



OLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

Data Visualisation: An introduction to Tableau

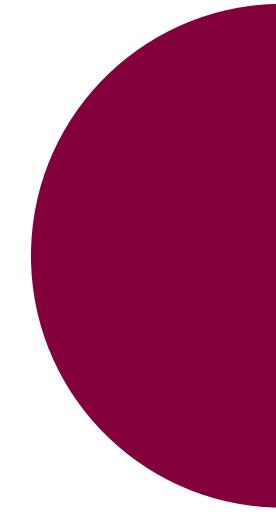
Heike Vornhagen



OLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY

Institiúid na hEolaíochta Sonrai
Data Science Institute

University
of Galway
.ie

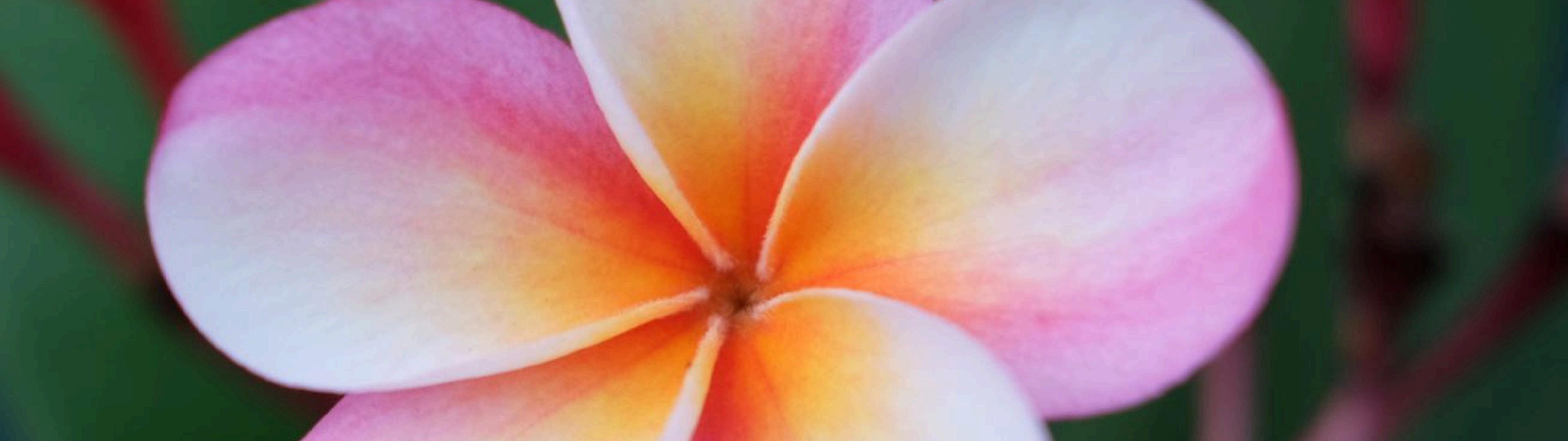


Who am I?

Post-doctoral researcher @ Data Science Institute

How do people **understand** and interact with online data?

Building data visualisations to **support decision-making**.



01 - Introduction to data visualisation

02 - Introduction to Tableau

03 - Practical Session

DATA VISUALISATION IS ...

“kind of narrative providing
a clear answer to a
question without extraneous
details”



BENJAMIN FRY,
DATA DESIGNER

Key considerations



GOALS

What are your goals?
What message do you want to get
across?

DATA

What data do you need?
What data do you want to show?

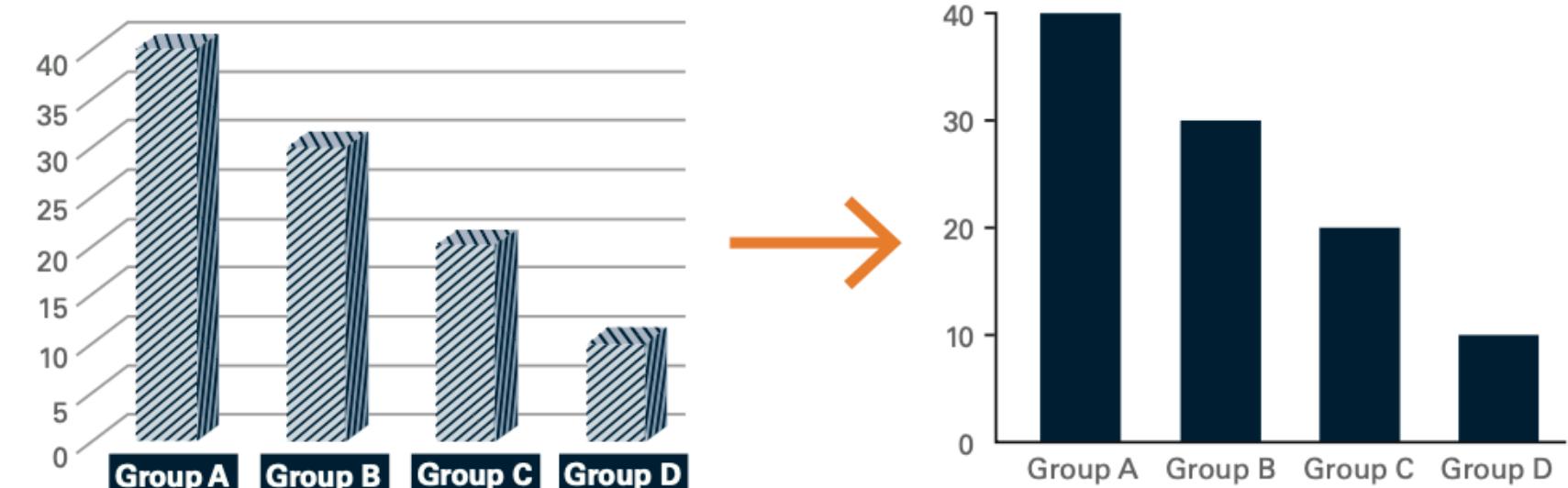
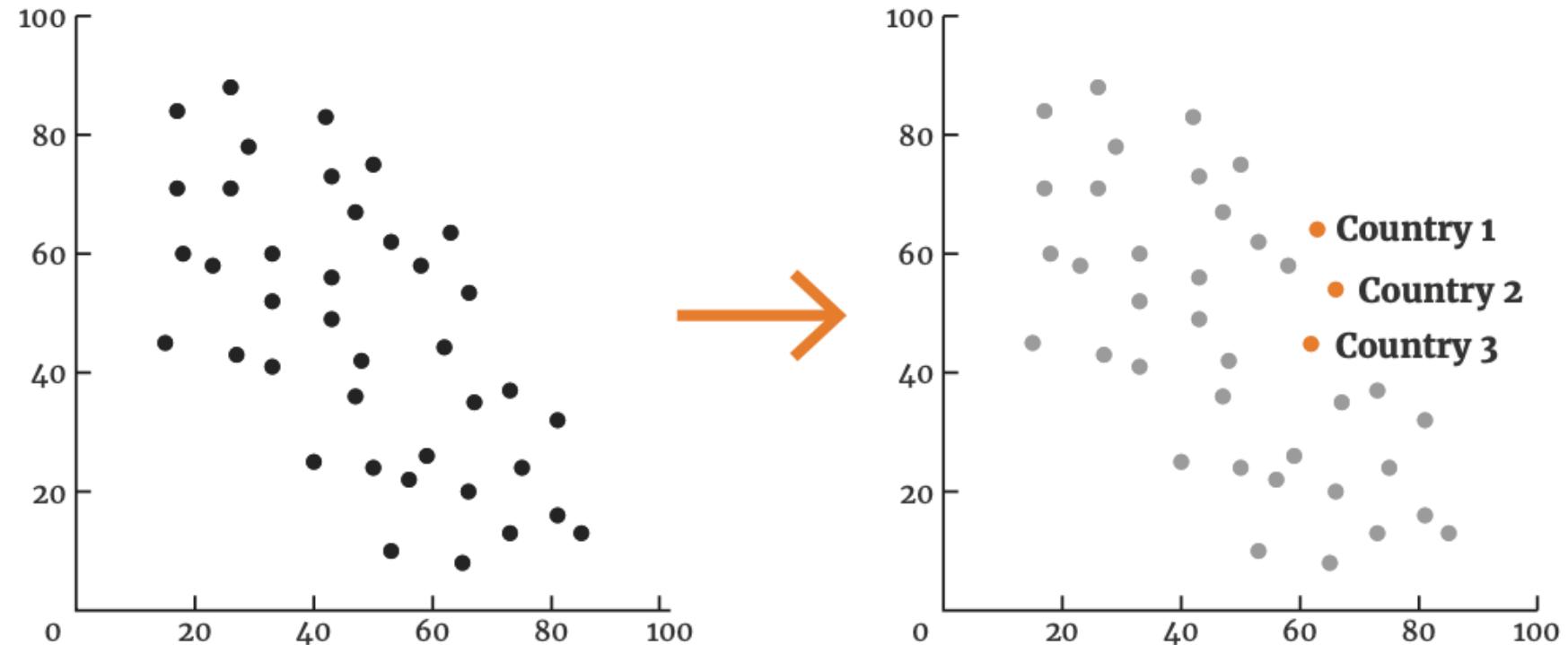
AUDIENCE

Who is it for?
What are their interests?
Data & Graph Literacy

Presentation Tips

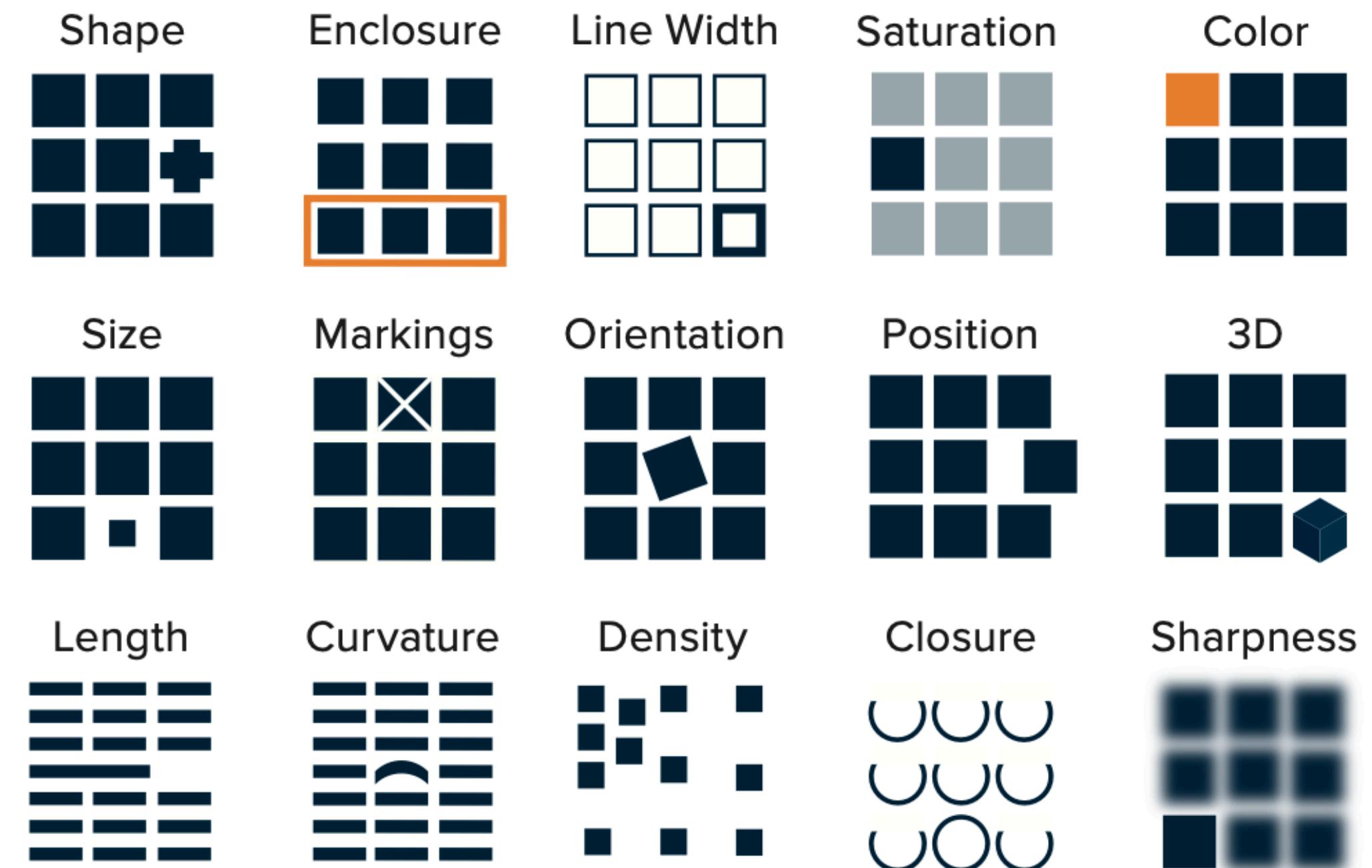
Show the data. Highlight what is important and filter out what is not needed.

Reduce Clutter. Think of backgrounds, gridlines, textures.



Presentation Tips

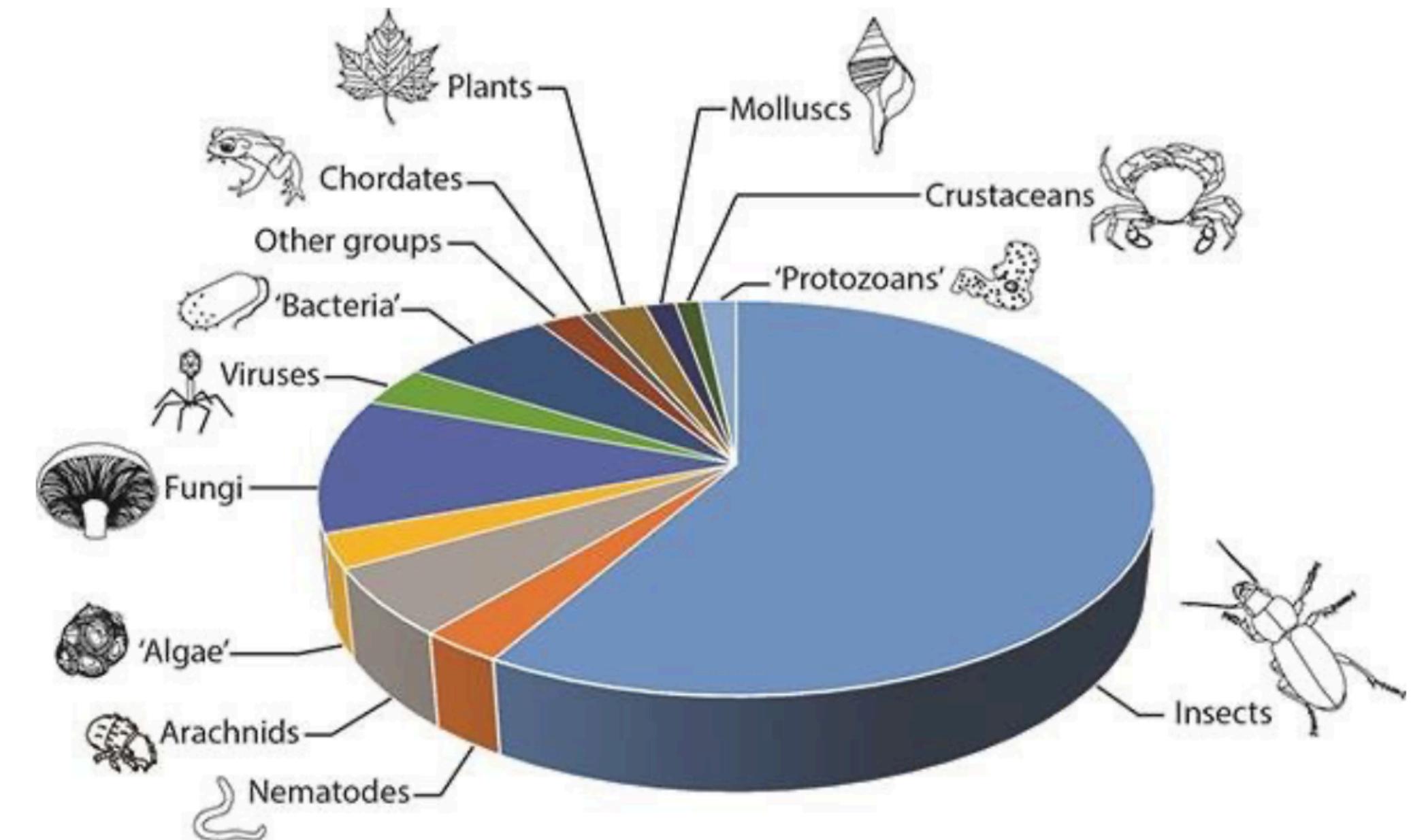
Preattentive processing. We see certain aspects without having to think - use these to highlight what is important.



Presentation Tips

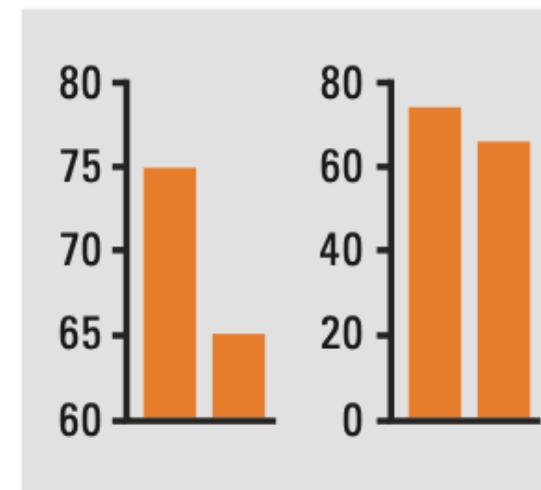
Pie Charts. Problematic if there are too many slices or if slices are very similar and accurate figures are needed. Always should sum up to 100%.

3D Charts. Problematic as it distorts the data space. Only use if you have 3D data and it can be consumed in 3D.



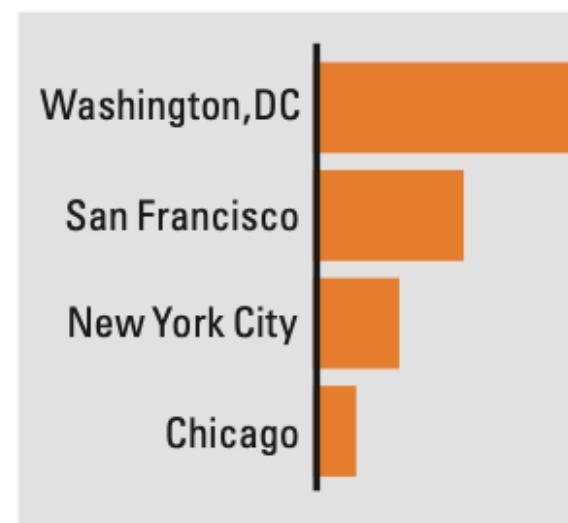
Presentation Tips

Start bar and column charts at zero



Bar and column charts that do not start at zero overemphasize the differences between the values. For small changes in quantities, consider visualizing the difference or the change in the values.

Make labels easy to read



When applicable, rotate bar and column charts to make the labels horizontal. If possible, make vertical axis labels horizontal, possibly below the title. In general, make labels clear, concise, and easy for your reader to understand.

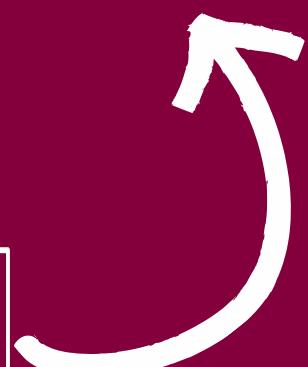
Data visualisation is always about good decisions

To make the best decisions you need to be familiar with all your options and aware of the things that will influence your choices.



THINGS YOU
COULD DO

THINGS YOU
WILL DO



Recommended Reading

POLICYVIZ

Blogs, books and resources for better data visualisations. - <https://policyviz.com>

GUARDIAN'S DATA VISUALISATION EXAMPLES

<http://www.theguardian.com/news/datablog+technology/data-visualisation>

VISUALISING DATA.

A frequently updated blog that tracks the latest developments in data visualization tools, techniques, and resources. - <https://visualisingdata.com>

WTF VISUALIZATIONS.

Visualizations that make no sense. - <http://viz.wtf>

On technology ...

The thing is, this world, especially the digital data visualisation world, is changing rapidly: new technologies, new tools and frameworks are being developed constantly. So you need to be able to adapt.

But principles are much more timeless. If you know what you want to create, then using technology is just the means to create what you have in mind.

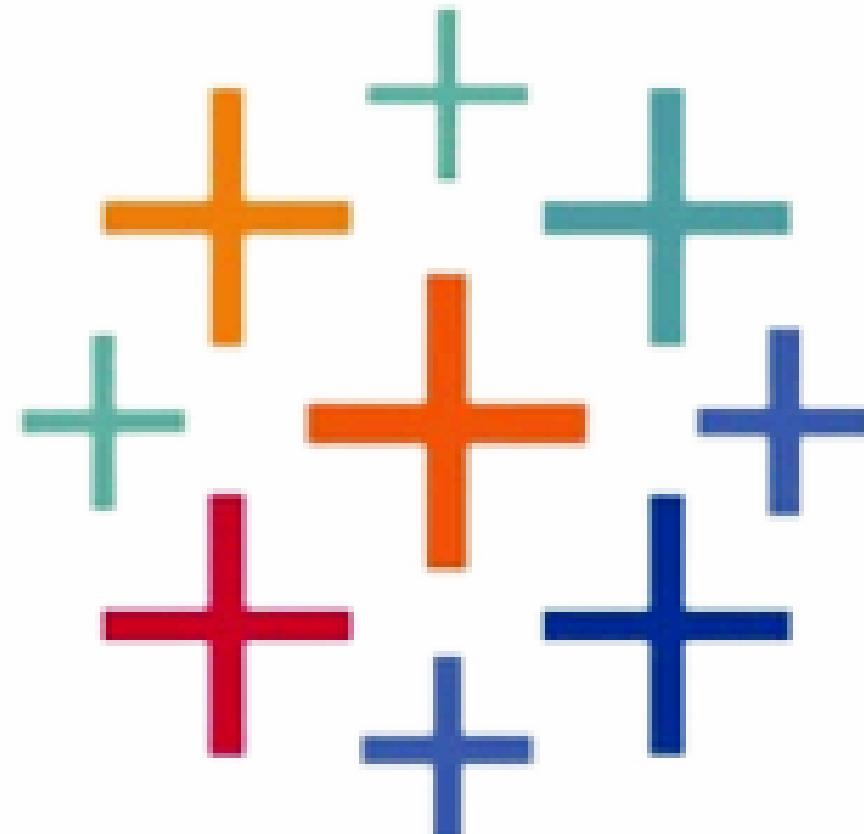
If you're too fixed on one type of technology, you may be out of a job soon.

JAN WILLEM TULP,



What is Tableau?

- Interactive data visualization software company
- Founded in 2003
- Owned by Salesforce



+ tableau

A large, stylized word "tableau" composed of blue plus signs (+). The letters are of varying sizes and are arranged to follow the curve of the word.



Connect

To a File

- Microsoft Excel
- Text file
- JSON file
- PDF file
- Spatial file
- Statistical file

To a Server

- OData
- More... >

Open

Open from Tableau Public

What's New

You can now save your work locally or publish to your Tableau Public profile. Local save is available on Tableau Desktop Public Edition 2024.3.0

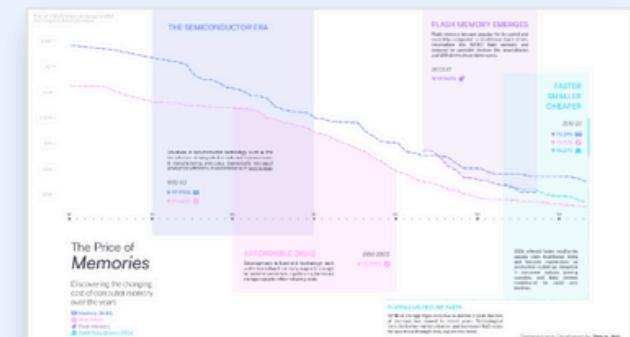
UPDATE NOW →



Learn Tableau

- [Get started with Tableau Public](#)
- [Watch how-to videos](#)
- [Explore sample data sets](#)
- [Learn on Trailhead: Tableau Hands-On Challenges](#)
- [Read the blog](#)

Viz Of The Day



The Price Of Memories

[EXPLORE TODAY'S VIZ →](#)

[SEE TRENDING VIZZES →](#)

[VIZ OF THE DAY ARCHIVE →](#)

Chosen data source

Joining multiple data sources

Relate tables
Drag tables near mammals to relate them

Add a base table
Drag out additional base tables for multi-fact analysis.

Data types:
 ABC = Categorical data
 # = Numerical data
 ⚽ = Geographical data
 ⏰ = Date & Time

mammals (mammscopy)

Connections
mammscopy Microsoft Excel

Sheets
mammals Taxonomy New Union New Table Extension

mammals

Table Details

mammals 11 fields 14248 rows

100 → rows

Date	Taxon Name	Grid Reference	#	#	Abc	Abc	Abc	Abc	Abc
14/02/2015	Apodemus sylvaticus	V790624	79,050.00	62,450.00	OSI	Ardea East, Tuosist	Fionn Moore	Trapped	
30/09/2016	Apodemus sylvaticus	O177299	317,750.00	229,950.00	OSI	University College Dublin	Billy Clarke	null	
14/12/2016	Apodemus sylvaticus	S736879	273,650.00	187,950.00	OSI	Millbrook Farm	Cian Merne	Sighting of live animal	
28/04/2018	Apodemus sylvaticus	S335966	233,550.00	196,650.00	OSI	Rushin	Mary Bulfin	Sighting of live animal	
14/12/2022	Apodemus sylvaticus	null	-7.12	52.91	WGS84	Kellystown	Hugh Shepherd	Sighting of live animal	
05/08/2017	Apodemus sylvaticus	null	-7.24	52.65	WGS84	Lacken Walk, Kilkenny city	Alice and Niall McManus	Sighting of live animal	
15/04/2017	Apodemus sylvaticus	V908415	90,850.00	41,550.00	OSI	Brahalish, Durrus	Donal Mangan	Sighting of live animal	
19/09/2018	Apodemus sylvaticus	R303942	130,350.00	194,250.00	OSI	Knockaunroe	Eamonn Twomey	Sighting of live animal	

Go to Worksheet

Data Source Sheet 1

The screenshot shows the Tableau interface with several UI elements highlighted by pink boxes:

- Data pane**: A vertical pane on the left containing the **Tables**, **Marks**, and **Filters** sections.
- Dimensions**: A category under **Tables** containing fields like **Abundance**, **County**, **Date**, etc.
- Measures**: A category under **Tables** containing fields like **Count**, **Latitude (generated)**, **Longitude (generated)**, etc.
- Filters**: A section under **Tables** containing the **mammals** filter.
- Marks Card**: A section under **Marks** showing options for **Color**, **Size**, **Text**, **Detail**, and **Tooltip**.
- Shelves**: A header for the main workspace area.

The main workspace is labeled **Sheet 1** and contains two "Drop field here" areas. A pink arrow points from the **Dimensions** category to the top "Drop field here" area, and another arrow points from the **Measures** category to the bottom "Drop field here" area.

The Data Pane lists all the fields from the source data
Dimensions represents fields that contains qualitative data or categorical data.
Measures represents a field that contains quantitative data
Most often, dimensions are **discrete** fields, and measures are **continuous**.
In Tableau **blue colour** indicates a **discrete** value and **green colour** indicates **continuous** value.

A word on data

Tableau works with long tables.
Wide tables need to be
transformed to fit the format.

County	2015	2016	2017	2018	2020	2021	Animal
Carlow	0	0	0	0	0	0	<i>Apodemus sylvaticus</i>
Cavan	0	0	0	0	0	0	<i>Capra hircus</i>
Clare	124	1	0	1	0	124	<i>Cervus elaphus</i>
Cork City	0	0	0	0	0	0	<i>Cervus nippon</i>
Cork County	12	0	0	2	0	10	<i>Crocidura russula</i>
Donegal	45	0	3	0	3	39	<i>Dama dama</i>
Dublin City	0	0	0	0	0	0	<i>Erinaceus europaeus</i>
Dún Laoghaire	0	1	1	0	0	0	<i>Halichoerus grypus</i>
Fingal	0	0	0	0	0	0	<i>Lepus timidus</i> subsp. <i>ibericus</i>
Galway City	38	0	0	0	0	38	<i>Lutra lutra</i>
Galway Cour	0	0	0	1	0	0	<i>Martes martes</i>
Kerry	92	2	1	2	32	59	<i>Meles meles</i>
Kildare	3	0	1	0	1	1	<i>Mus musculus</i>
Kilkenny	0	1	1	0	0	0	<i>Muscardinus avellanarius</i>
Laois	12	2	0	2	10	2	<i>Mustela erminea</i> subsp. <i>himalayana</i>
Leitrim	0	0	1	0	0	0	<i>Mustela vison</i>
Limerick City	7	3	3	0	1	6	<i>Myodes glareolus</i>
Limerick Cou	50	7	0	0	15	42	<i>Oryctolagus cuniculus</i>
Longford	7	0	0	0	3	4	<i>Phoca vitulina</i>
Louth	5	0	0	0	0	5	<i>Rattus norvegicus</i>
Mayo	0	1	0	0	1	0	<i>Sciurus carolinensis</i>
Meath	0	0	0	0	0	0	<i>Sciurus vulgaris</i>
Monaghan	1	0	0	0	1	0	<i>Sorex minutus</i>
North Tippera	13	0	0	0	0	13	<i>Vulpes vulpes</i>
Offaly	0	0	0	0	0	0	<i>Apodemus sylvaticus</i>

A word on data

Tableau works with long tables.

Wide tables need to be transformed to fit the format.

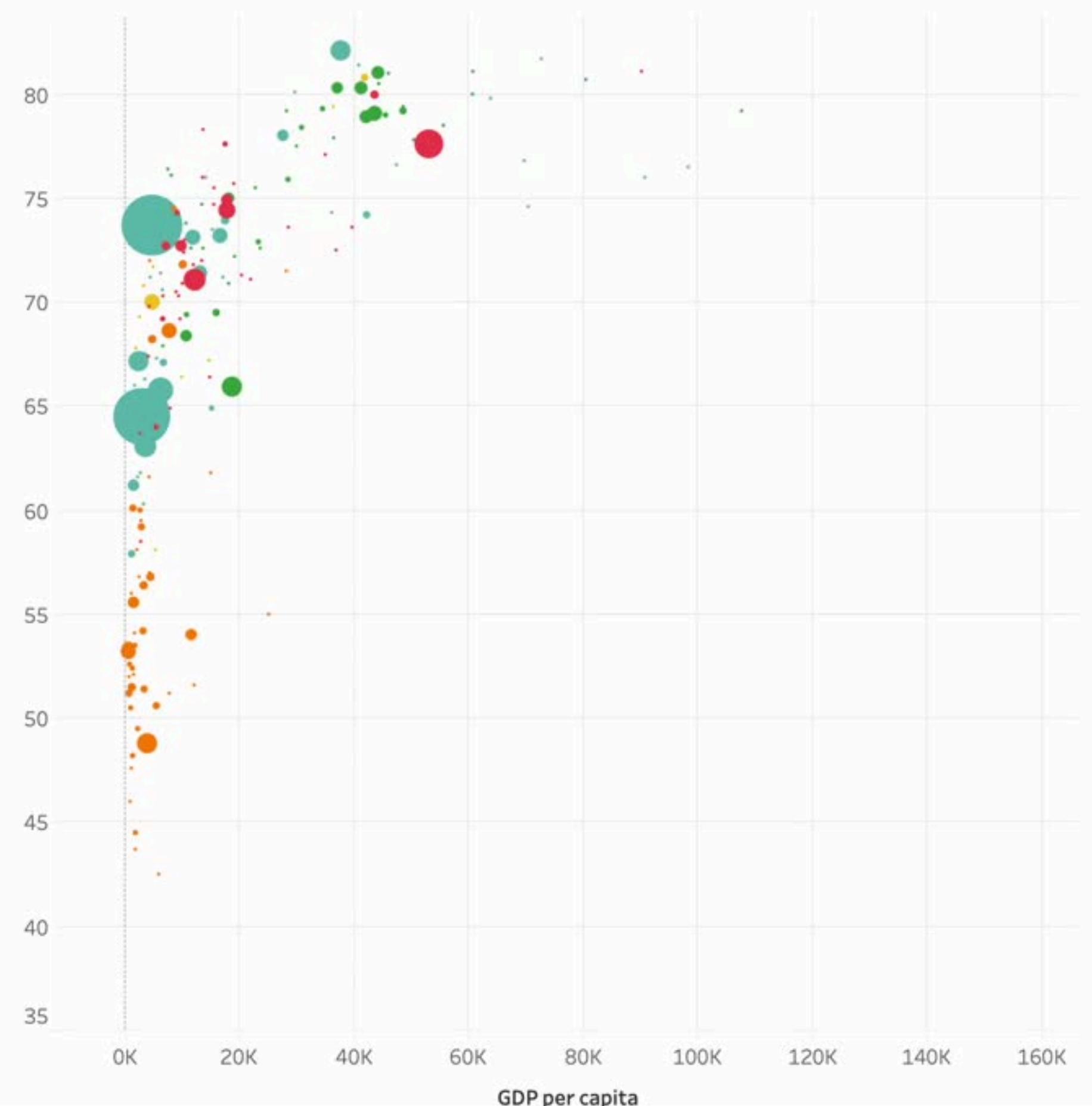
County	Year	Animal
Carlow	2015	0 <i>Apodemus sylvaticus</i>
Cavan	2015	0 <i>Capra hircus</i>
Clare	2015	124 <i>Cervus elaphus</i>
Cork City	2015	0 <i>Cervus nippon</i>
Cork County	2015	12 <i>Crocidura russula</i>
Donegal	2015	45 <i>Dama dama</i>
Dublin City	2015	0 <i>Erinaceus europaeus</i>
Dún Laoghaire	2015	0 <i>Halichoerus grypus</i>
Fingal	2015	0 <i>Lepus timidus</i> subsp. <i>hiber</i>
Galway City	2015	38 <i>Lutra lutra</i>
Galway Cour	2015	0 <i>Martes martes</i>
Kerry	2015	92 <i>Meles meles</i>
Kildare	2015	3 <i>Mus musculus</i>
Kilkenny	2015	0 <i>Muscardinus avellanarius</i>
Laois	2015	12 <i>Mustela erminea</i> subsp. <i>hi</i>
Leitrim	2016	0 <i>Mustela vison</i>
Limerick City	2016	7 <i>Myodes glareolus</i>
Limerick Cou	2016	50 <i>Oryctolagus cuniculus</i>
Longford	2016	7 <i>Phoca vitulina</i>
Louth	2016	5 <i>Rattus norvegicus</i>
Mayo	2016	0 <i>Sciurus carolinensis</i>
Meath	2016	0 <i>Sciurus vulgaris</i>
Monaghan	2016	1 <i>Sorex minutus</i>
North Tippera	2016	13 <i>Vulpes vulpes</i>
Offaly	2016	0 <i>Apodemus sylvaticus</i>

Practice example

We will recreate this together.

Open Tableau.
Connect to Text file.
Upload **life-expectancy.csv**

Life expectancy vs GDP 1990-2021



OLSCOIL NA
GAILIMHE
UNIVERSITY
OF GALWAY

Institiúid na hEolaíochta Sonrai
Data Science Institute

life-expectancy-un-vs-gdp-per-capita-wb

Filters
0 | Add

Connections Add

life-expectancy...p-per-capita-wb
Text file

Files

Use Data Interpreter
Data Interpreter might be able to clean your Text file workbook.

life-expectan...capita-wb.csv

New Union

New Table Extension

life-expectancy-un-vs-gdp... 7 fields 16066 rows

Relate tables

Drag tables near life-expectancy-un-vs-gdp-per-cap... to relate them

Add a base table

Drag out additional base tables for multi-fact analysis.

Need help adding data? [Learn more](#)

100 → rows

Name: life-expectancy-un-vs-gdp-per-capita-wb.csv

Fields

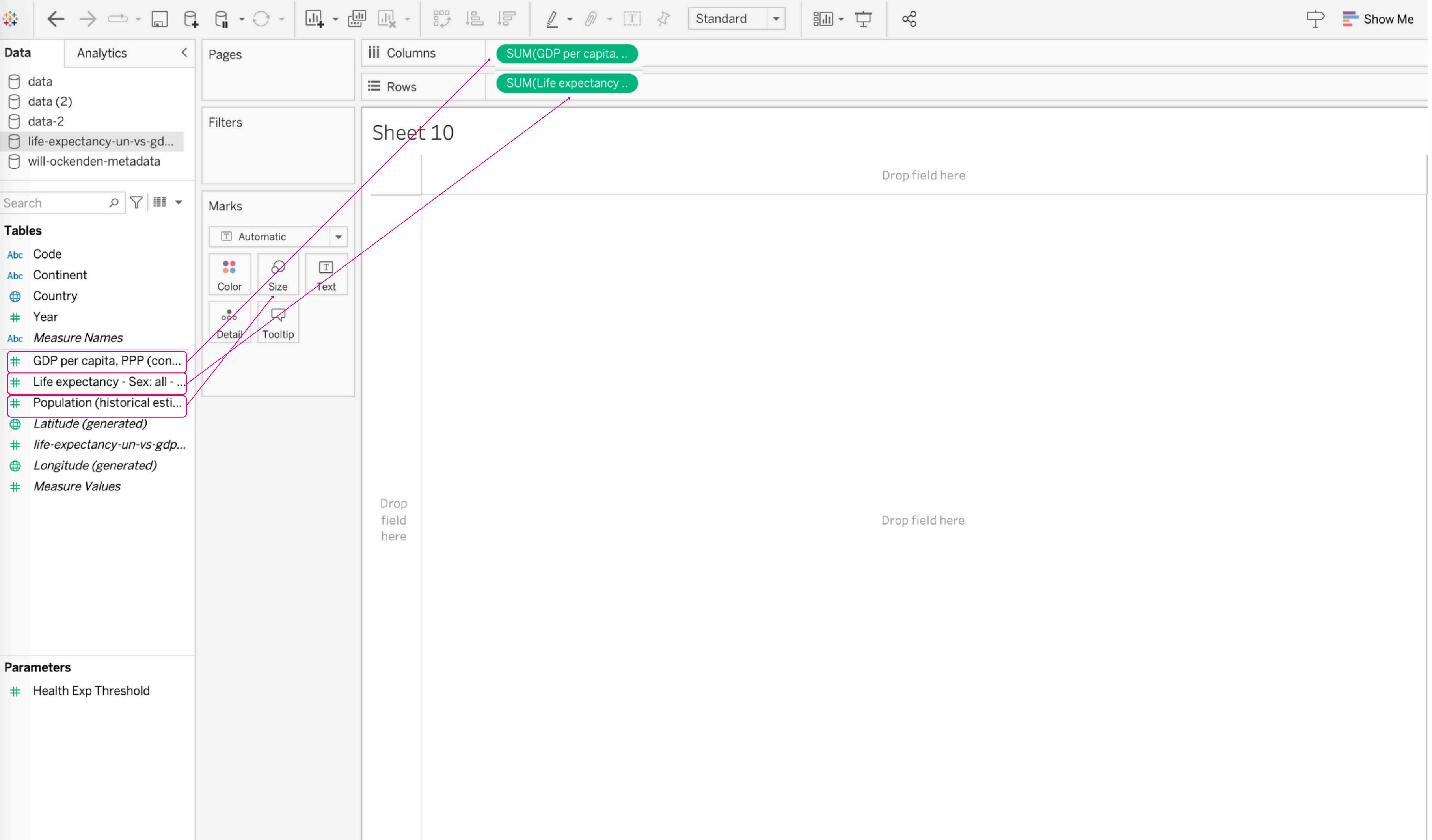
Type	Field Name	Phys...	Rem...
🌐	Country	life-ex...	Country
Abc	Code	life-ex...	Code
#	Year	life-ex...	Year
#	Life expectancy - Sex: all - Age:	life-ex...	Life ex...

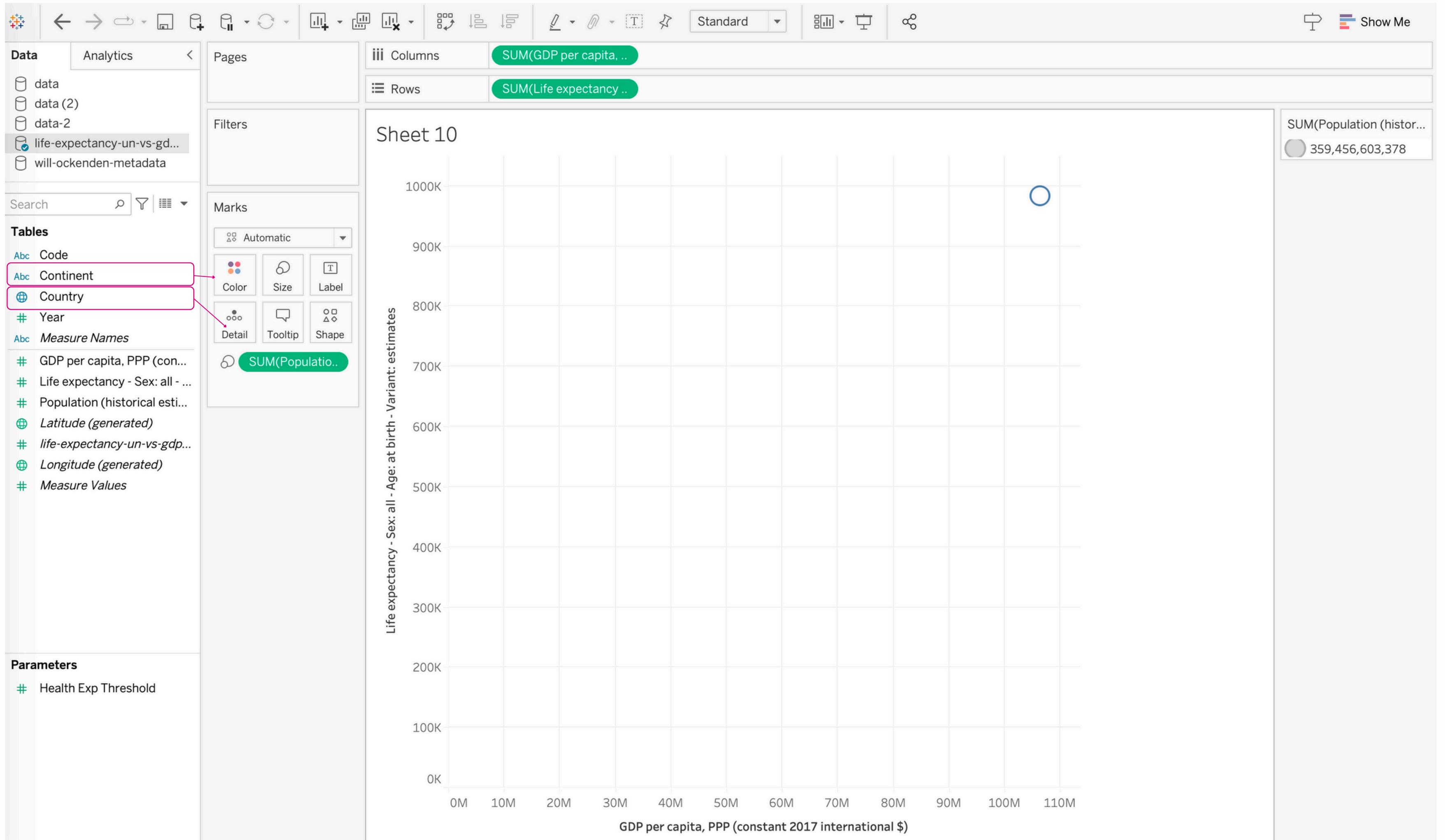
Go to Worksheet

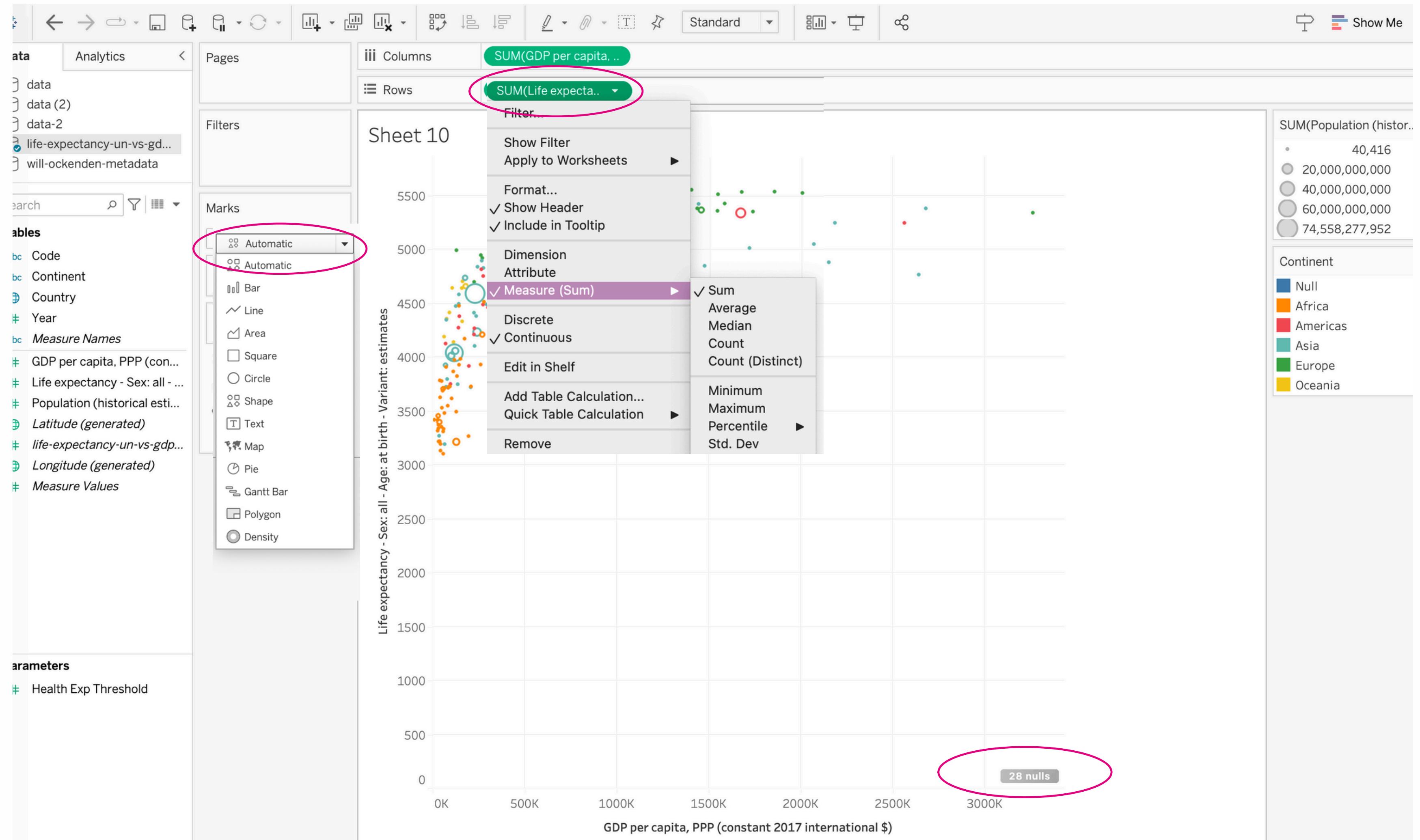
Data Source Sheet 1

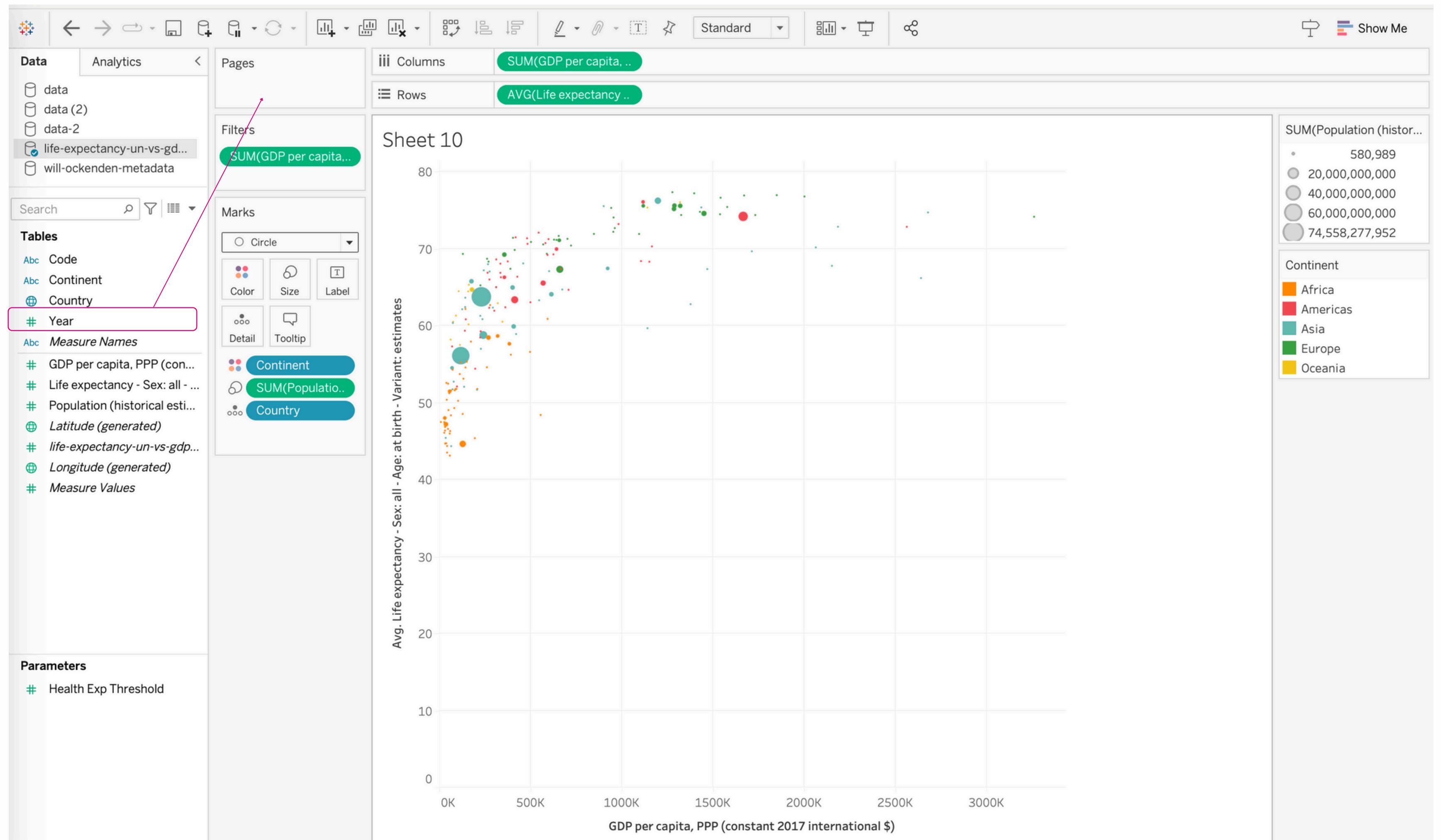
Filters
0 | Add

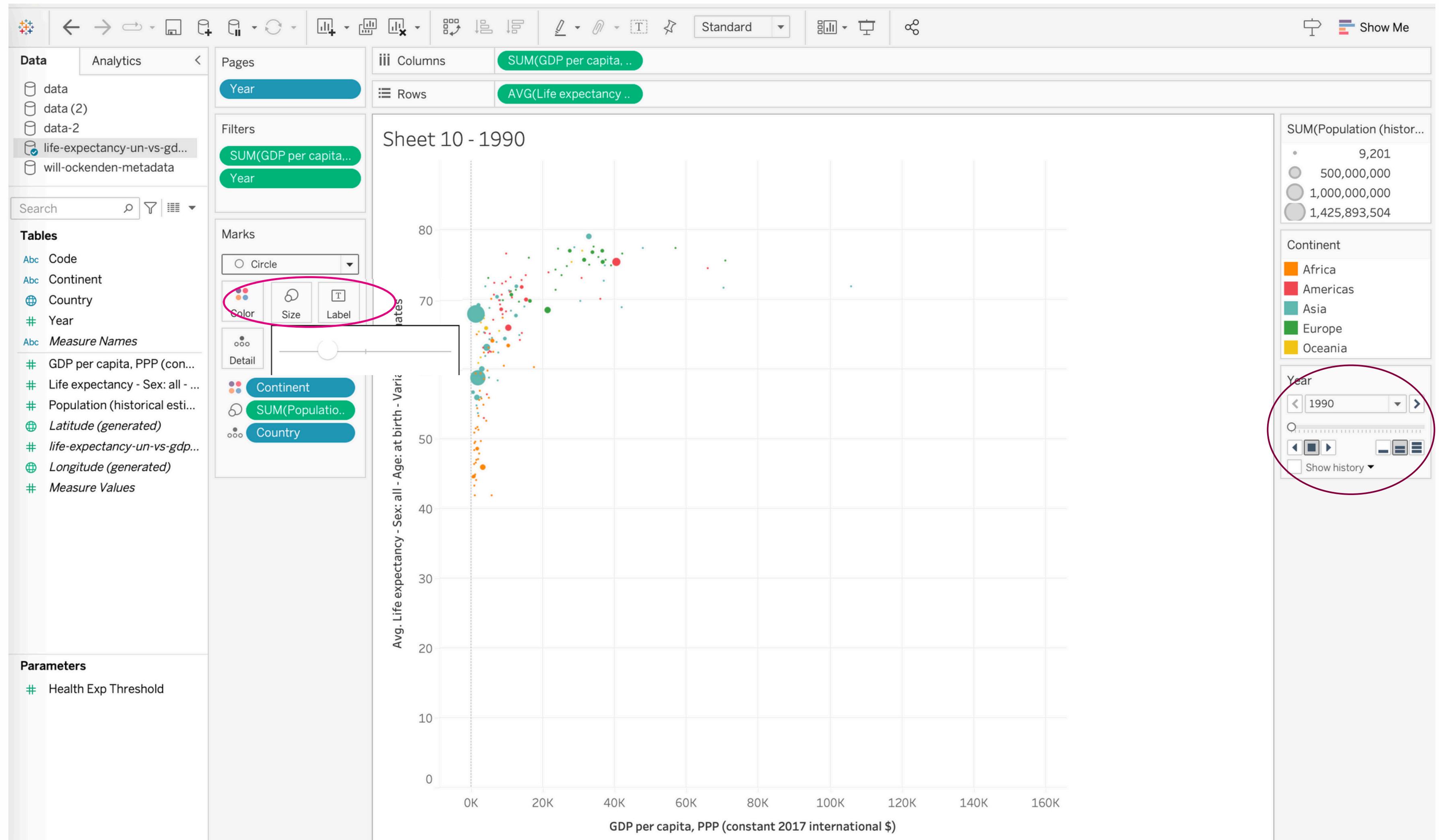
Country	Code	Year	Life expectancy - Sex:
Afghanistan	AFG	1950	
Afghanistan	AFG	1951	
Afghanistan	AFG	1952	
Afghanistan	AFG	1953	
Afghanistan	AFG	1954	
Afghanistan	AFG	1955	
Afghanistan	AFG	1956	
Afghanistan	AFG	1957	

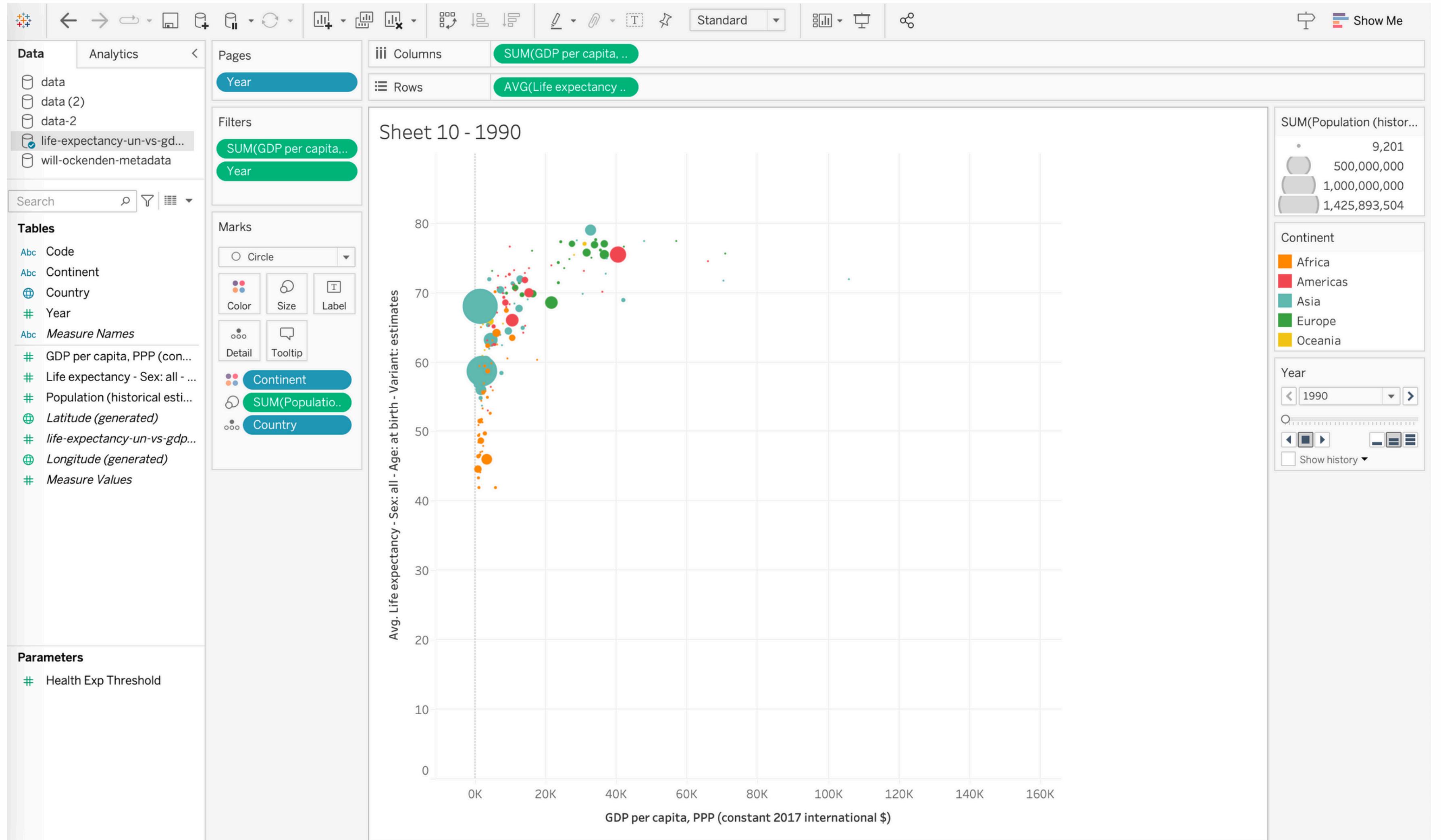




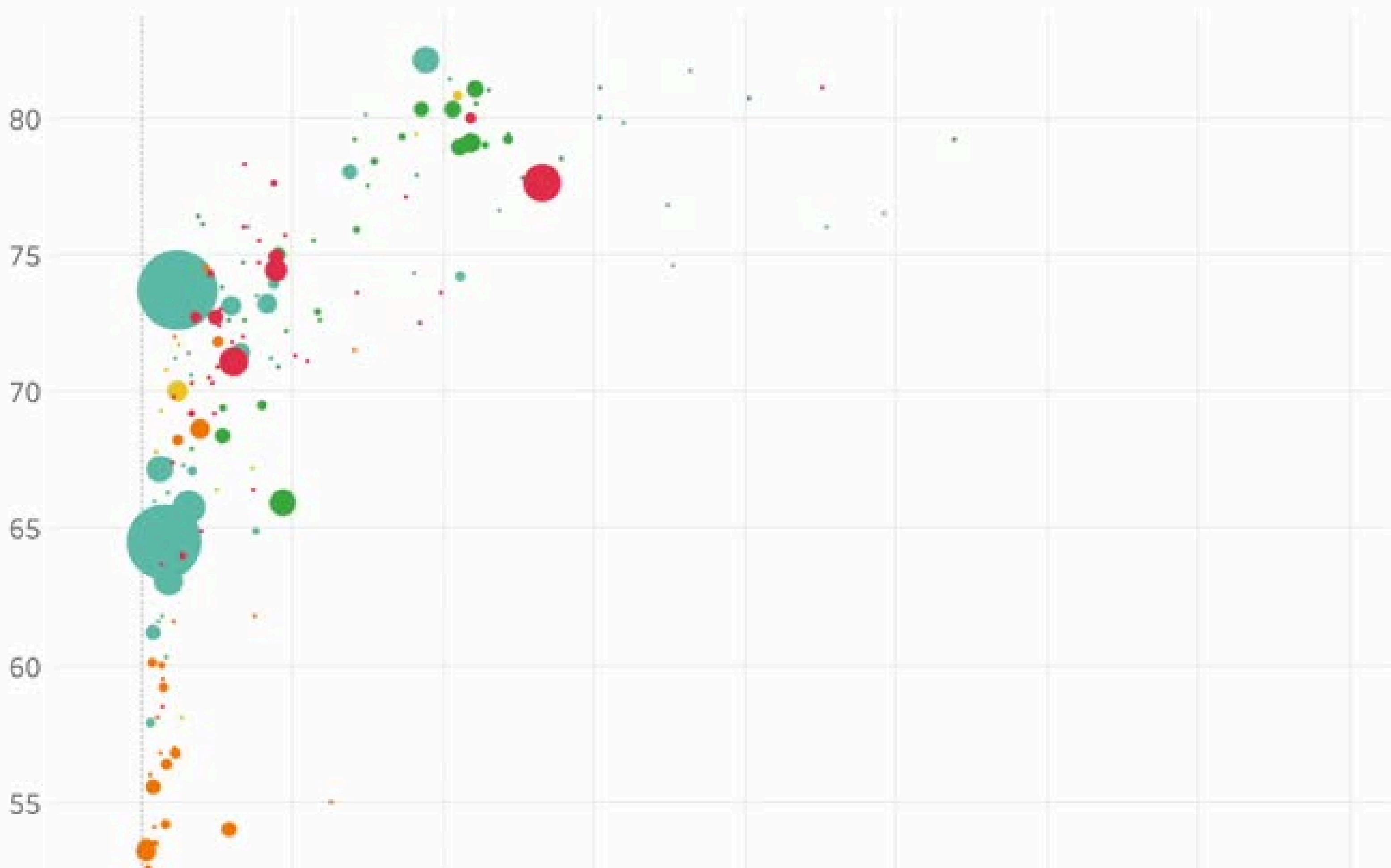


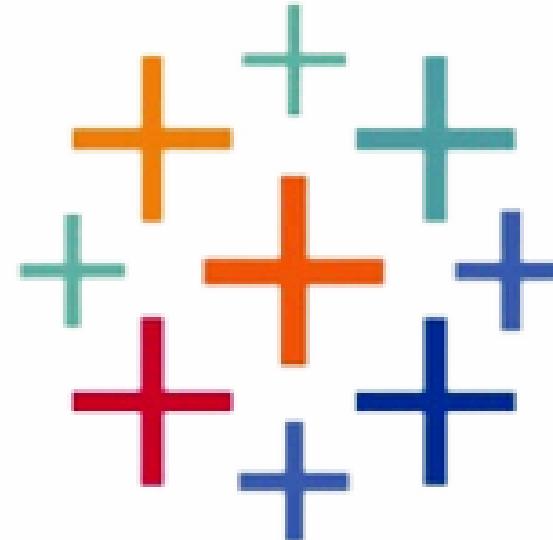






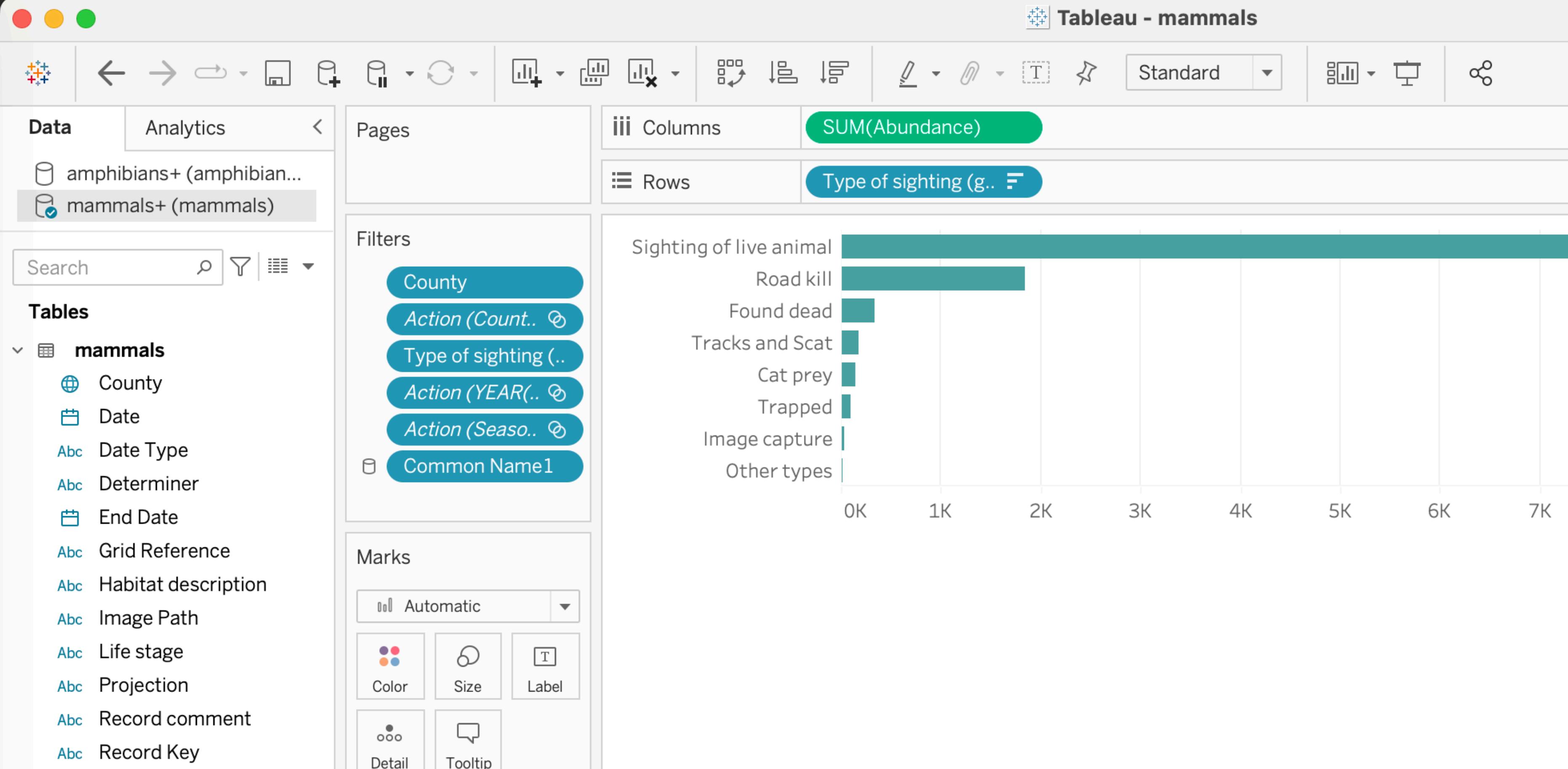
Life expectancy vs GDP 1990-2021





+ableau

Let's get started!



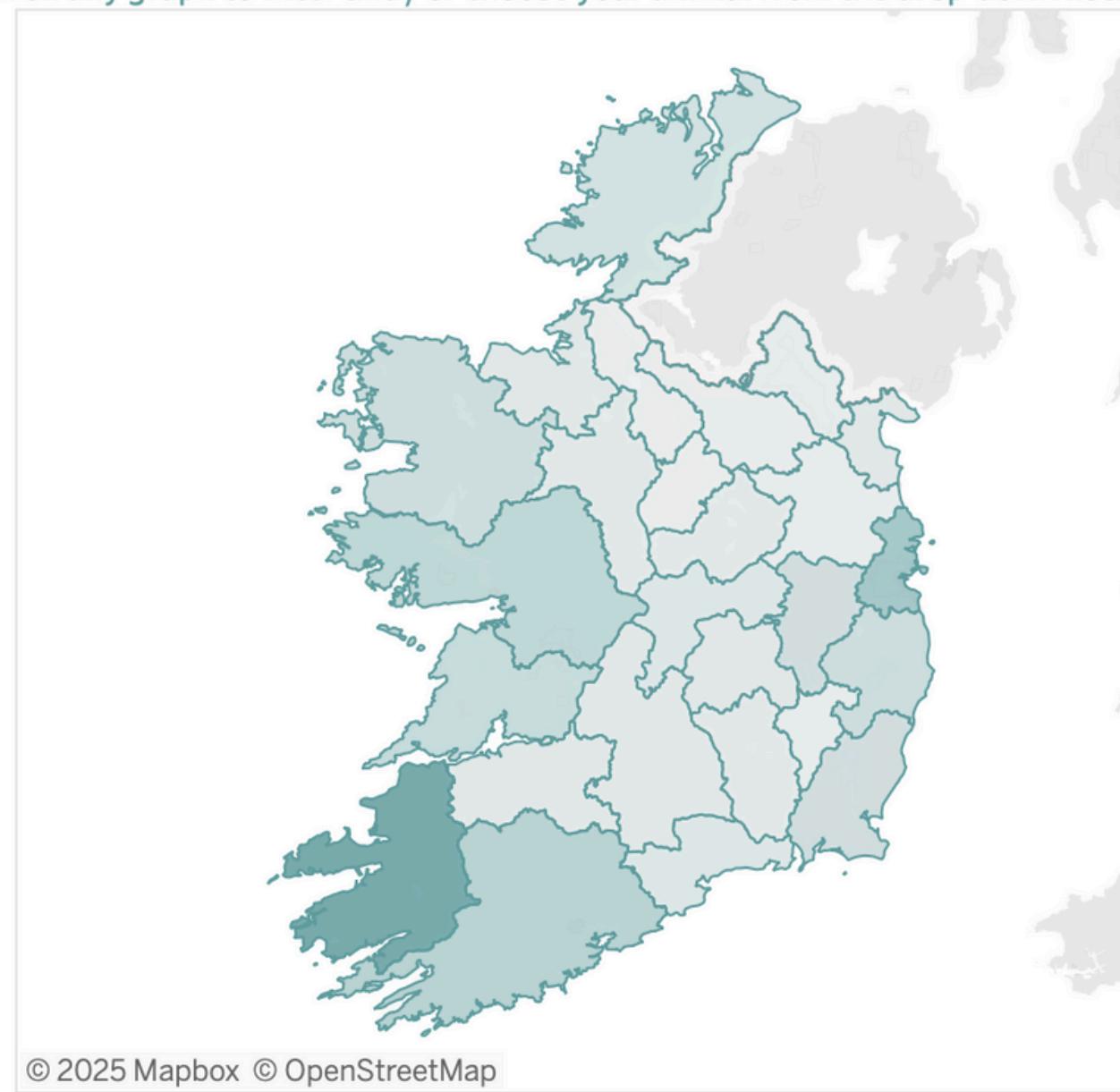
Seeing animals in Ireland

Select your animal here

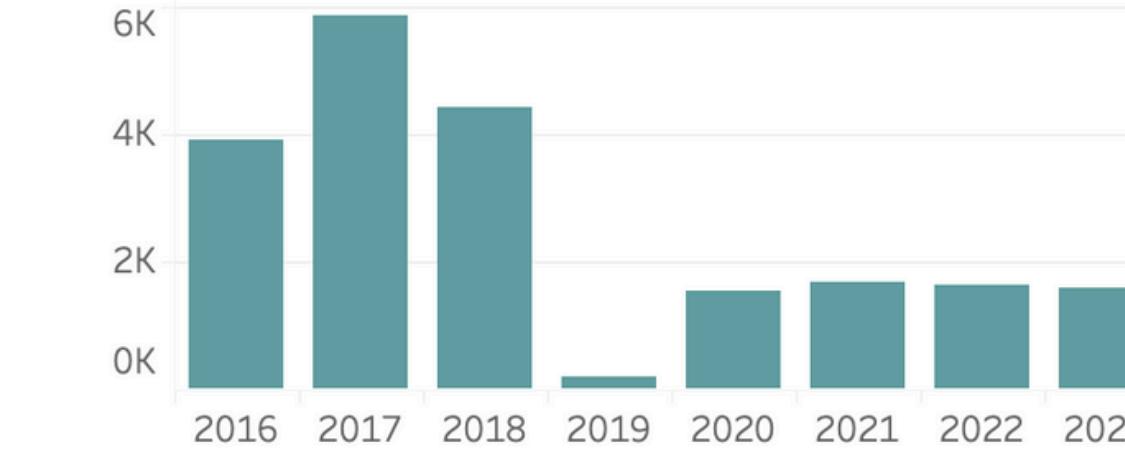
(All)

Animal sightings submitted to the National Biodiversity Data Centre 2016 - 2024.

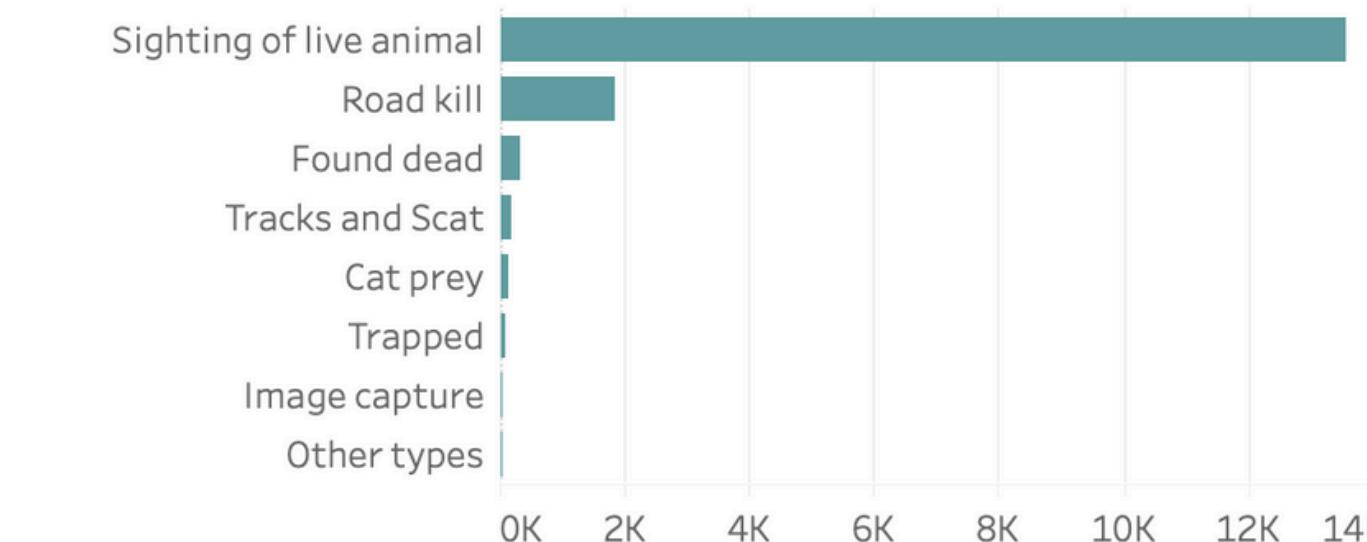
Click on any graph to filter and / or choose your animal from the drop-down list.



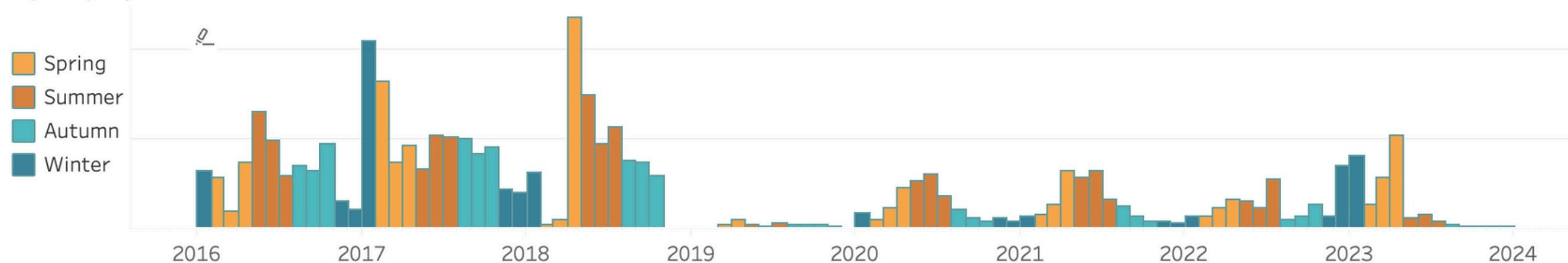
Number of sightings by year



Type of sighting



Sightings by season



Steps

CREATE FOUR VISUALISATIONS

A map showing abundance of sightings in each county with a filter for type of animals (from taxonomy).
A column chart showing number of sightings per year.
A bar chart showing the type of sightings.
Another column chart showing seasons.

USE A FORMULA

For the last column chart you need to use a formula to tell Tableau to group dates into seasons.

CREATE A DASHBOARD

Click on 'new dashboard' and drag your visualisations onto the dashboard.

Tableau Desktop Public Edition

Data Analytics < Pages ☰

mammals+ (mammals...)

Search ✖ ☰

Tables

mammals

- County
- Date
- Grid Reference
- Projection
- Recorder
- Site Name
- Taxon Name
- Type of sighting
- Type of sighting (group)
- Abundance
- East
- North
- mammals (Count)**

Taxonomy

- Common Name
- Taxon Name (copy)
- Taxonomy (Count)**

Measure Names

Show Mark Labels

✓ Aggregate Measures

Stack Marks

Explain Data Settings...

Reveal Hidden Data

Percentage Of

Totals

Forecast

Trend Lines

Special Values

Table Layout

Legends

Filters

Highlighters

Parameters

Create Calculated Field...

Edit Calculated Field

Infer Properties from Missing Values

Cycle Fields

Swap Rows and Columns

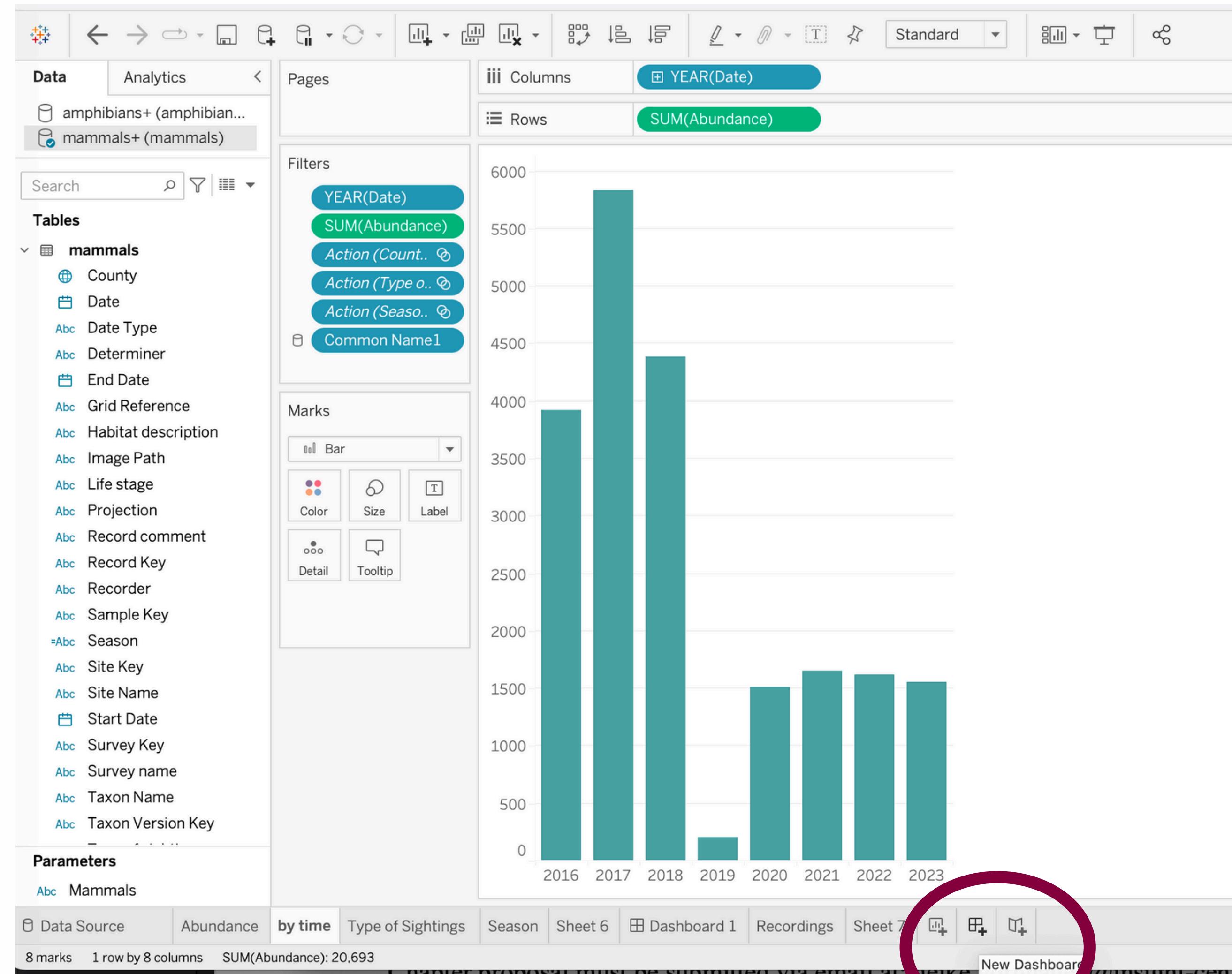
Drop field here

Drop field here

Drop field here

Public - Book1

case month([Date])
when in(2,3,4) then 'Spring'
when in(5,6,7) then 'Summer'
when in(8,9,10) then 'Autumn'
when in(11,12,1) then 'Winter'
END



Your visualisations

Dashboard elements

The screenshot shows the Tableau desktop application interface. The top bar includes standard file and navigation icons. Below the header, the 'Dashboard' tab is selected in the top-left corner. A sidebar on the left contains sections for 'Default' (Phone), 'Device Preview', 'Size' (Desktop Browser (1000 x 8...)), and two main lists: 'Sheets' and 'Objects'. Both lists are highlighted with a red rounded rectangle. The 'Sheets' list includes items like Abundance, by time, Type of Sightings, Season, Sheet 6, Recordings, and Sheet 7. The 'Objects' list includes Horizontal Container, Vertical Container, Text, Extension, Data Story, Image, Blank, Workflow, Web Page, and Navigation. At the bottom of the sidebar, there are buttons for 'Tiled' (selected) and 'Floating', and a checkbox for 'Show dashboard title'. The bottom of the screen shows the Tableau ribbon with tabs for Data Source, Abundance, by time, Type of Sightings, Season, Sheet 6, Dashboard 1, Recordings, Sheet 7, Dashboard 2, and several other icons.

Drop sheets here

Sheets

- Abundance
- by time
- Type of Sightings
- Season
- Sheet 6
- Recordings
- Sheet 7

Objects

- Horizontal Container
- Vertical Container
- A Text
- Extension
- Data Story
- Image
- Blank
- Workflow
- Web Page
- Navigation

Tiled Floating

Show dashboard title

Data Source Abundance by time Type of Sightings Season Sheet 6 Dashboard 1 Recordings Sheet 7 Dashboard 2

Possible layout

There's multiple options to create a dashboard.

ADD VERTICAL CONTAINER

Add 'Seasons' to the bottom half

ADD HORIZONTAL CONTAINER TO TOP

Add 'Abundance' to the left half

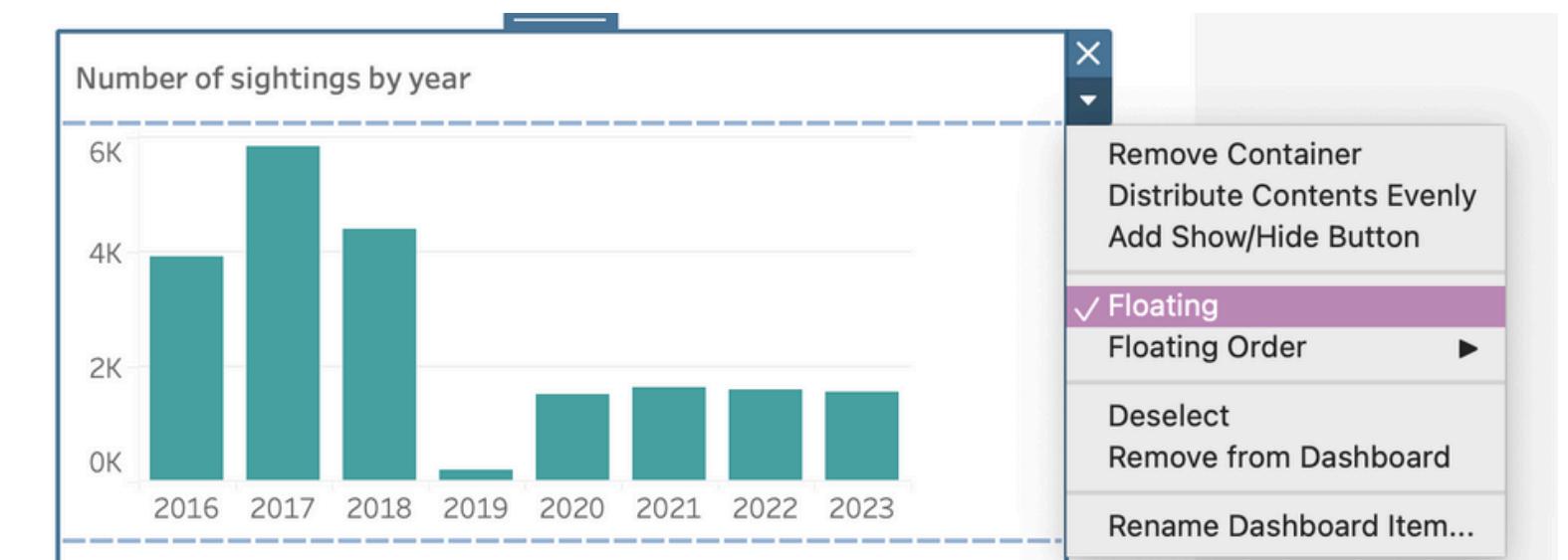
ADD VERTICAL CONTAINER TO RIGHT

Add 'By time' to the top half

Add 'Type of Sightings' to the bottom half

ADD / CHANGE TEXT AS NECESSARY

Move items by changing them to 'Floating'





heike.vornhagen@insight-centre.org