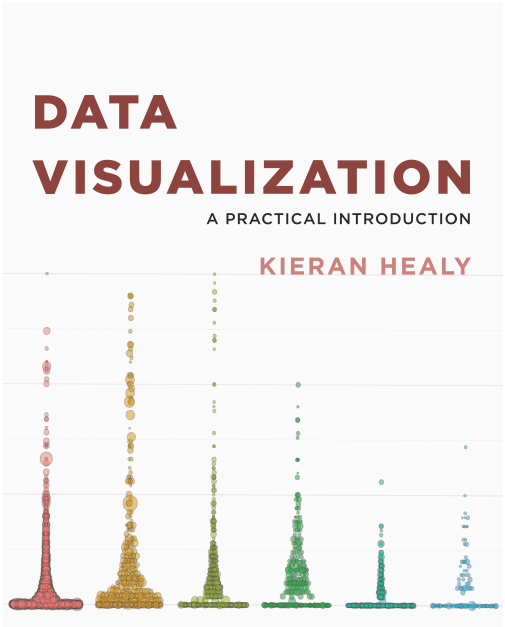


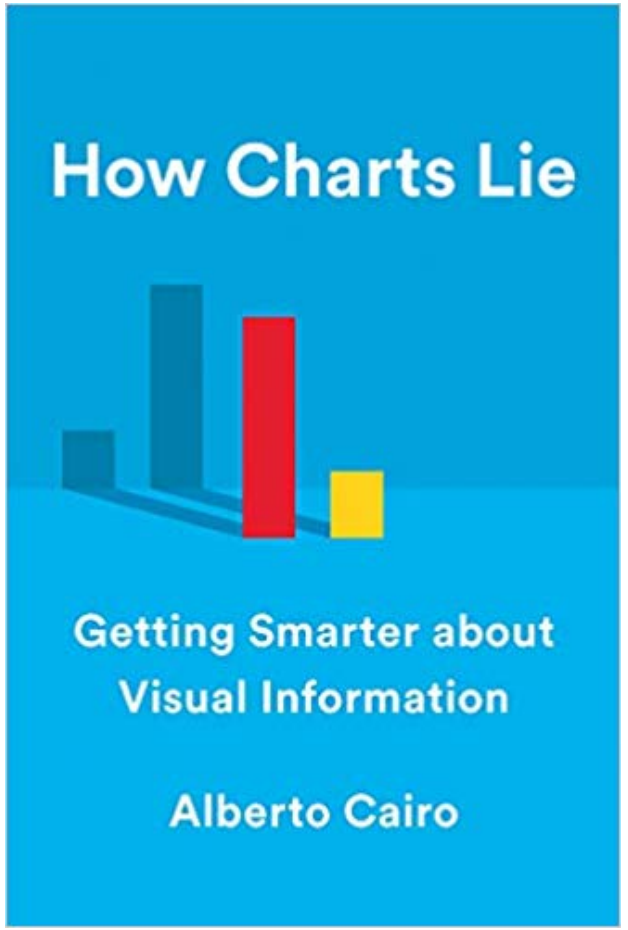




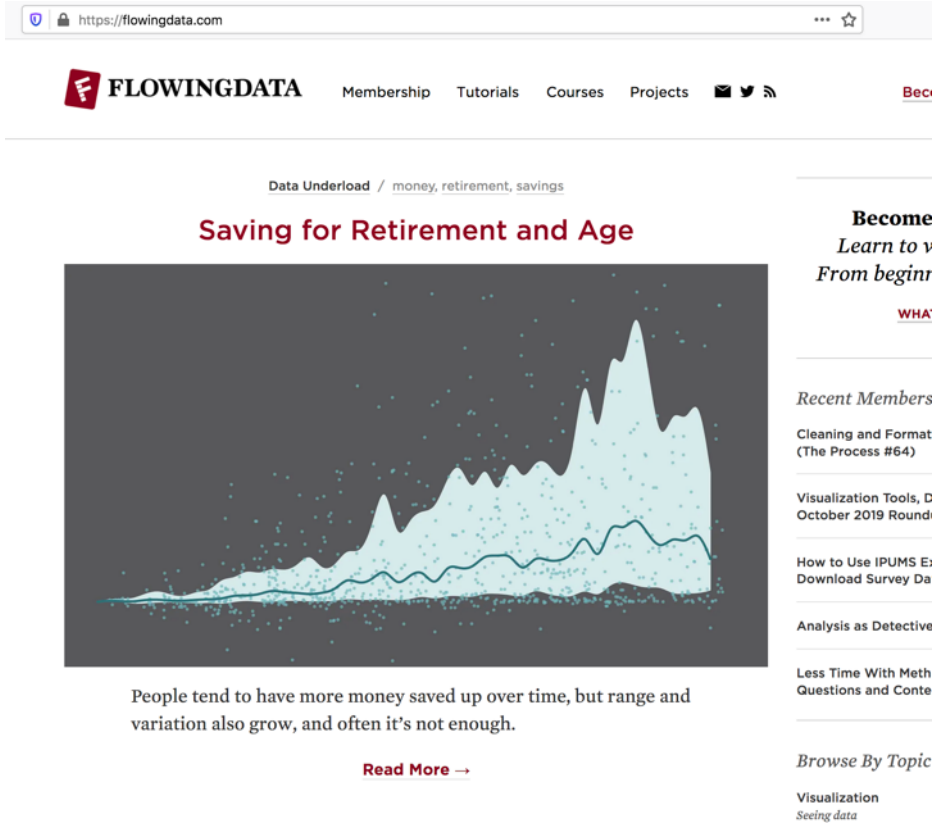
LIBROS – VISUALIZACIÓN (ACTUALES)

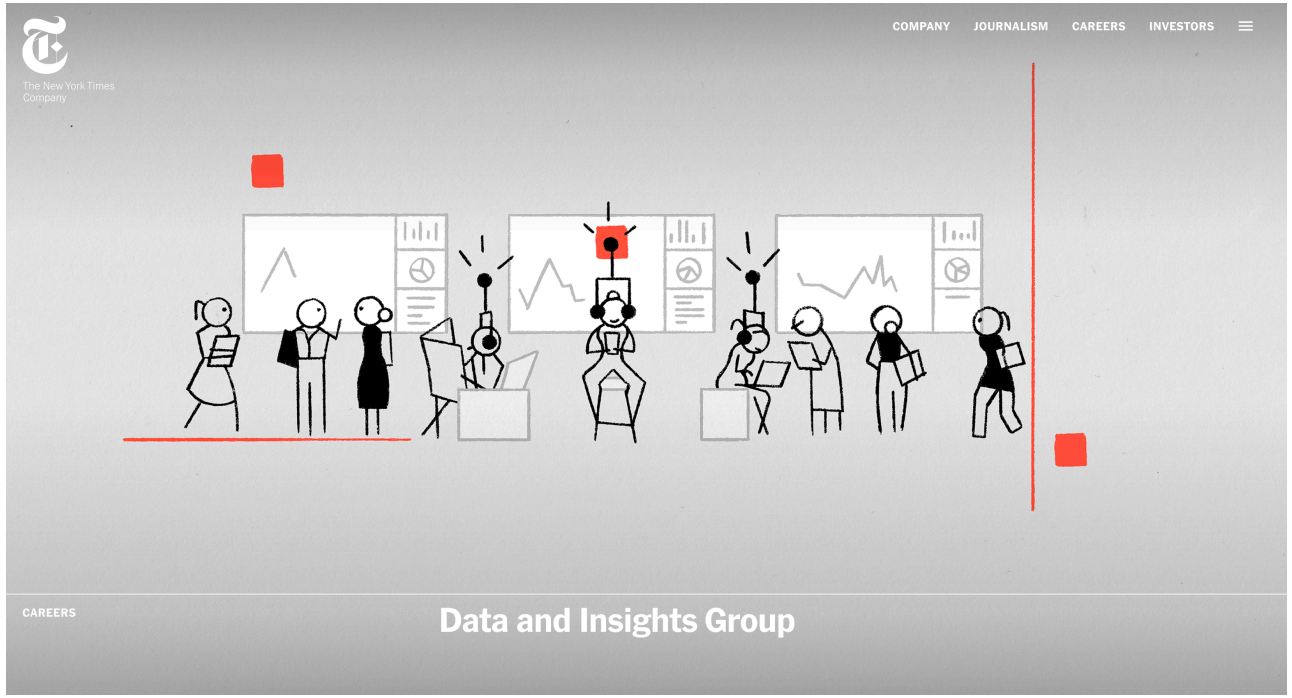






WEBS





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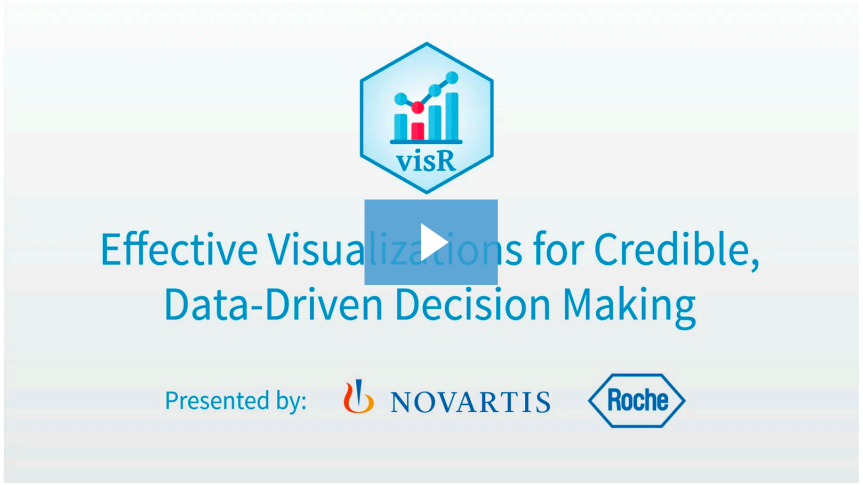

WEBINARS

Effective Visualizations for Data Driven Decisions

Charlotta Früchtenicht | **Diego Saldana** | **Mark Baille** | **Marc Vandemeulebroecke** | April 1, 2020

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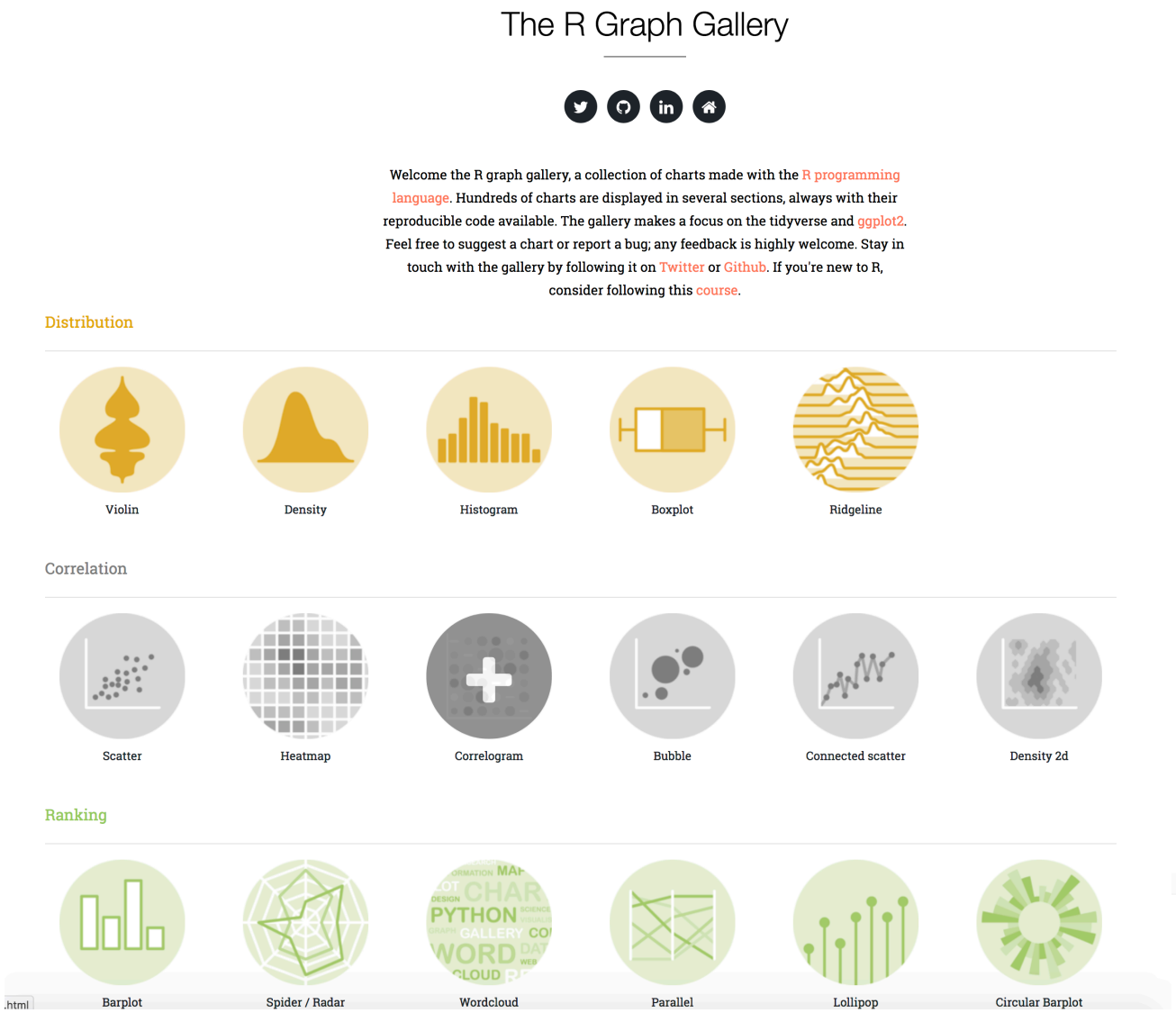
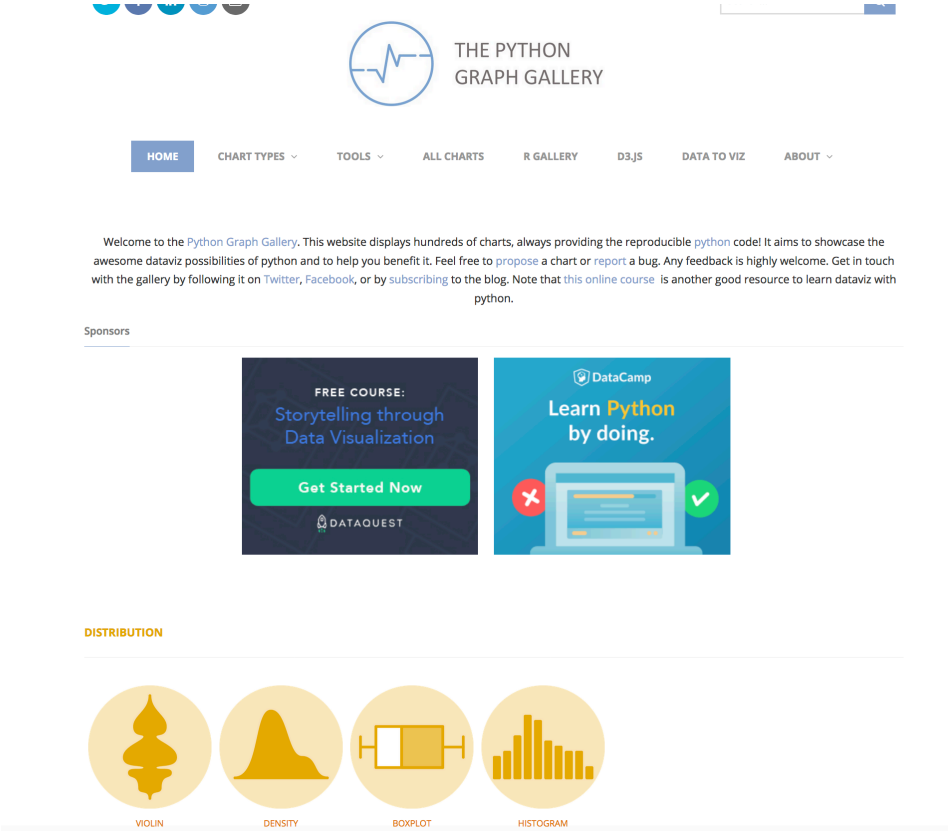
https://www.r-graph-gallery.com/



https://python-graph-gallery.com/



¡GRACIAS!

(cof@qualityexcellence.es)