Data visualisation in R using crime data

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Welcome

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All materials for today are available online.

Web link: https://rpubs.com/langton_

Material: https://github.com/langtonhugh/data_viz_R_workshop

Contents

11.15-11.45

- Intro to data viz
- ggplot2

11.45-12.15

- Live demo

12.15-13.00

- Exercise
- Own data

13.00-14.00

- Lunch

Contents

14.00-15.00

- Intro to spatial viz
- Live demo

15.00-15.15

- Coffee

15.15-16.00

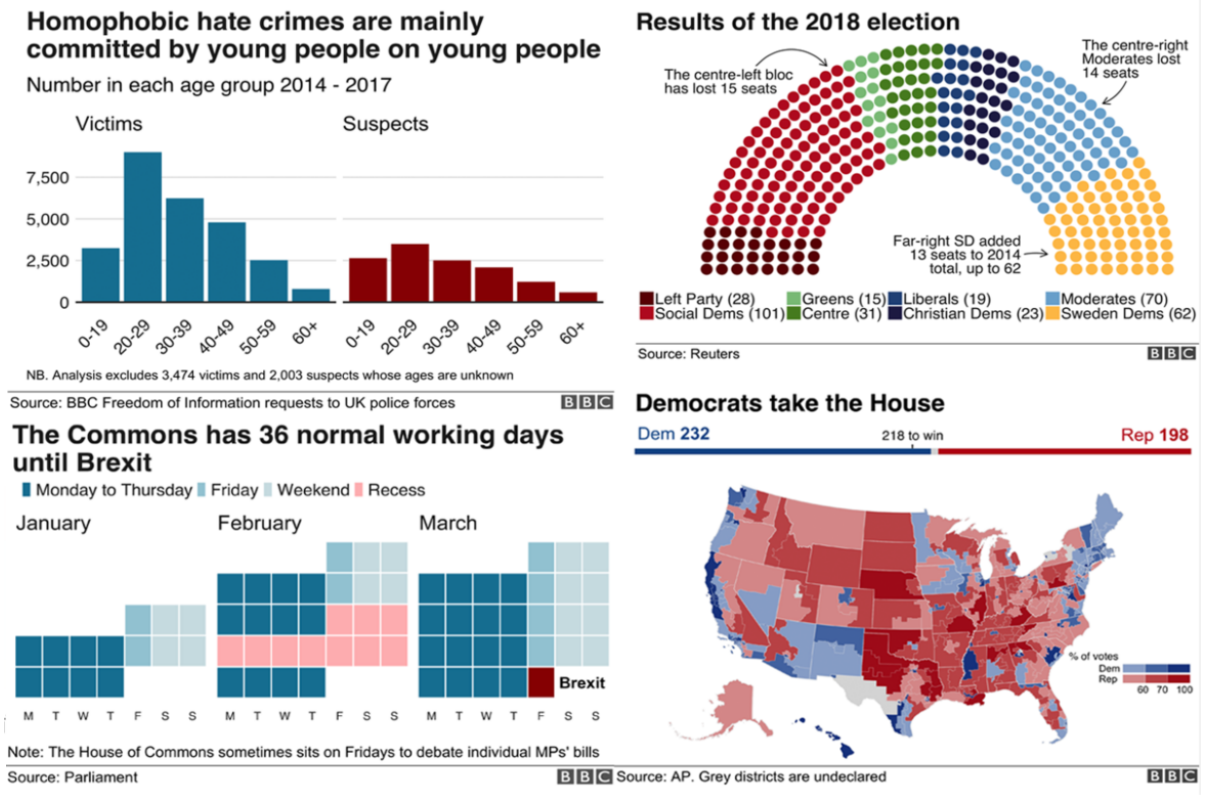
- Exercise
- Own data

Data viz

"The visual representation and presentation of data to facilitate understanding" (Kirk, 2019)

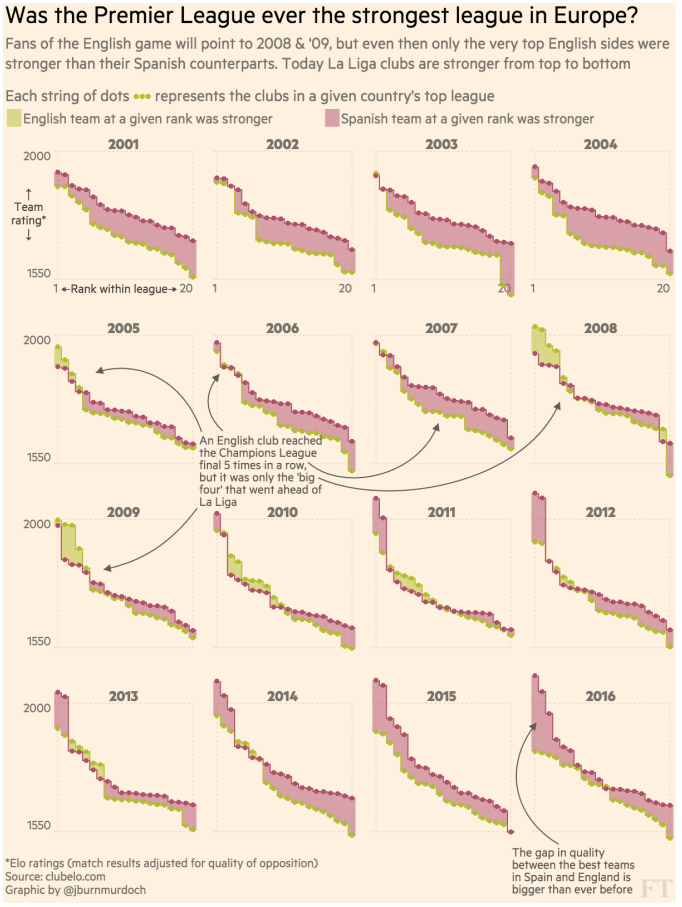
Data viz in R

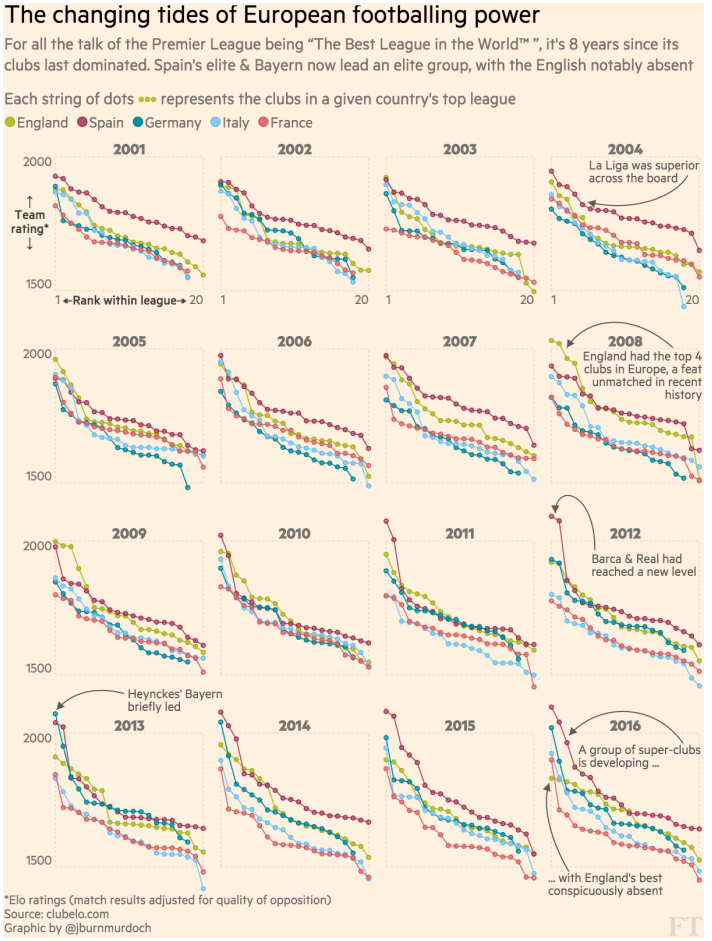
"The visual representation and presentation of data to facilitate understanding" (Kirk, 2019)



Source: Medium

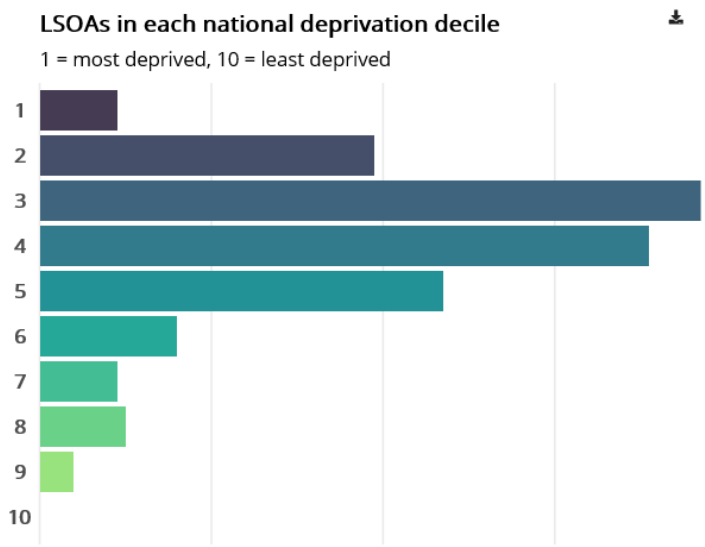
Data viz in R

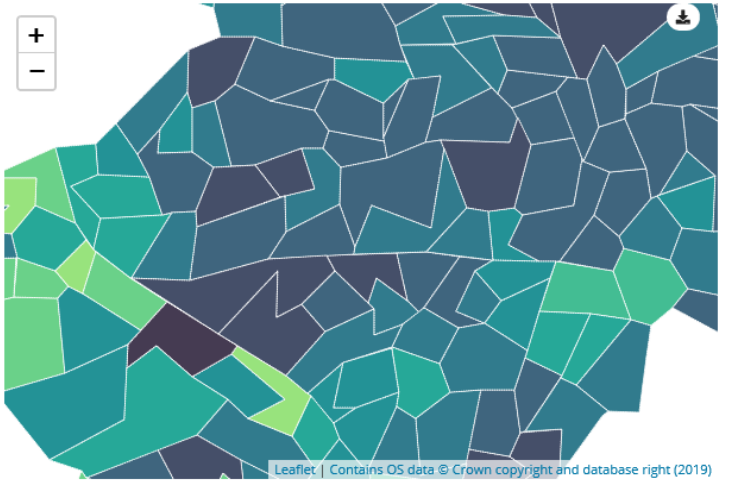




Source: John Burn-Murdoch

Data viz in R

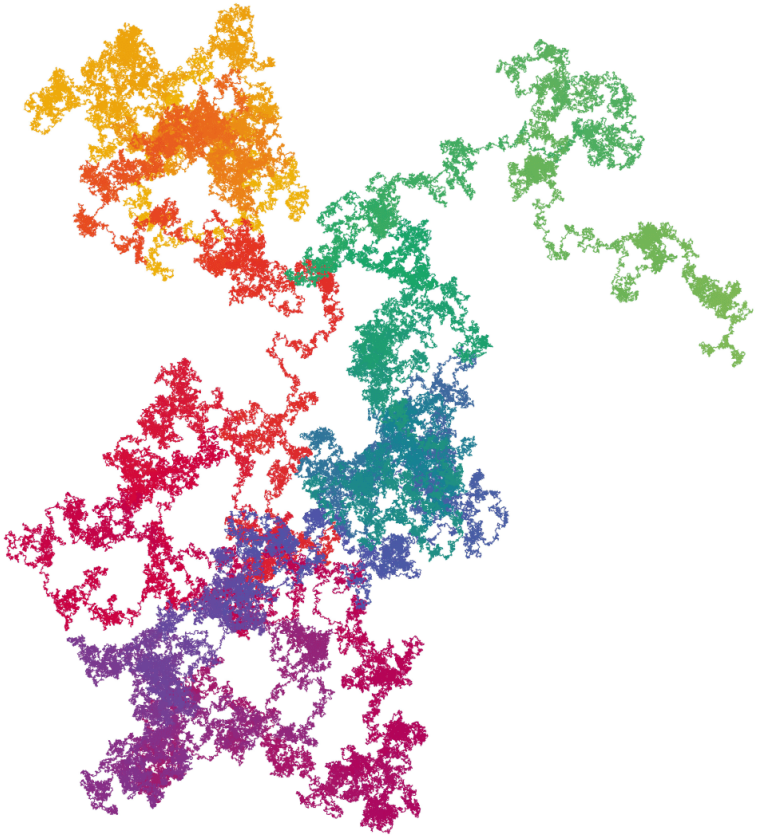




TRAFFORD COUNCIL Indices of Deprivation, 2019

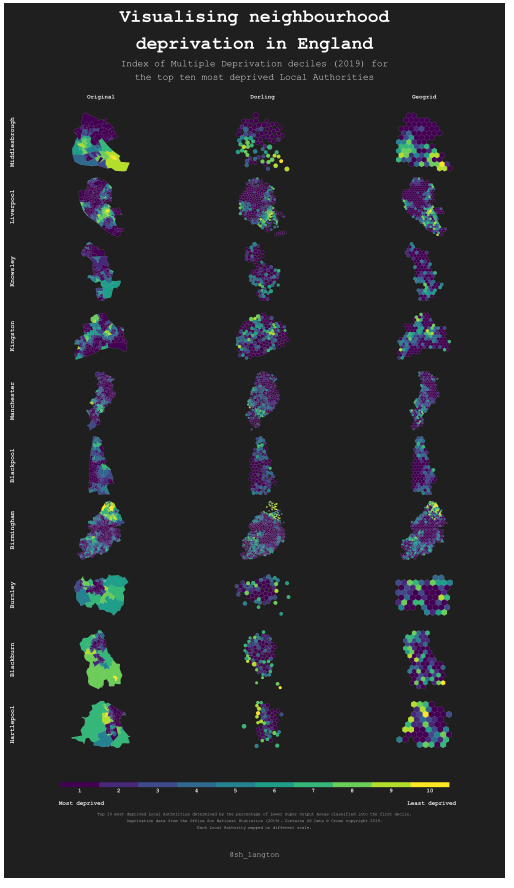
Source: Trafford Data Lab

Data viz in R



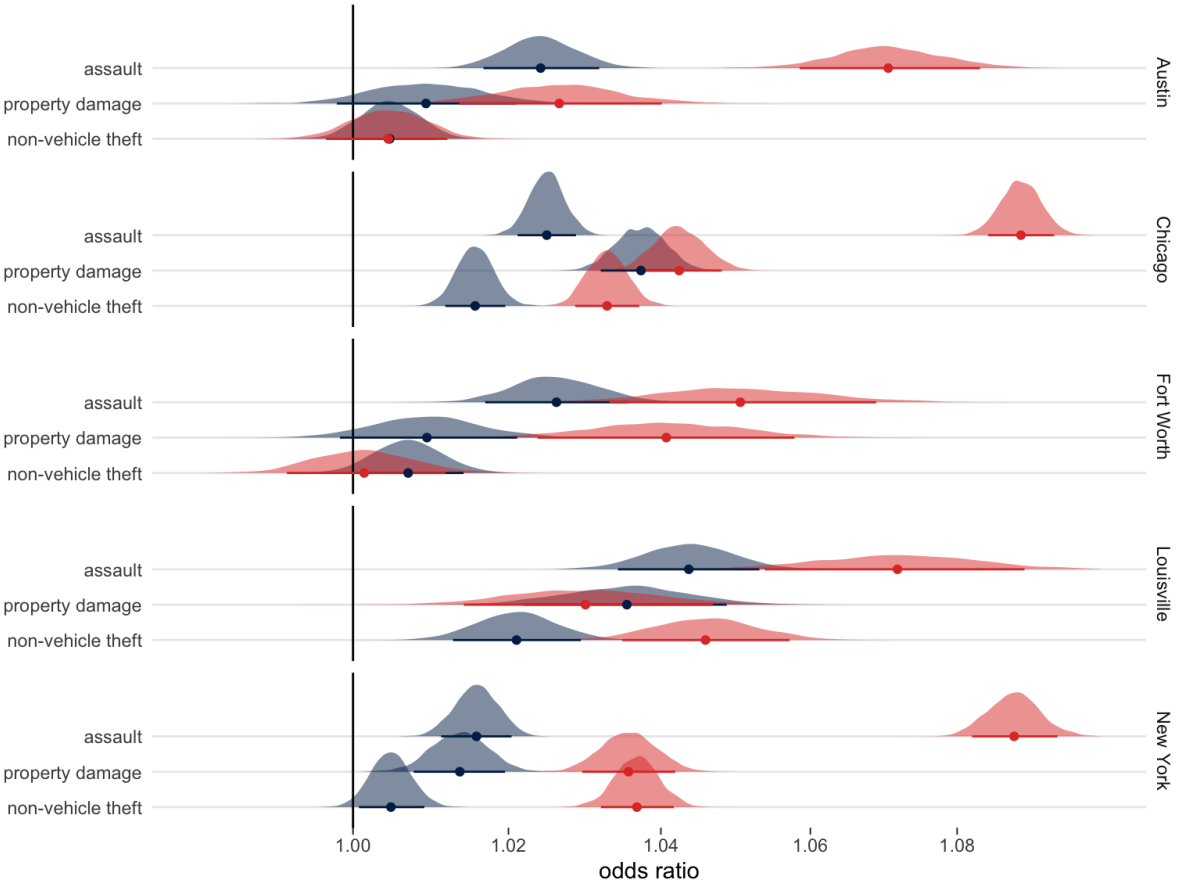
Source: Nadleh Bremer

Data viz in R



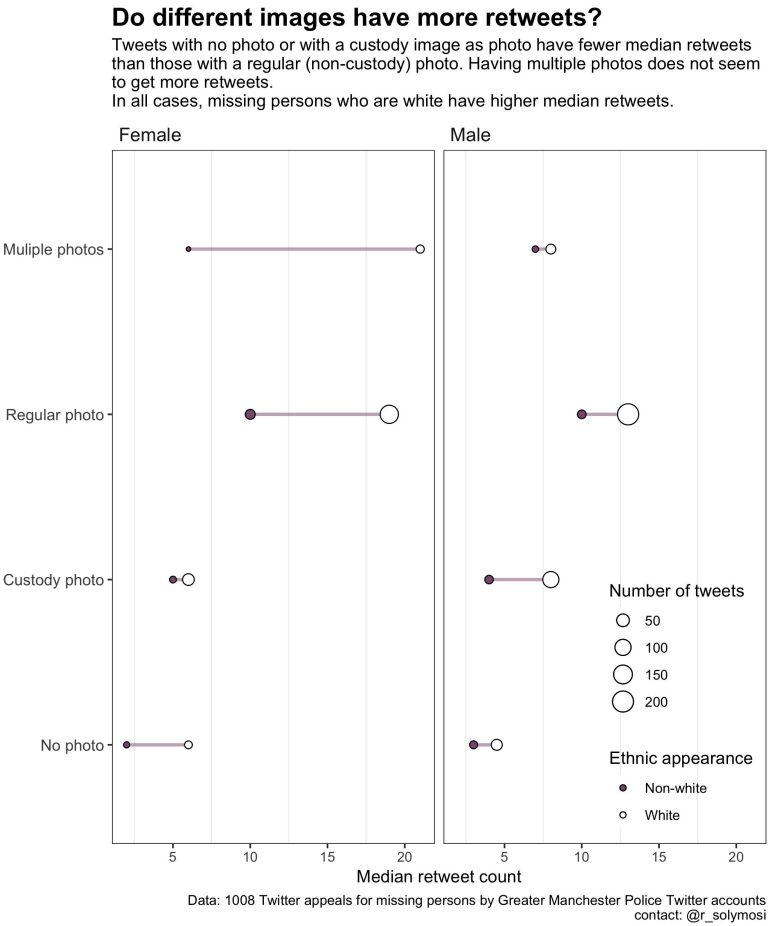
Source: Sam Langton

Data viz in R using crime data



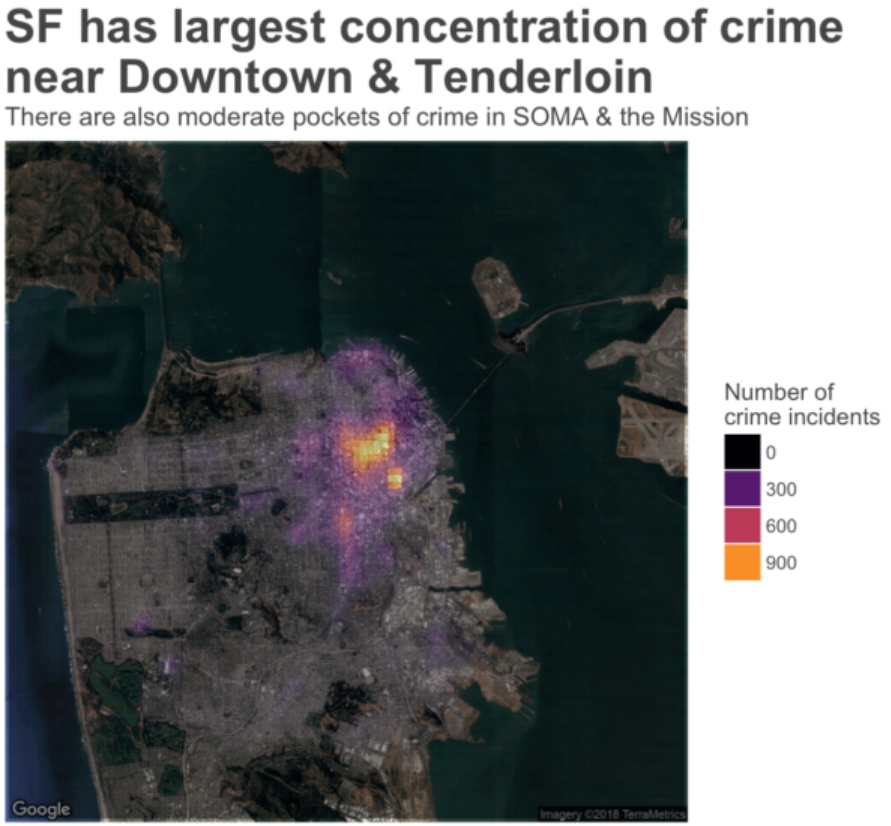
Source: Matt Ashby

Data viz in R using crime data



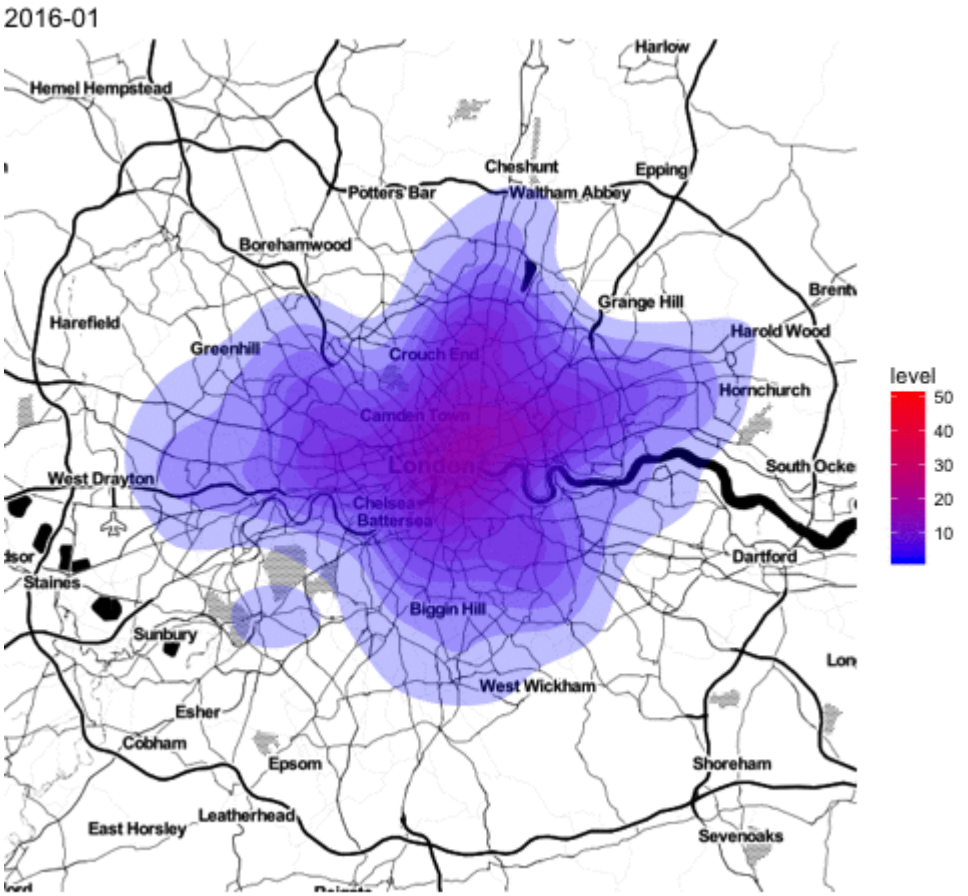
Source: Reka Solymosi

Data viz in R using crime data



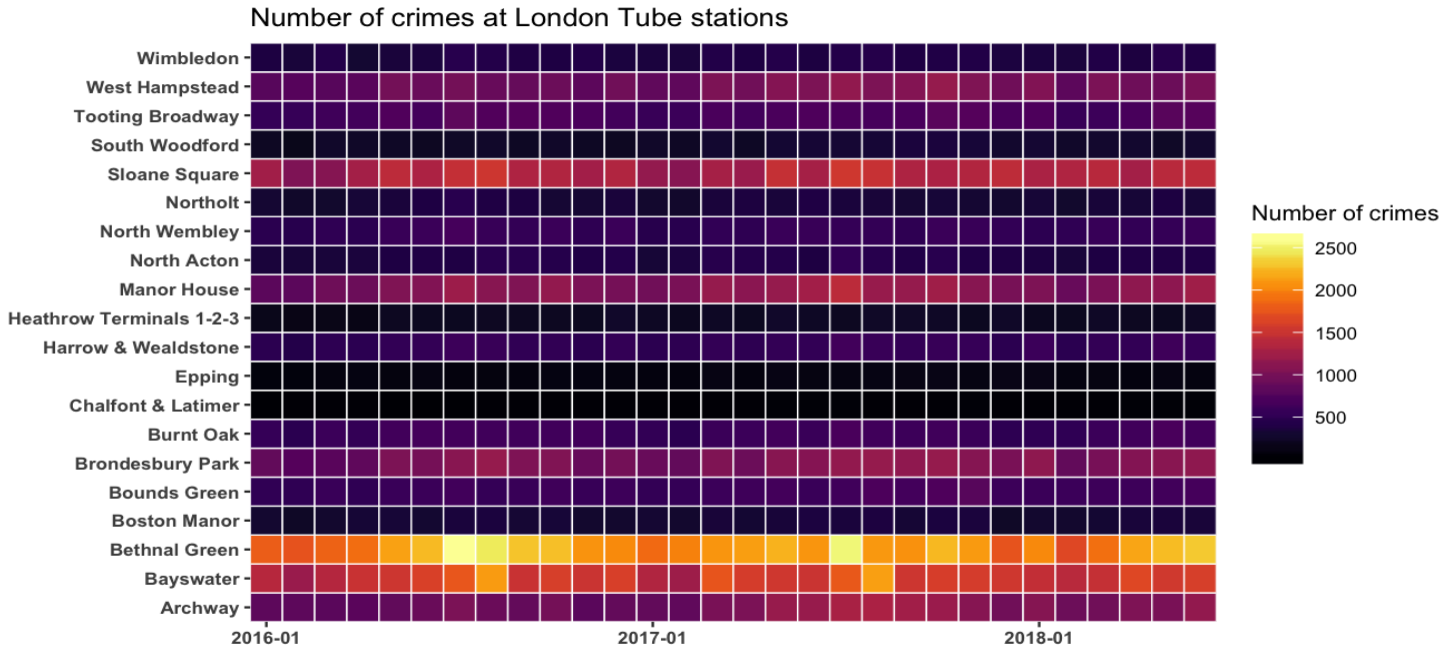
Source: Sharp Insight

Data viz in R using crime data



Source: Kasia Kulma

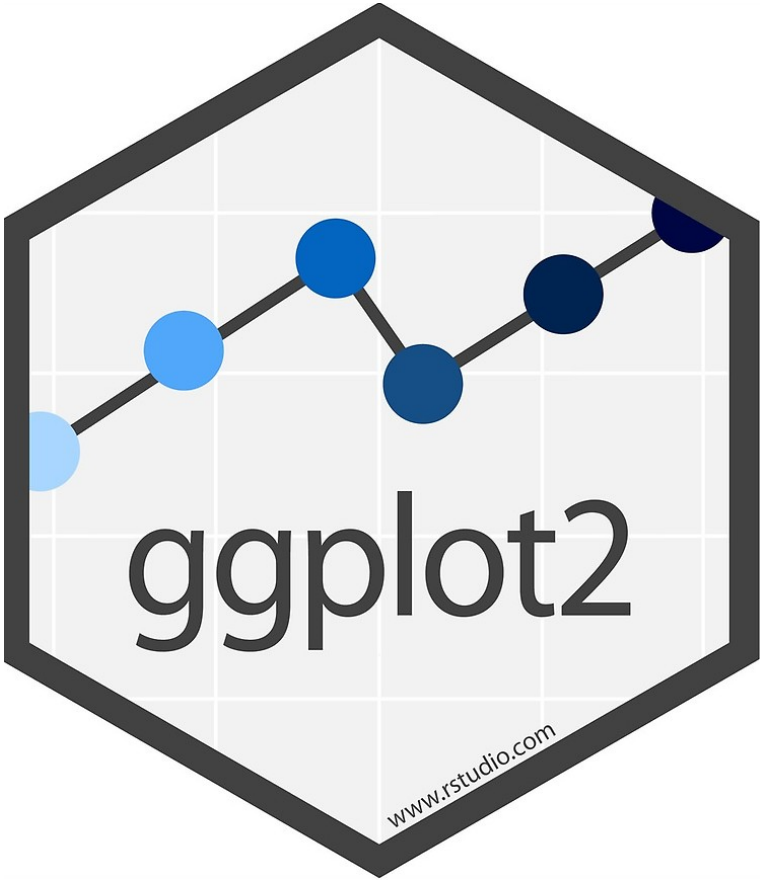
Data viz in R using crime data



Source: Kasia Kulma

Common thread?

Common thread?



ggplot2

- ggplot2 is a package for creating graphics in R based on the grammar of graphics.
- A fundamental component of this is that graphics are made up **layers**.
- This way of thinking is reflected in how we write ggplot2 code.

Image source: Skill Gaze

ggplot2

df1

var1	var2	var3
5	7	AA
3	2	AA
7	9	AA
9	15	BB
12	17	BB

ggplot2

df1

var1	var2	var3
5	7	AA
3	2	AA
7	9	AA
9	15	BB
12	17	BB

What is the relationship between var1 and var2?

ggplot2: data

Image source: Skill Gaze

ggplot2: data

```
ggplot(data = df1)
```


df1

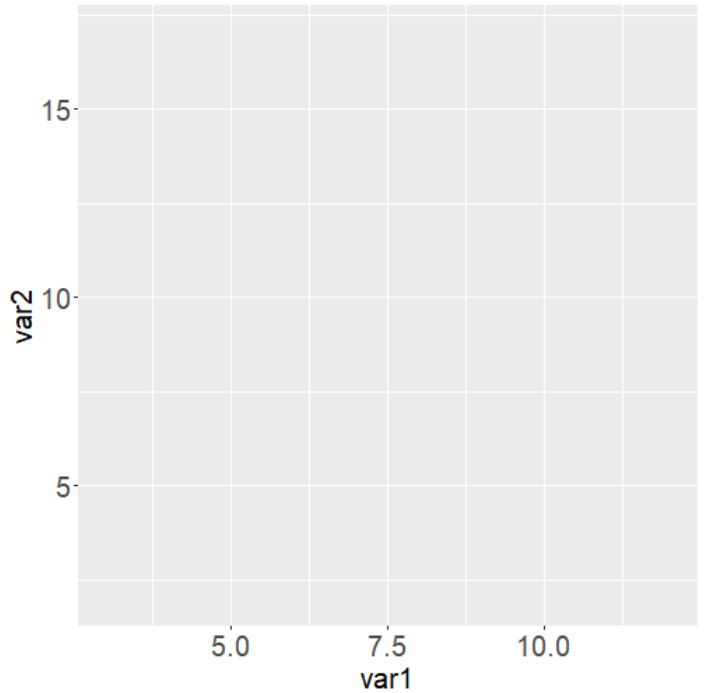
var1	var2	var3
5	7	AA
3	2	AA
7	9	AA
9	15	BB
12	17	BB

ggplot2: aesthetics

Image source: Skill Gaze

ggplot2: aesthetics

```
ggplot(data = df1, mapping = aes(x = var1, y = var2))
```



df1

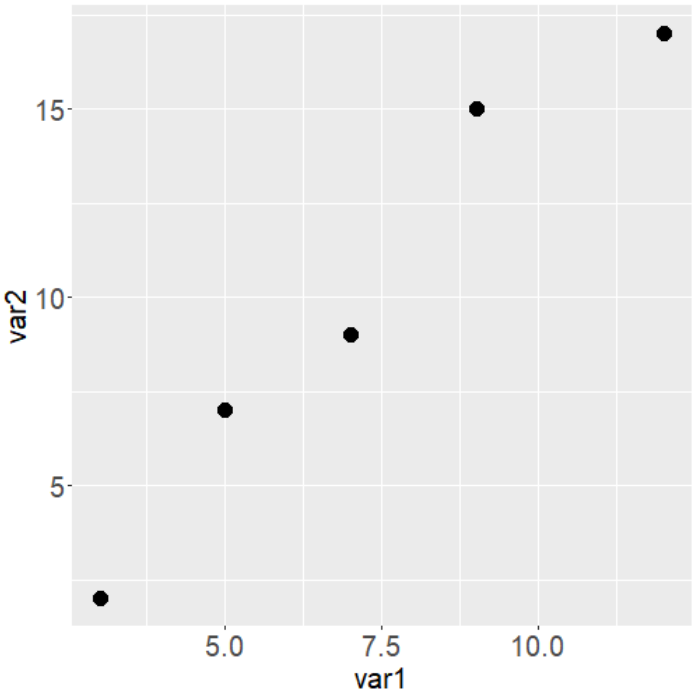
var1	var2	var3
5	7	AA
3	2	AA
7	9	AA
9	15	BB
12	17	BB

ggplot2: geometries

Image source: Skill Gaze

ggplot2: geometries

```
ggplot(data = df1, mapping = aes(x = var1, y = var2)) +
  geom_point()
```



df1

var1	var2	var3
5	7	AA
3	2	AA
7	9	AA
9	15	BB
12	17	BB

ggplot2: different aesthetics

df1

var1	var2	var3
5	7	AA
3	2	AA
7	9	AA
9	15	BB
12	17	BB

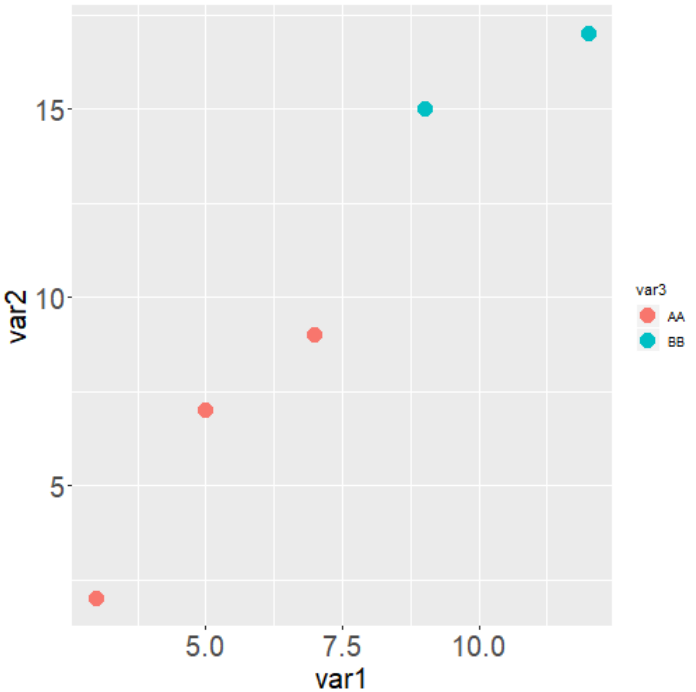
How does var3 factor into this relationship?

ggplot2: different aesthetics

- x
- y
- colour
- shape
- size
- alpha
- linetype
- ...

ggplot2: different aesthetics

```
ggplot(data = df1, mapping = aes(x = var1, y = var2, colour = var3)) +
  geom_point()
```



df1

var1	var2	var3
5	7	AA
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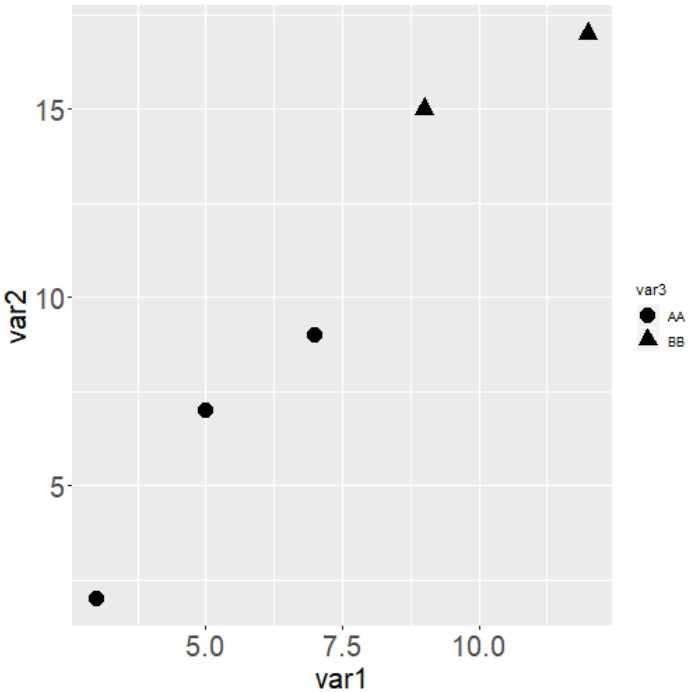
12	17	BB

ggplot2: different aesthetics

```
ggplot(data = df1, mapping = aes(x = var1, y = var2, shape = var3)) +
  geom_point()
```

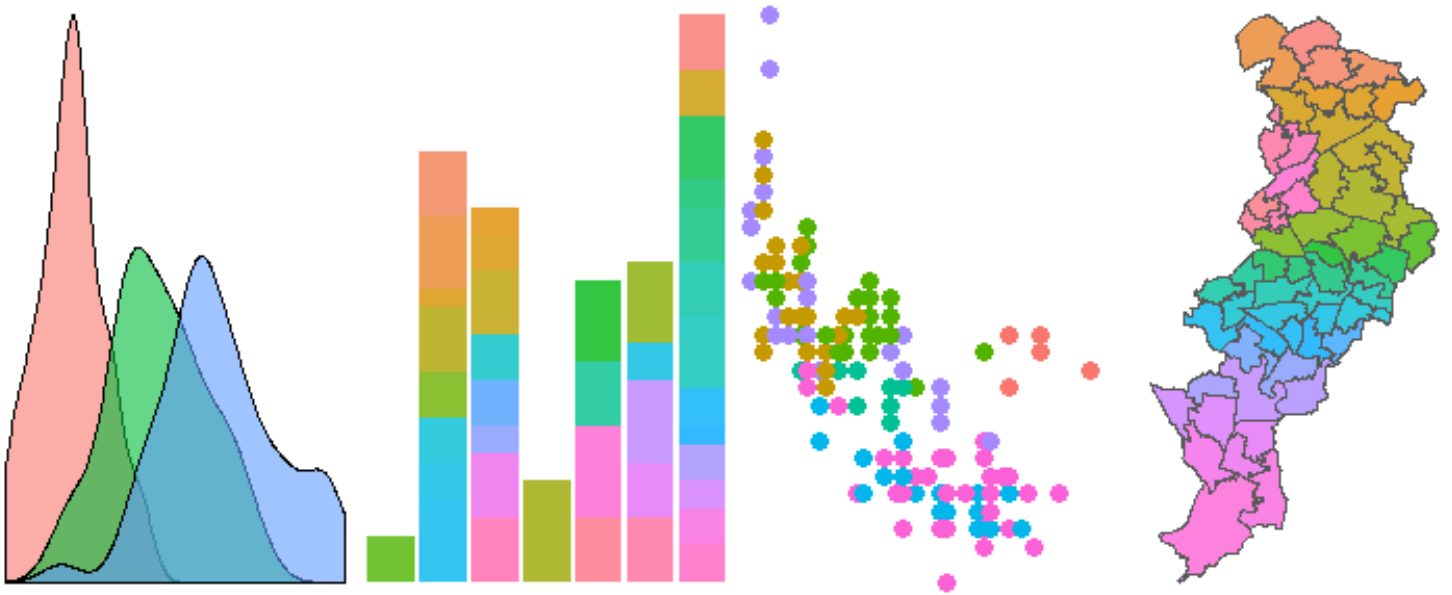


df1

var1	var2	var3
5	7	AA
3	2	AA
7	9	AA
9	15	BB
12	17	BB

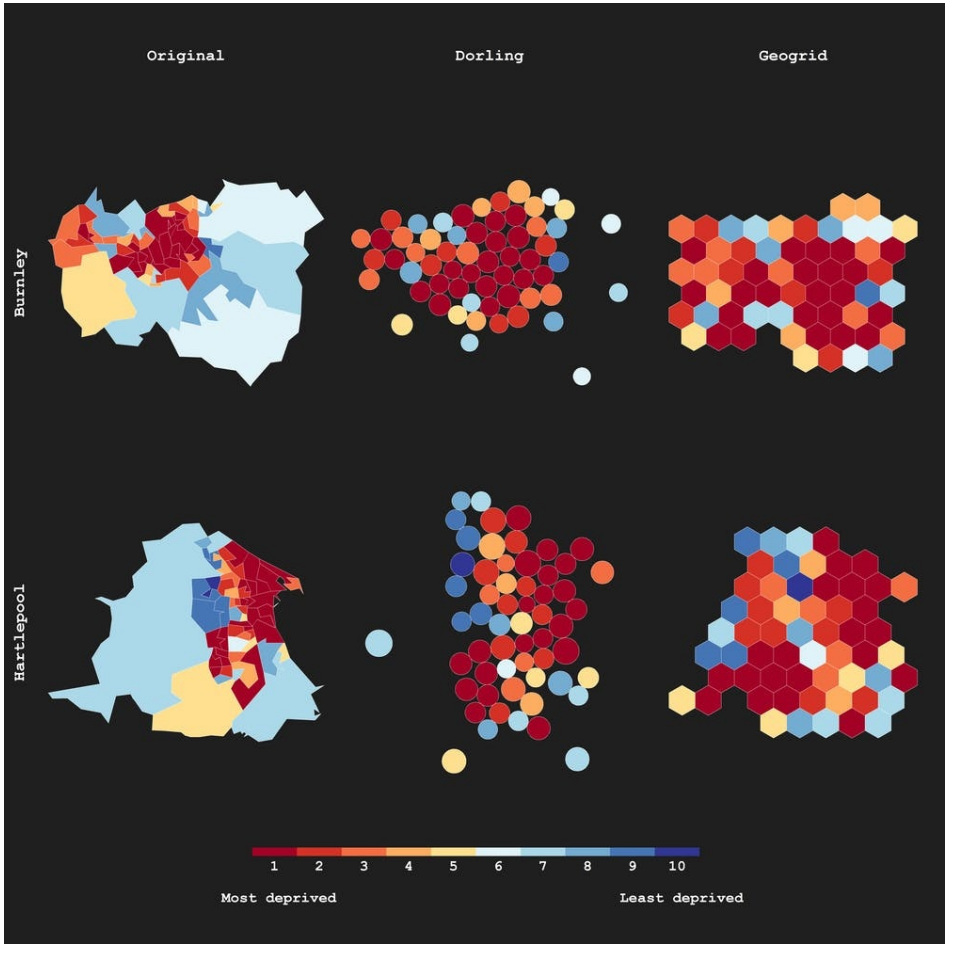
ggplot2: different geometries

- geom_point()
- geom_bar()
- geom_density()
- geom_smooth()
- ...



Crime demo

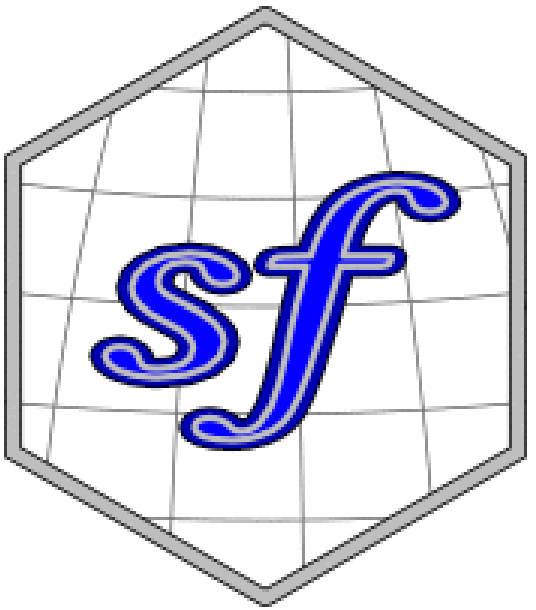
Maps in R



Source: The Conversation

The good news...

- Making a map in R is *very similar* to what we have covered already.
- Using `ggplot2` to create beautiful maps is fairly straightforward, making use of an additional package `sf`.



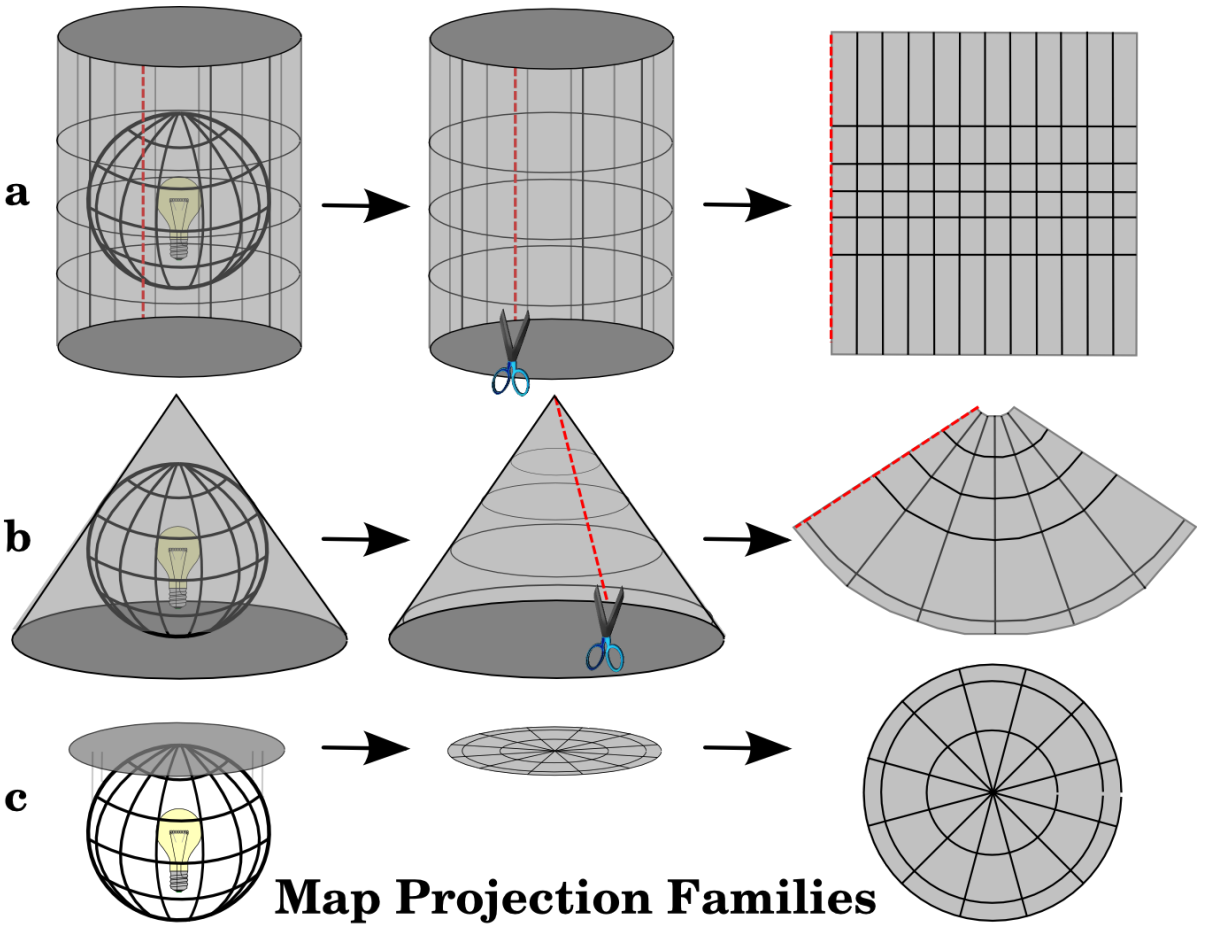
The bad news...

- You might be entering uncharted territory!
- Spatial visualisation necessitates some additional level of understanding in geography and Geographic Information Systems (GIS), including:
  - Spatial data
  - Projection
  - Visualisation issues

The bad news: spatial data

- Today, we will use shapefiles (`.shp`).
- Shapefiles are a popular format to store geospatial vector data.
- Unlike standard 2D data frames, such as .csv files, shapefiles contains multiple components.
  - `.shp`
  - `.shx`
  - `.dbf`
  - `.prj`
- But there are other formats, such as *.geojson* or *kml*, which you might come across.
- There is some debate over the most appropriate, with each having their own advantages and disadvantages.

The bad news: projections

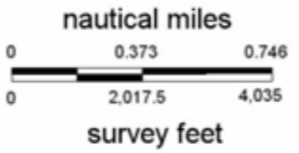


Source: QGIS.

The bad news: visualisation issues

Ten tips to make your maps more ‘interesting’

Tip 1: Do not include a scale bar



This will make it much more interesting as your map readers have to guess the distance between objects. One of the main purposes of mapping crime is to compare areas and examine the proximity of objects, so why make it easy for the uninitiated to understand you map? Without a scale bar nobody will have a clue how far things are apart and this gives you the opportunity to have impromptu quizzes or make things up as you are presenting. If you accidentally include a scale bar use a scale that goes; "0 ----- 6.75 ------13.25 kilometers" instead of the usual "0 ---5 ---10" or similar. Big complex numbers really impress audiences, and you want to look your most clever.

Source: Jerry Ratcliffe

Crime demo