Online Course
Data Visualization for Professionals

THE UNIVERSITY of EDINBURGH

RawGraphs

An Introduction

Uta Hinrichs

uhinrich@ed.ac.uk

Visual+
Interactive
Data

design
informatics

THE UNIVERSITY of EDINBURGH

outline for today

- What is RawGraphs?
- What is RawGraphs good for?
- Example visualisations in RawGraphs
- Creating visualisations in RawGraphs
  - Scatterplots
  - Circle packing
  - Flow diagrams

what is RawGraphs?

what is RawGraphs?

- DensityDesign Research, Milan
- Calibro Design Studio, Milan
- Inmagik, Bergmao

→ Tool for visualization designers to bridge the link between spreadsheets and vector graphics editors

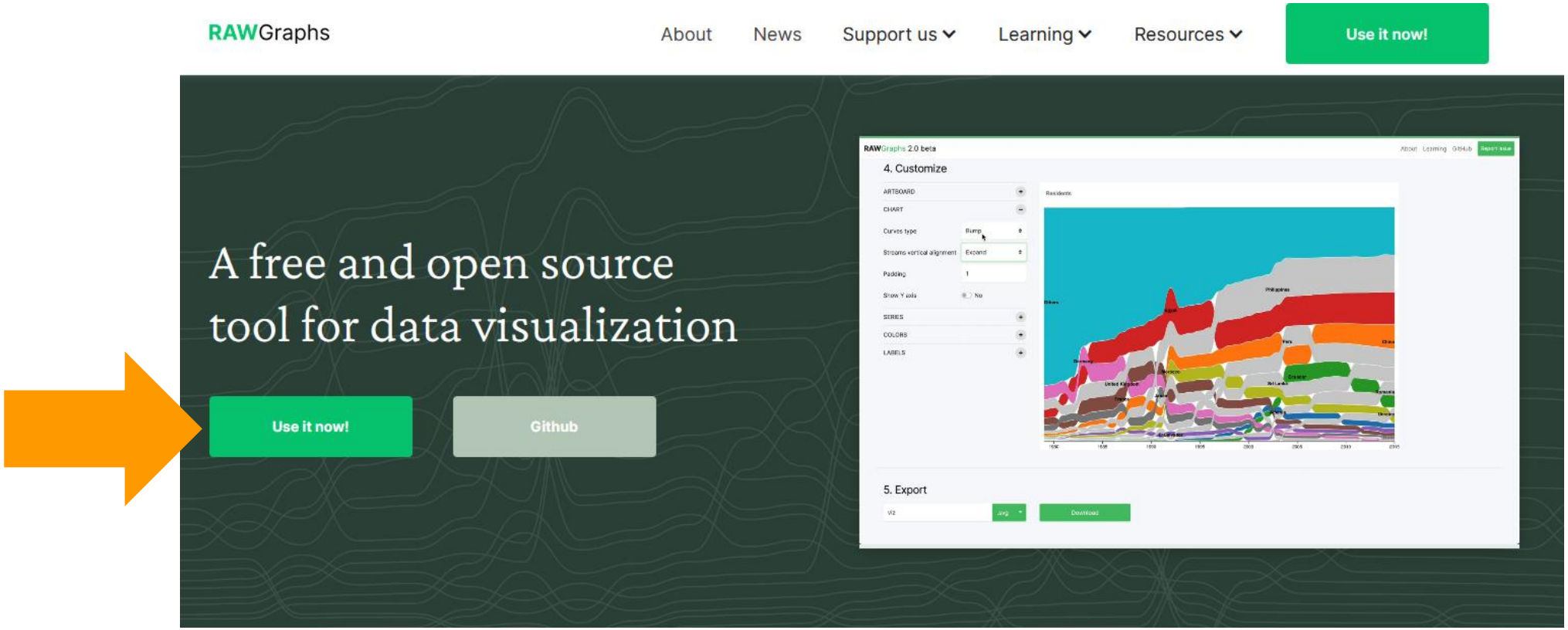
what is RawGraphs?

- Online visualization tool
- Open-source (free)

- Data sources supported
  - Tabular data (csv, tsv, dsv)
  - Json files
  - Data urls
  - SPARQL queries
- Based on the design principles of data visualisation

where can I get RawGraphs?

- No need to download and install – just open your browser!
- RawGraphs: https://www.rawgraphs.io/



what is RawGraphs good for?

- Visualizing tabular & relational data using standard visualizations
- Simple creation of static visualizations
- Good export functions to edit graphs in vector graphics applications (e.g., Adobe Illustrator, Inkscape, or Figma)
  - .svg
  - .png
  - .jpg
  - .rawgraphs

→ Good for quick explorations and computational sketches

→ Good for designing custom static visualization (e.g., for print reports)

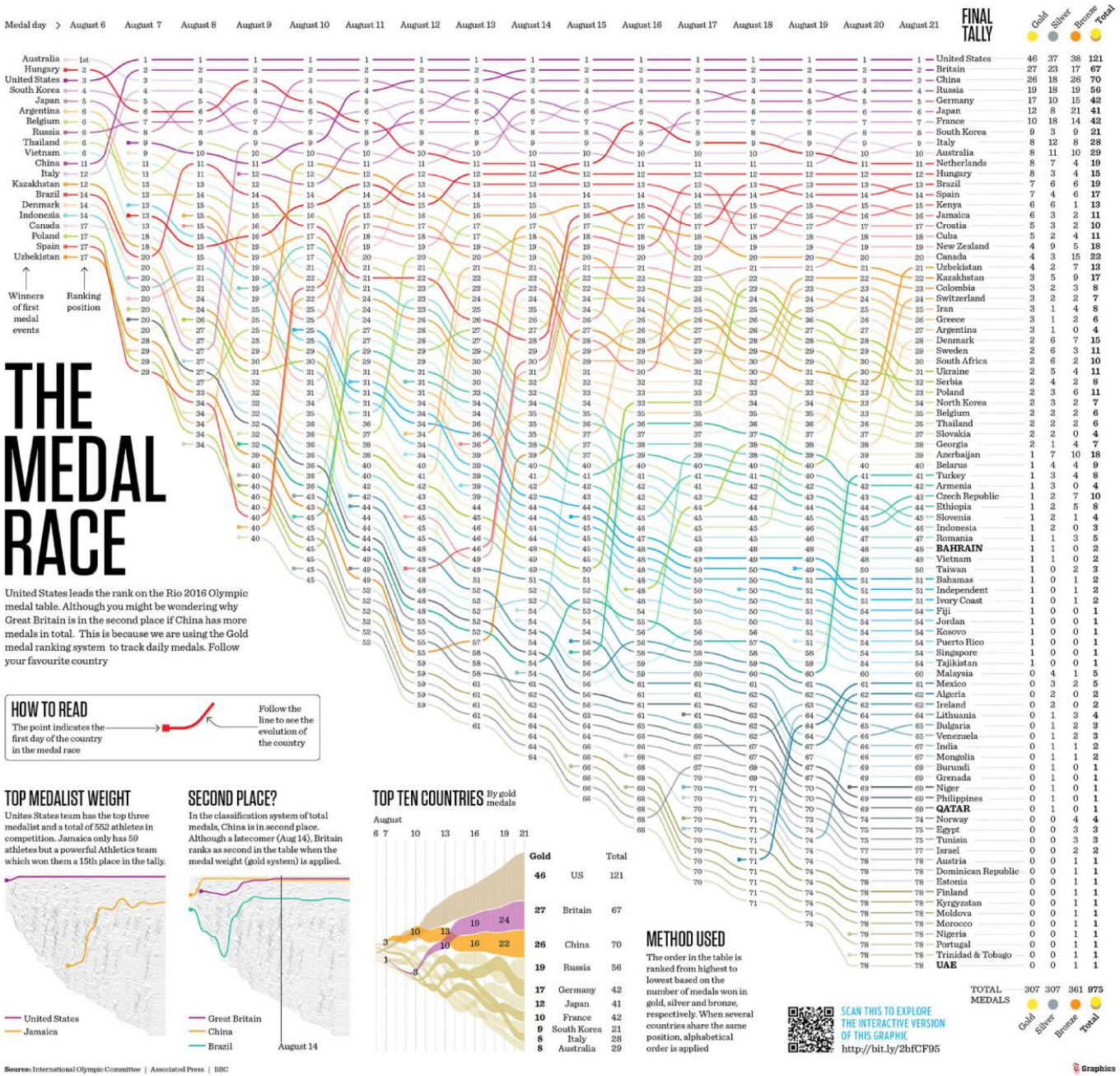
what is Tableau NOT good for?

- No text visualization techniques
- No geographic visualization techniques
- No interactivity!

- Customization in RawGraphs is somewhat limited BUT, you can edit your visualization in a vector graphics editor!

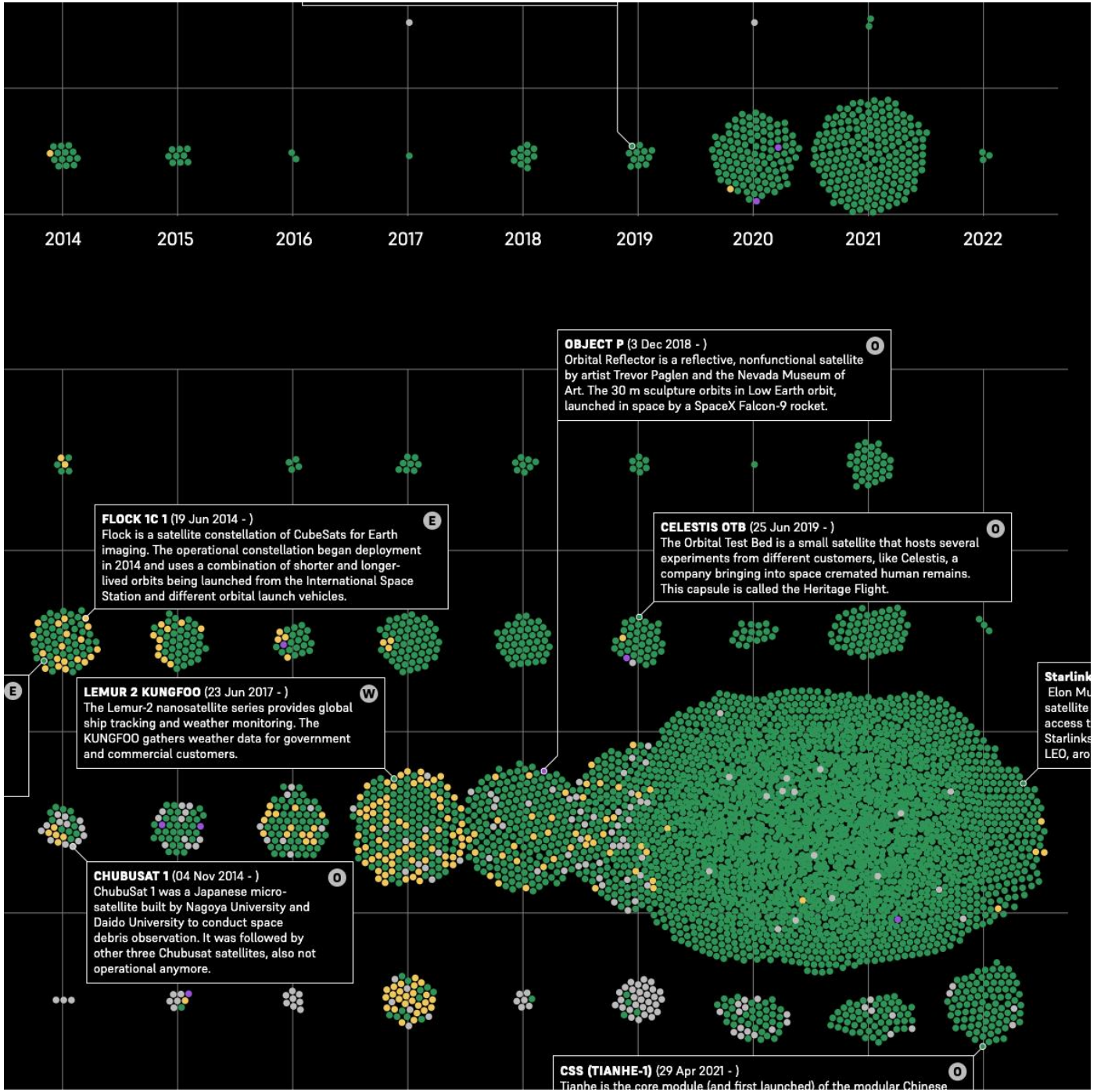
example visualisations in RawGraphs

the medal race



https://www.rawgraphs.io/gallery/the-medal-race

satellite chart



https://www.rawgraphs.io/gallery/satellite-charts

creating visualisations in RawGraphs

some advice

- Don’t let the tool drive your visualization design
  - Come up with visualization ideas and THEN try to implement them in Tableau
- Think critically about the design solutions that RawGraphs is offering
  - Colour schemes
  - Spatial layout
  - Labelling
  - Legends
  - …
- Explore different possible design solutions
- If you have an idea, and you don’t know how to do it
  - There are lots of tutorials and “how-tos” online
  - Ask here in the class

creating visualizations in RawGraphs

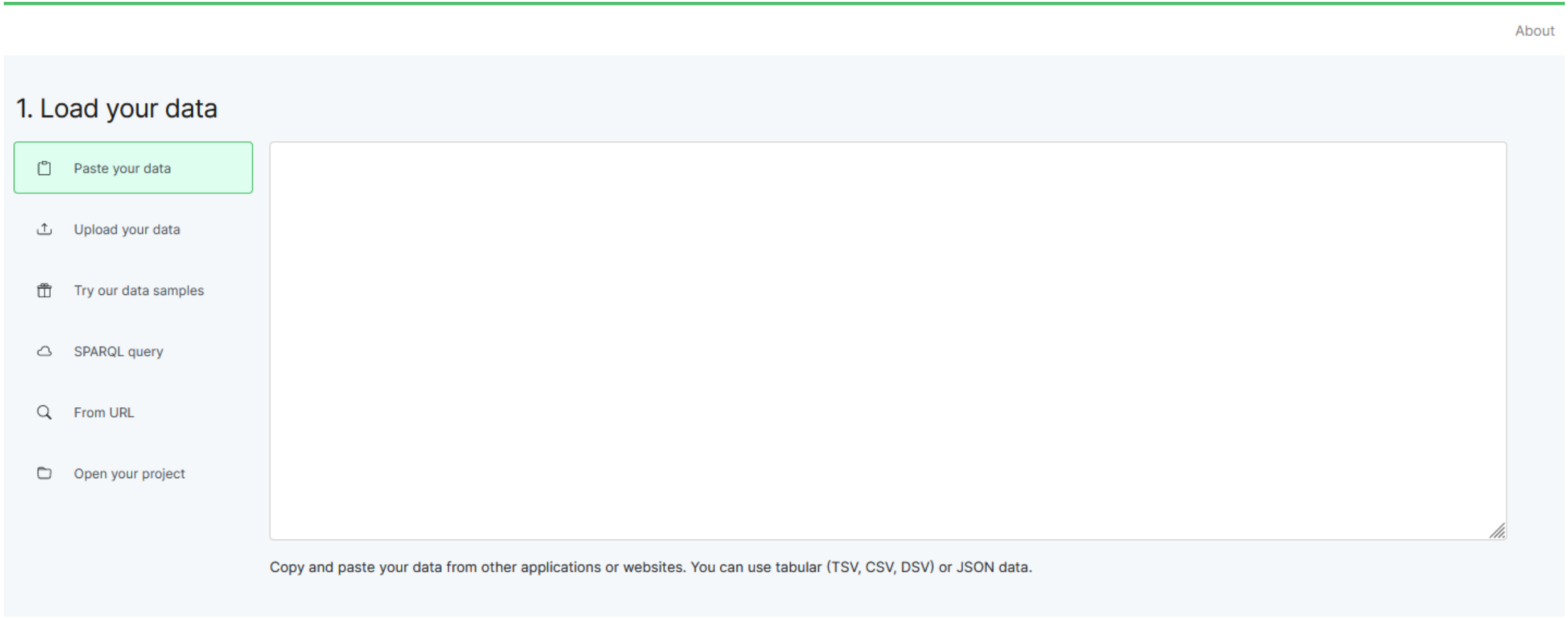
- Open RawGraphs in your browser
  - https://app.rawgraphs.io/

- Two ways to follow this tutorial
  - Try to follow-along on your own computer
  - Watch the tutorial now and try it yourself later using the step-by-step tutorial slides

RawGraphs overview

1. Load your data
2. Choose a chart
3. Mapping
4. Customize
5. Export

load our data



load our data

About

1. Load your data

- Paste your data
- Upload your data
- Try our data samples
- SPARQL query
- From URL
- Open your project

Aromas of wine and frequency
Sunburst Diagram

Source: Own work

Energy flows in UK (2050)
Sankey diagram

Source: gov.uk

EU Index of consumer prices
Horizon Graph

Source: Eurostat

Felidae classification (cats and friends)
Dendrogram, Circular dendrogram

Source: Special thanks to interns

FIFA players statistics
Radar Chart

Source: K. Gadiya via Kaggle

Foreign residents in Milan
Bumpchart

Source: Comune di Milano

GDP sector composition
Pie chart, Stacked barchart

Source: Wikipedia

Happiness index
Multiset Barchart

Source: World Happiness Report

Hate crimes in New York
Alluvial Diagram

Source: NYC Open Data

Highest grossing movies in history
Bubble chart

Source: Wikipedia

Iris flowers
Convex hull, Parallel Coordinates

Source: R. Fisher

Italians PMs and Presidents
Gantt chart

Source: Wikidata

Kobe Bryant shoots
Hexagonal Binning, Voronoi diagram

Lannister vs Starck relationships

Letter Frequency by Language

Most populated cities per continent

load our data

Abc

1. Load your data

DATA PARSING OPTIONS

Column separator: \t Tab

Thousands separator: ,

Decimals separator: .

Date Locale: en-GB

DATA TRANSFORMATION

Stack on: Column

Reset

Change data

	# Budget (mln)	# Real Worldwide Box Of...	# ROI	Aa Genre	Aa Title
1	3.9	402	104.5	Drama	Gone with the Wind
2	237	2790	11.8	Action	Avatar
3	200	2194	11	Drama	Titanic
4	11	776	70.5	Action	Star Wars: Episode IV - A
5	356	2798	7.9	Action	Avengers: Endgame
6	8.2	286	34.9	Biography	The Sound of Music
7	10.5	793	75.5	Family	E.T. the Extra-Terrestria
8	13	123	9.4	Adventure	The Ten Commandments

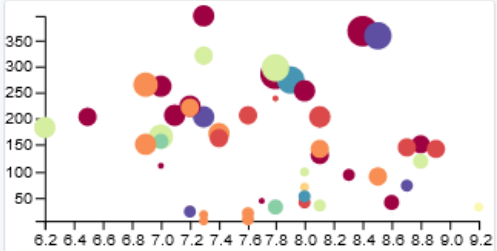
50 rows (250 cells) have been successfully parsed, now you can choose a chart!

Copy to clipboard

choose a chart

2. Choose a chart

Show All charts



Bubble chart

The basic layout is a scatter plot, which allows to see correlations among two continuous dimensions. A further quantitative dimension with size and a quantitative or categorical dimension with color.

Code Tutorial

- **Alluvial Diagram** — Correlations, proportions
- **Arc Diagram** — Networks
- **Bar chart** — Correlations
- **Multi-set bar chart** — Correlations, proportions
- **Stacked bar chart** — Correlations, proportions
- **Beeswarm plot** — Distributions, time series, proportions
- **Box plot** — Distributions
- **Bubble chart** — Correlations, proportions
- **Bumpchart** — Time series, correlations, proportions
- **Calendar heatmap** — Time chunks, proportions
- **Circle Packing** — Hierarchies, proportions
- **Circular dendrogram** — Hierarchies, proportions
- **Contour plot** — Correlations, distributions
- **Convex hull** — Correlations, proportions
- **Linear dendrogram** — Hierarchies, proportions
- **Gantt chart** — Time series, correlations
- **Hexagonal binning** — Correlations, distributions
- **Horizon graph** — Time series, correlations
- **Line chart** — Time series, correlations
- **Matrix Plot** — Correlations, time series, proportions
- **Parallel coordinates** — Correlations, distributions

choose a chart – tutorial

TUTORIAL Latest update: January 28, 2022

How to make a scatterplot

In this guide you'll learn how to create a bubble chart (or scatterplot). The goal is to visualize the correlation between production budget and return of investments among blockbusters in different movie category.

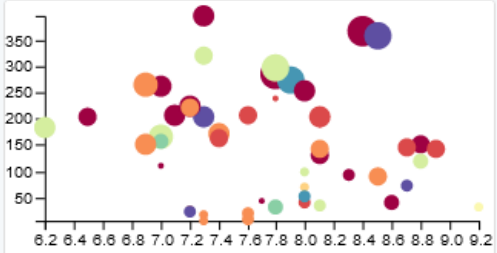
Download the resources

Found a mistake in the tutorial? Contact us.

choose a chart

2. Choose a chart

Show All charts



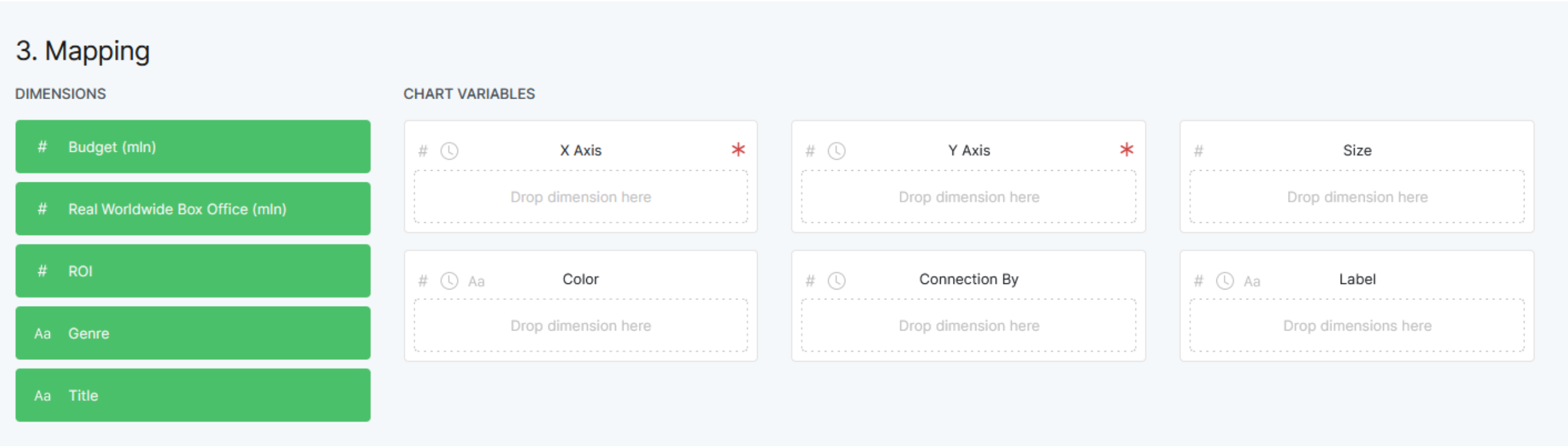
Bubble chart

The basic layout is a scatter plot, which allows to see correlations among two continuous dimensions. A further quantitative dimension with size and a quantitative or categorical dimension with color.

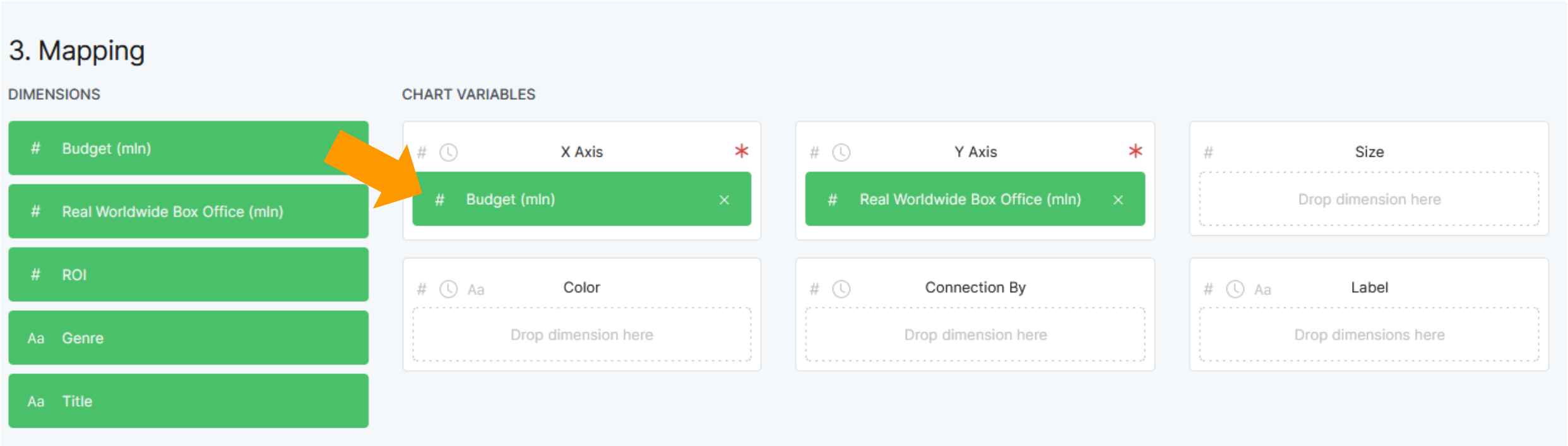
Code Tutorial

- **Alluvial Diagram** — Correlations, proportions
- **Arc Diagram** — Networks
- **Bar chart** — Correlations
- **Multi-set bar chart** — Correlations, proportions
- **Stacked bar chart** — Correlations, proportions
- **Beeswarm plot** — Distributions, time series, proportions
- **Box plot** — Distributions
- **Bubble chart** — Correlations, proportions
- **Bumpchart** — Time series, correlations, proportions
- **Calendar heatmap** — Time chunks, proportions
- **Circle Packing** — Hierarchies, proportions
- **Circular dendrogram** — Hierarchies, proportions
- **Contour plot** — Correlations, distributions
- **Convex hull** — Correlations, proportions
- **Linear dendrogram** — Hierarchies, proportions
- **Gantt chart** — Time series, correlations
- **Hexagonal binning** — Correlations, distributions
- **Horizon graph** — Time series, correlations
- **Line chart** — Time series, correlations
- **Matrix Plot** — Correlations, time series, proportions
- **Parallel coordinates** — Correlations, distributions

mapping


3. Mapping
DIMENSIONS
Budget (mln)
Real Worldwide Box Office (mln)
ROI
Aa Genre
Aa Title
CHART VARIABLES
X Axis
Drop dimension here
Y Axis
Drop dimension here
Size
Drop dimension here
Color
Drop dimension here
Connection By
Drop dimension here
Label
Drop dimensions here

mapping


3. Mapping
DIMENSIONS
Budget (mln)
Real Worldwide Box Office (mln)
ROI
Aa Genre
Aa Title
CHART VARIABLES
X Axis
Budget (mln)
Y Axis
Real Worldwide Box Office (mln)
Size
Drop dimension here
Color
Drop dimension here
Connection By
Drop dimension here
Label
Drop dimensions here

customize

4. Customize

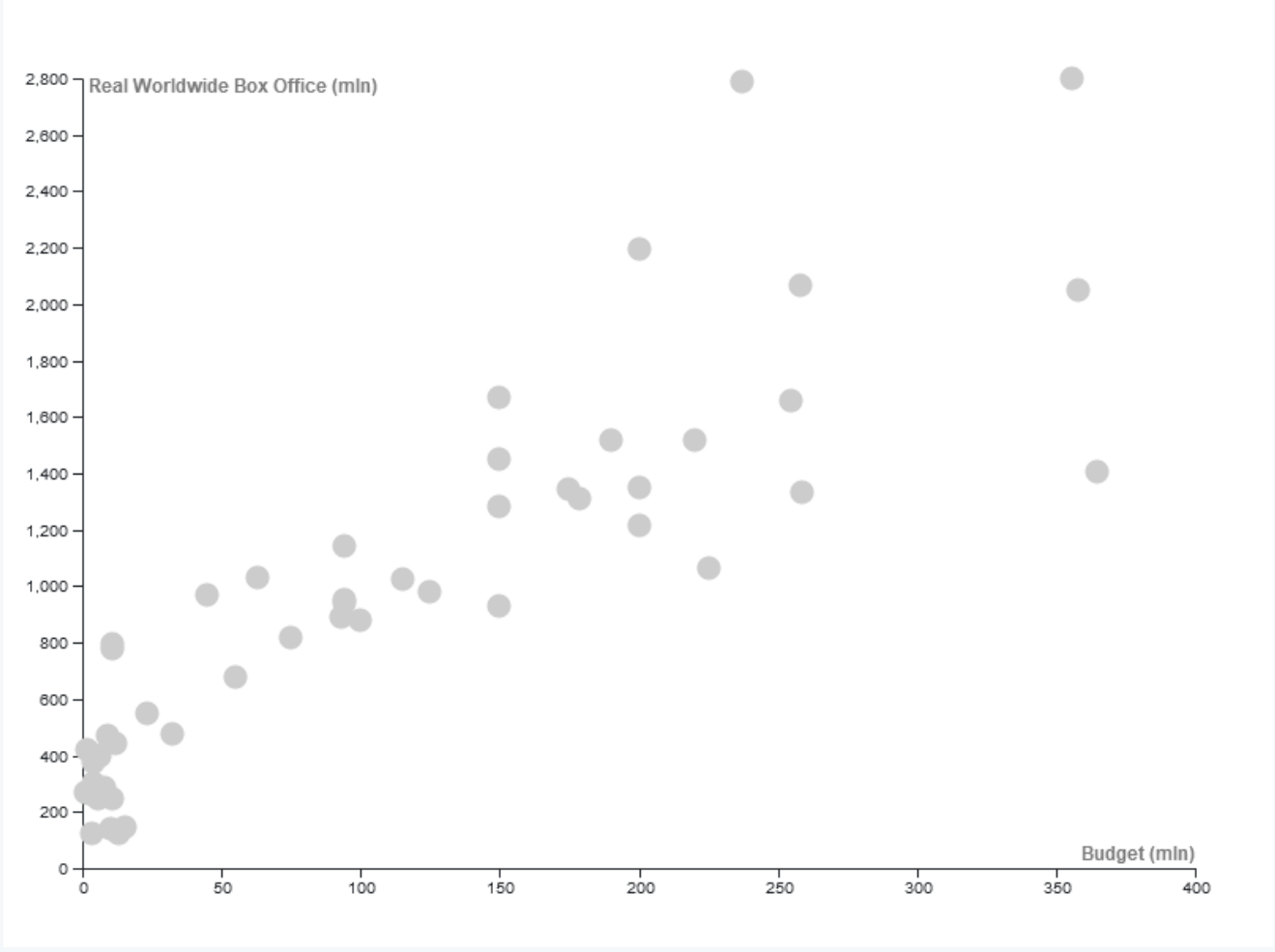
ARTBOARD −

Width (px)	805
Height (px)	600
Background	#FFFFFF
Margin (top)	50
Margin (right)	50
Margin (bottom)	50
Margin (left)	50
Show legend	No
Legend width	200

CHART +

COLORS +

LABELS +



customize

4. Customize

ARTBOARD +

CHART −

Set X origin to 0 — No

Set Y origin to 0 — No

Max diameter — 9

Show stroke — No

Show dots on data values — Yes

Dots diameter — 2

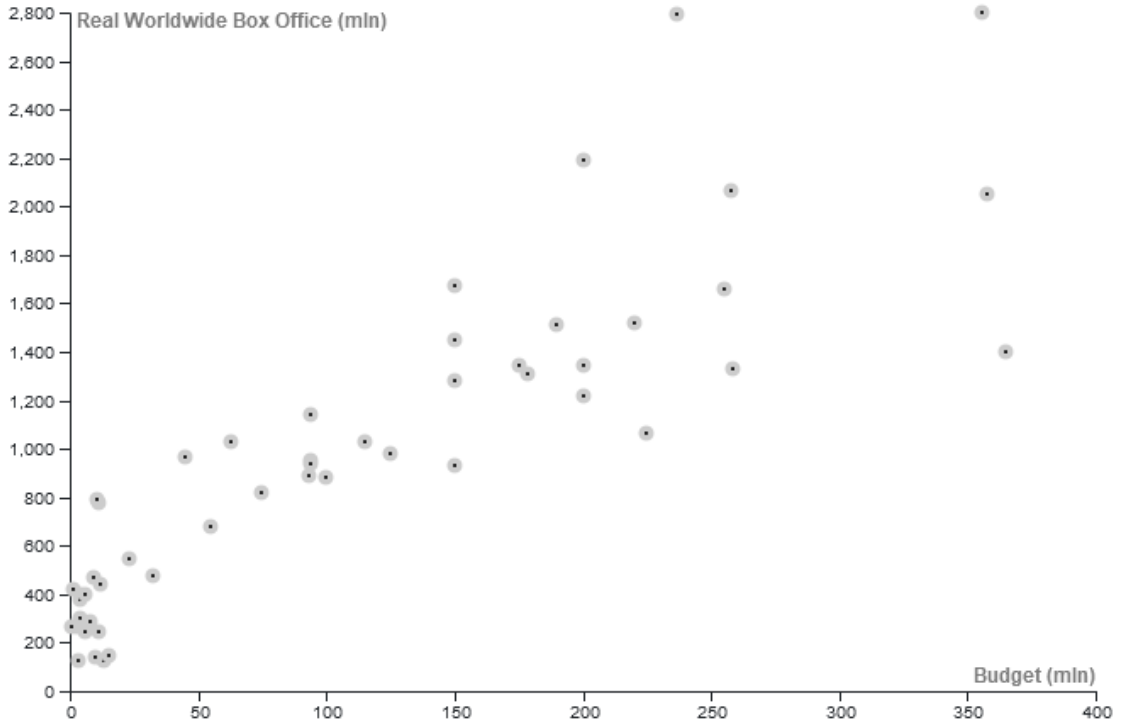
COLORS −

Default — #CCCCCC

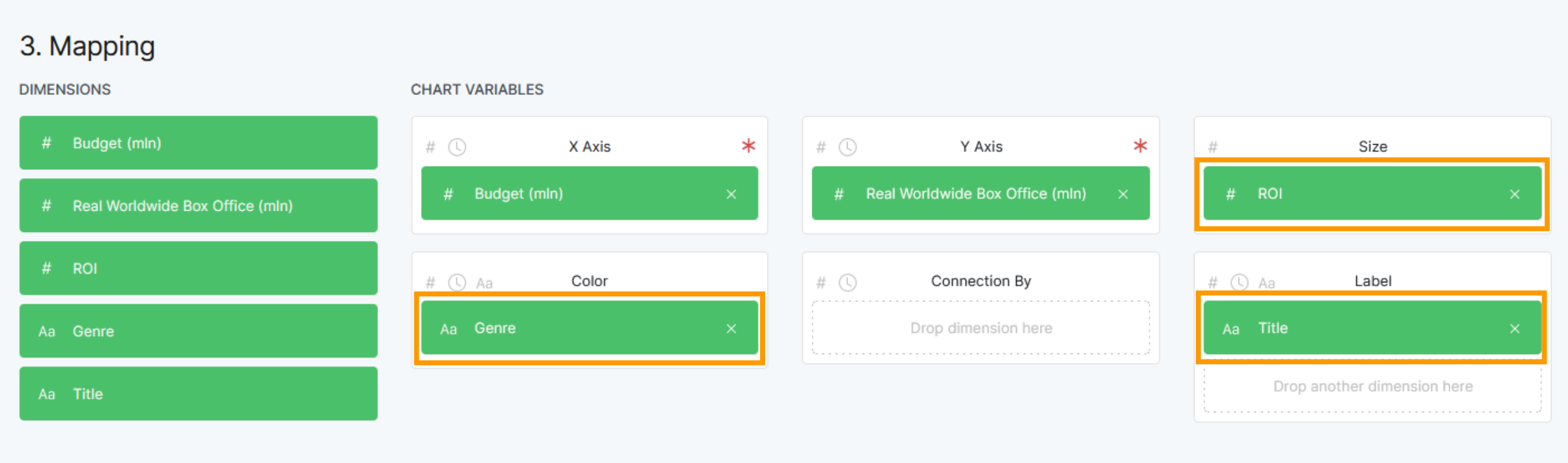
LABELS −

Show outline — No

Auto hide labels — No



mapping


3. Mapping
DIMENSIONS
Budget (mln)
Real Worldwide Box Office (mln)
ROI
Aa Genre
Aa Title
CHART VARIABLES
X Axis
Budget (mln)
Y Axis
Real Worldwide Box Office (mln)
Size
ROI
Color
Aa Genre
Connection By
Drop dimension here
Label
Aa Title
Drop another dimension here

customize

4. Customize

ARTBOARD +

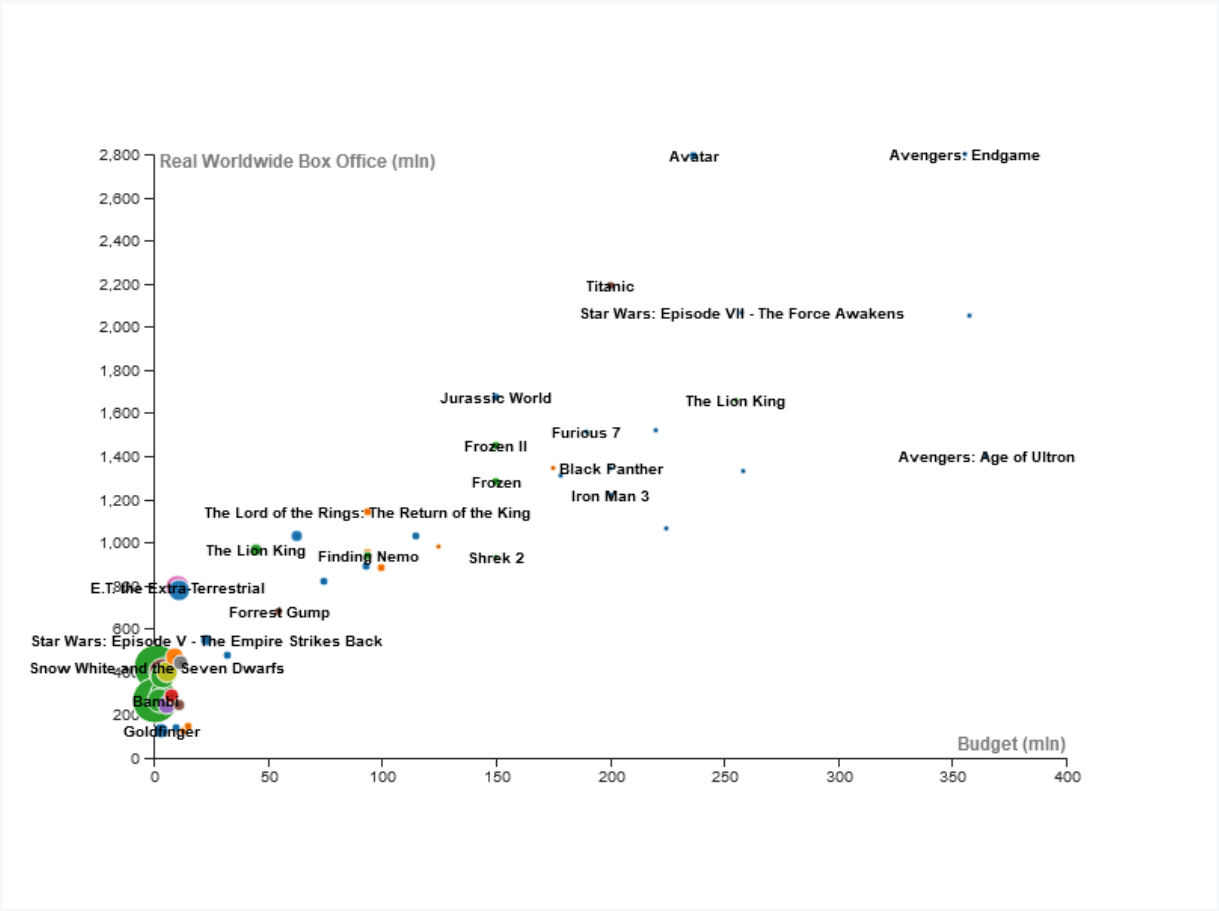
CHART −

Set X origin to 0	No
Set Y origin to 0	No
Max diameter	30
Show stroke	Yes
Show dots on data values	Yes
Dots diameter	1

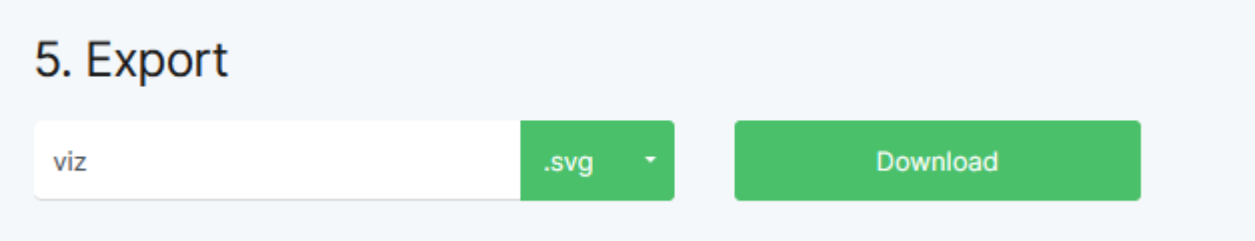
COLORS −

Color scale	Ordinal
Color scheme	

Action	#1F77B4
Adventure	#FF7F0E
Animation	#2CA02C
Biography	#D62728
Crime	#9467BD



export

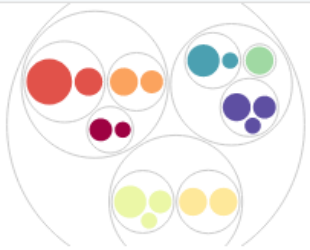


- Continue editing & refinement in any vector graphics editor
  - Adobe Illustrator
  - Inkscape
  - Figma

choose a different chart

2. Choose a chart

Show All charts



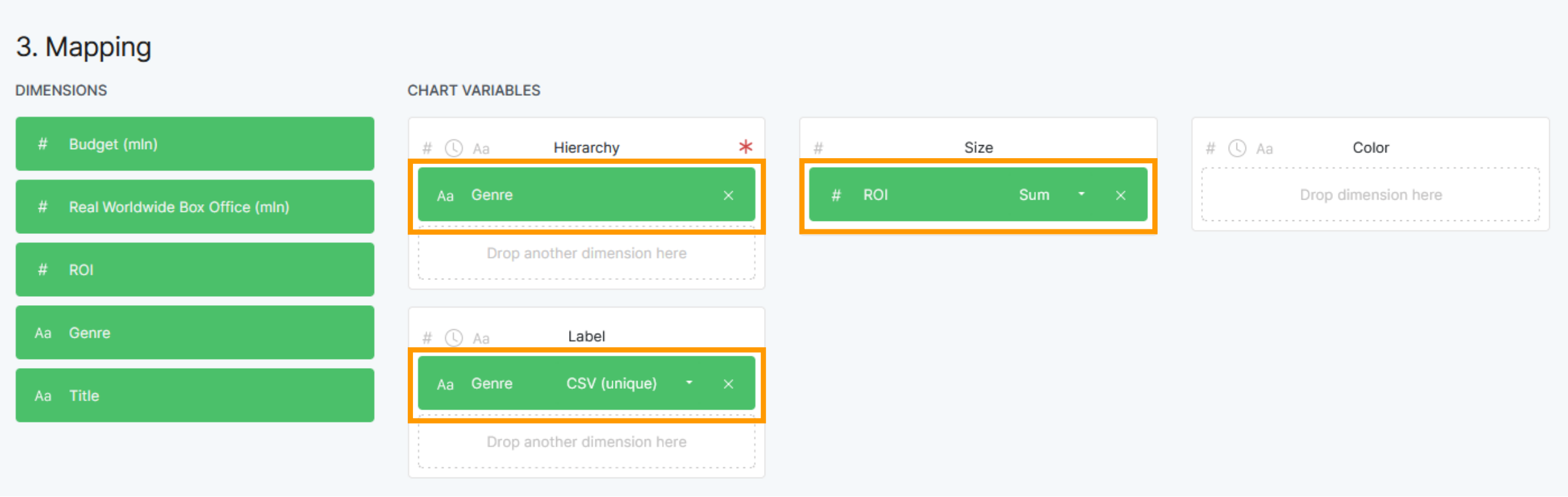
Circle Packing

It displays values of leaf nodes of a hierarchical structure by using circles areas. The hierarchical structure is depicted using nested circles. A further quantitative dimension with size and a quantitative or categorical dimension with color.

Code Tutorial

- **Alluvial Diagram** — Correlations, proportions
- **Arc Diagram** — Networks
- **Bar chart** — Correlations
- **Multi-set bar chart** — Correlations, proportions
- **Stacked bar chart** — Correlations, proportions
- **Beeswarm plot** — Distributions, time series, proportions
- **Box plot** — Distributions
- **Bubble chart** — Correlations, proportions
- **Bumpchart** — Time series, correlations, proportions
- **Calendar heatmap** — Time chunks, proportions
- **Circle Packing** — Hierarchies, proportions
- **Circular dendrogram** — Hierarchies, proportions
- **Contour plot** — Correlations, distributions
- **Convex hull** — Correlations, proportions
- **Linear dendrogram** — Hierarchies, proportions
- **Gantt chart** — Time series, correlations
- **Hexagonal binning** — Correlations, distributions
- **Horizon graph** — Time series, correlations
- **Line chart**
- **Matrix Plot**
- **Parallel coordinates**

mapping


3. Mapping
DIMENSIONS
Budget (mln)
Real Worldwide Box Office (mln)
ROI
Aa Genre
Aa Title
CHART VARIABLES
Aa Hierarchy
Aa Genre
Drop another dimension here
Aa Label
Aa Genre CSV (unique)
Drop another dimension here
Size
ROI Sum
Aa Color
Drop dimension here

customize

4. Customize

ARTBOARD +

CHART −

Padding 2

Sort circles by Size (descending)

COLORS −

Color scale Ordinal

Color scheme

cells color #1F77B4

LABELS −

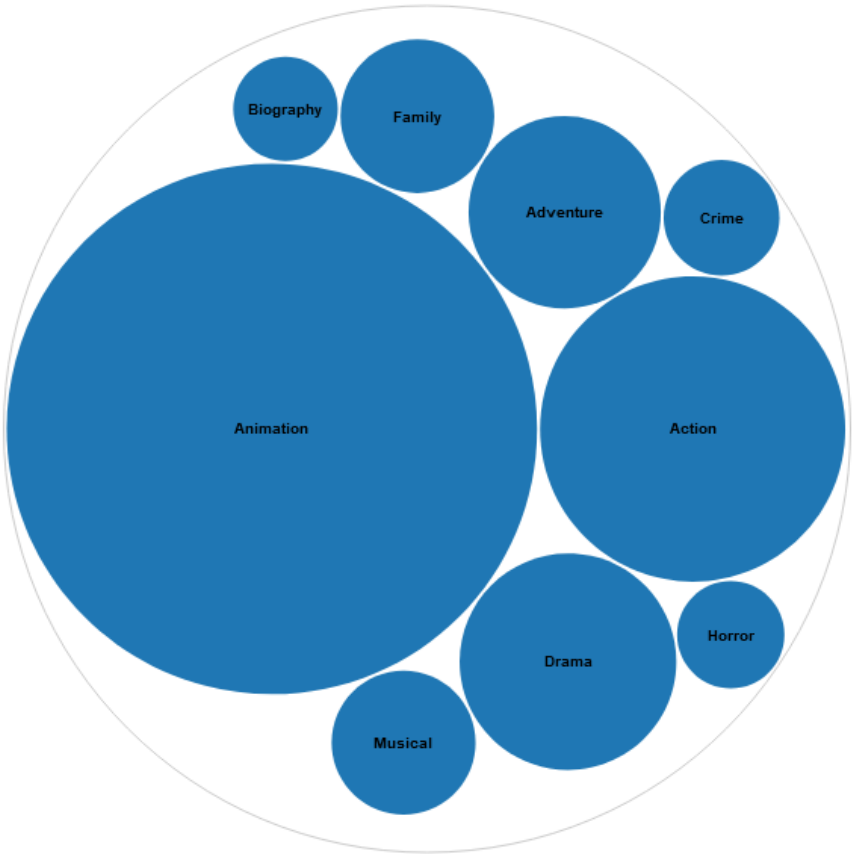
Label (1) Primary

Show outline No

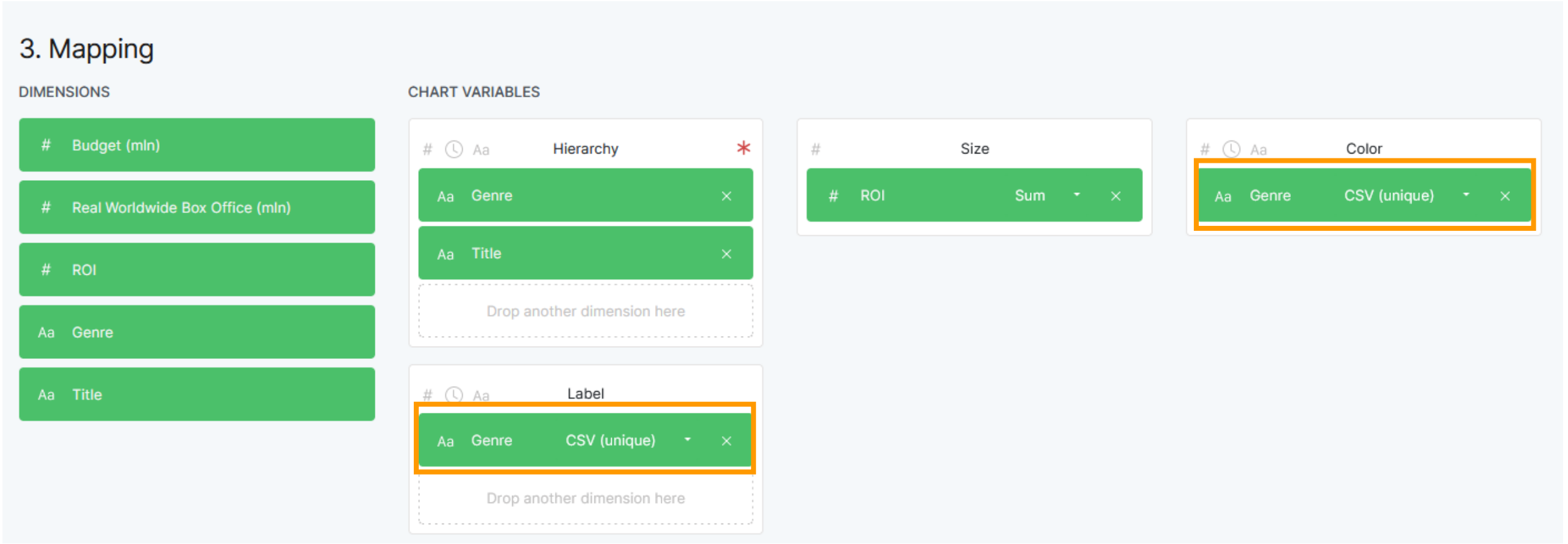
Show hierarchy labels No

Hierarchy labels position On point

Auto hide labels No



mapping


3. Mapping
DIMENSIONS
Budget (mln)
Real Worldwide Box Office (mln)
ROI
Aa Genre
Aa Title
CHART VARIABLES
Hierarchy
Aa Genre
Aa Title
Drop another dimension here
Label
Aa Genre CSV (unique)
Drop another dimension here
Size
ROI Sum
Color
Aa Genre CSV (unique)

customize

4. Customize

ARTBOARD +

CHART +

COLORS −

Color scale: Ordinal

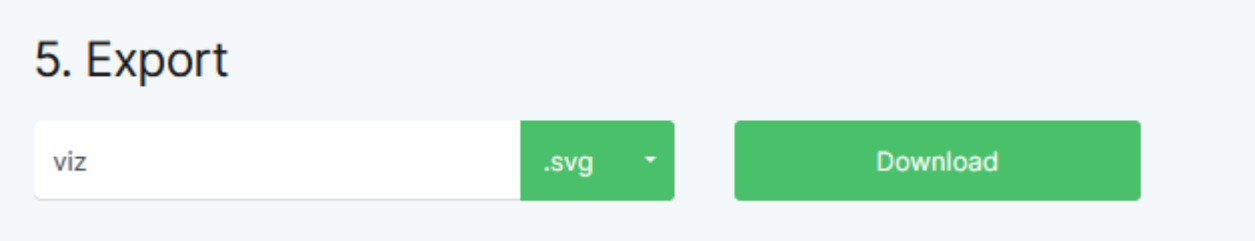
Color scheme

Action	#1F77B4
Adventure	#FF7F0E
Animation	#2CA02C
Biography	#D62728
Crime	#9467BD
Drama	#8C564B
Family	#E377C2
Horror	#7F7F7F
Musical	#BCBD22

LABELS −

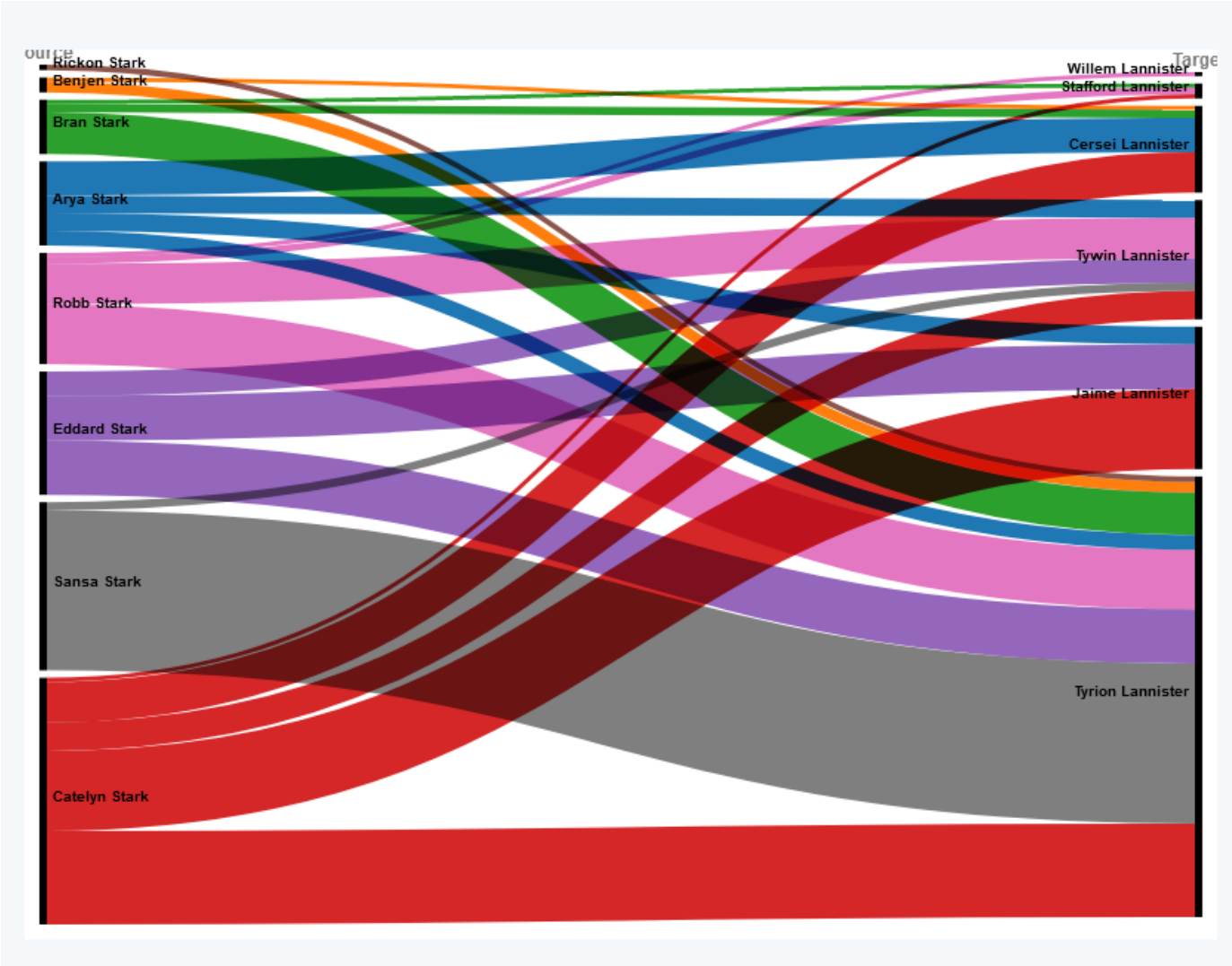
Label (1): Primary

export

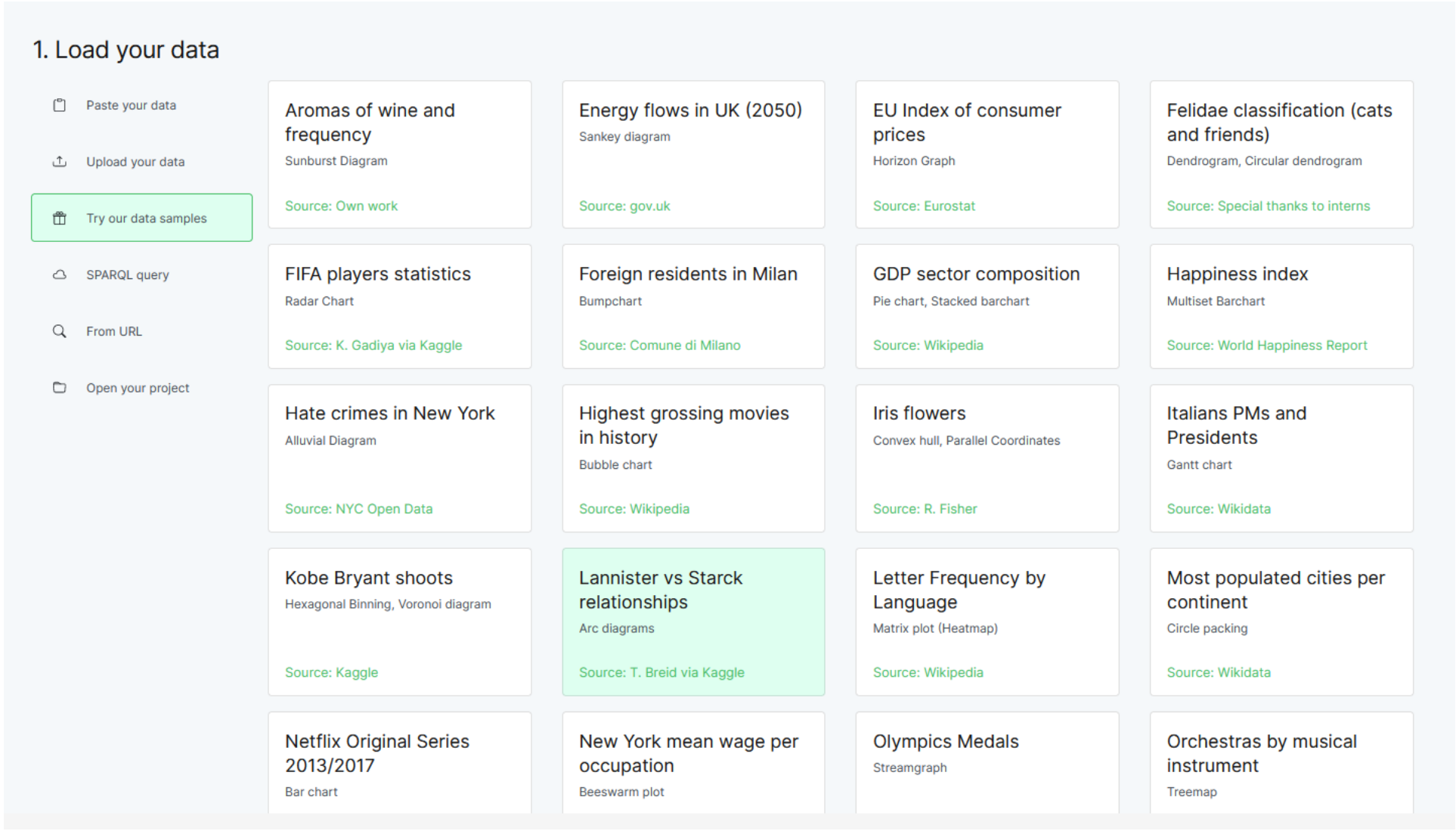


- Continue editing & refinement in any vector graphics editor
  - Adobe Illustrator
  - Inkscape
  - Figma

alluvial (flow) diagram example



alluvial (flow) diagram example



alluvial (flow) diagram example

1. Load your data

DATA PARSING OPTIONS

Column separator: \t Tab

Thousands separator: ,

Decimals separator: .

Date Locale: en-GB

DATA TRANSFORMATION

Stack on: Column

Reset

Change data

	Source	Target	weight
1	Arya Stark	Cersei Lannister	25
2	Arya Stark	Jaime Lannister	13
3	Arya Stark	Tyrion Lannister	11
4	Arya Stark	Tywin Lannister	13
5	Benjen Stark	Cersei Lannister	3
6	Benjen Stark	Tyrion Lannister	8
7	Bran Stark	Cersei Lannister	6
8	Bran Stark	Stafford Lannister	3

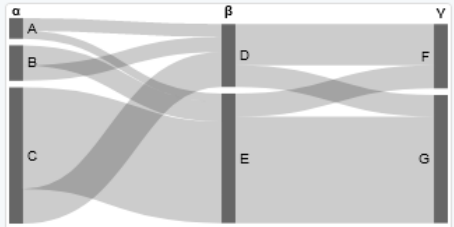
24 rows (72 cells) have been successfully parsed, now you can choose a chart!

Copy to clipboard

alluvial (flow) diagram example

2. Choose a chart

Show All charts



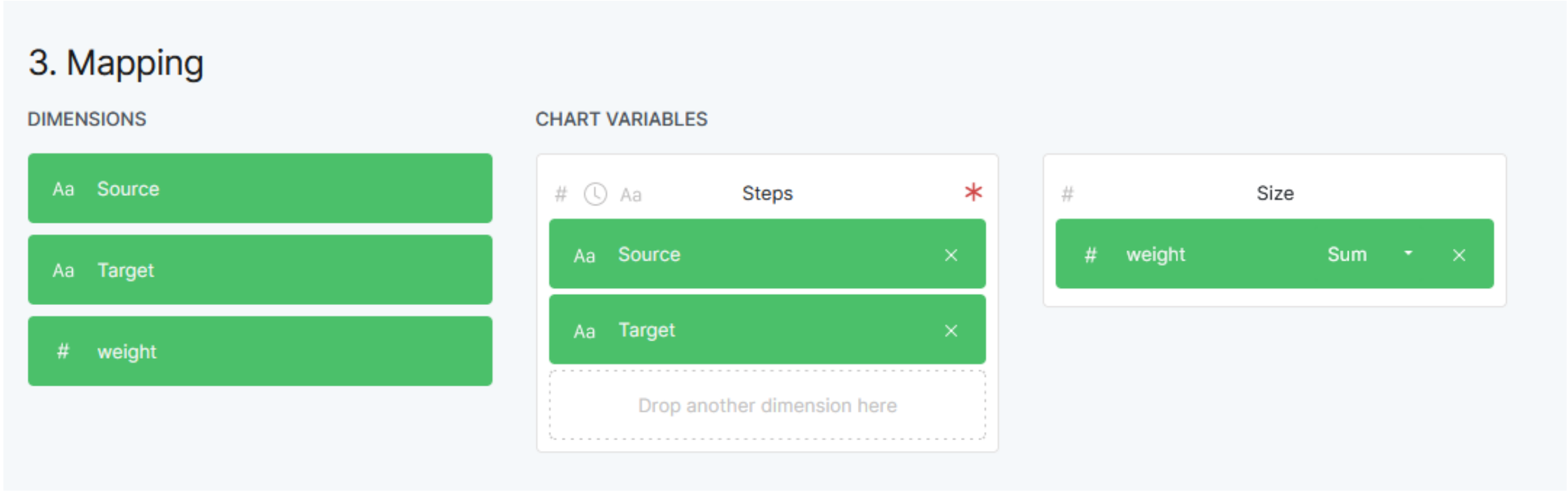
Alluvial Diagram

It shows correlations between categorical dimensions representing them as flows, visually linking categories with shared items. Each rectangle represents a unique value in the selected dimension, its height is proportional to its value. Correlations are represented with curved lines whose width is proportional to their value.

Code Tutorial

- **Alluvial Diagram** — Correlations, proportions
- **Arc Diagram** — Networks
- **Bar chart** — Correlations
- **Multi-set bar chart** — Correlations, proportions
- **Stacked bar chart** — Correlations, proportions
- **Beeswarm plot** — Distributions, time series, proportions
- **Box plot** — Distributions
- **Bubble chart** — Correlations, proportions
- **Bumpchart** — Time series, correlations, proportions
- **Calendar heatmap** — Time chunks, proportions
- **Circle Packing** — Hierarchies, proportions
- **Circular dendrogram** — Hierarchies, proportions
- **Contour plot** — Correlations, distributions
- **Convex hull** — Correlations, proportions
- **Linear dendrogram** — Hierarchies, proportions
- **Gantt chart** — Time series, correlations
- **Hexagonal binning** — Correlations, distributions
- **Horizon graph** — Time series, correlations
- **Line chart** — Time series, correlations
- **Matrix Plot** — Correlations, time series, proportions
- **Parallel coordinates** — Correlations, distributions

alluvial (flow) diagram example



alluvial (flow) diagram example

4. Customize

ARTBOARD

Width (px) 805

Height (px) 600

Background #FFFFFF

Margin (top) 10

Margin (right) 10

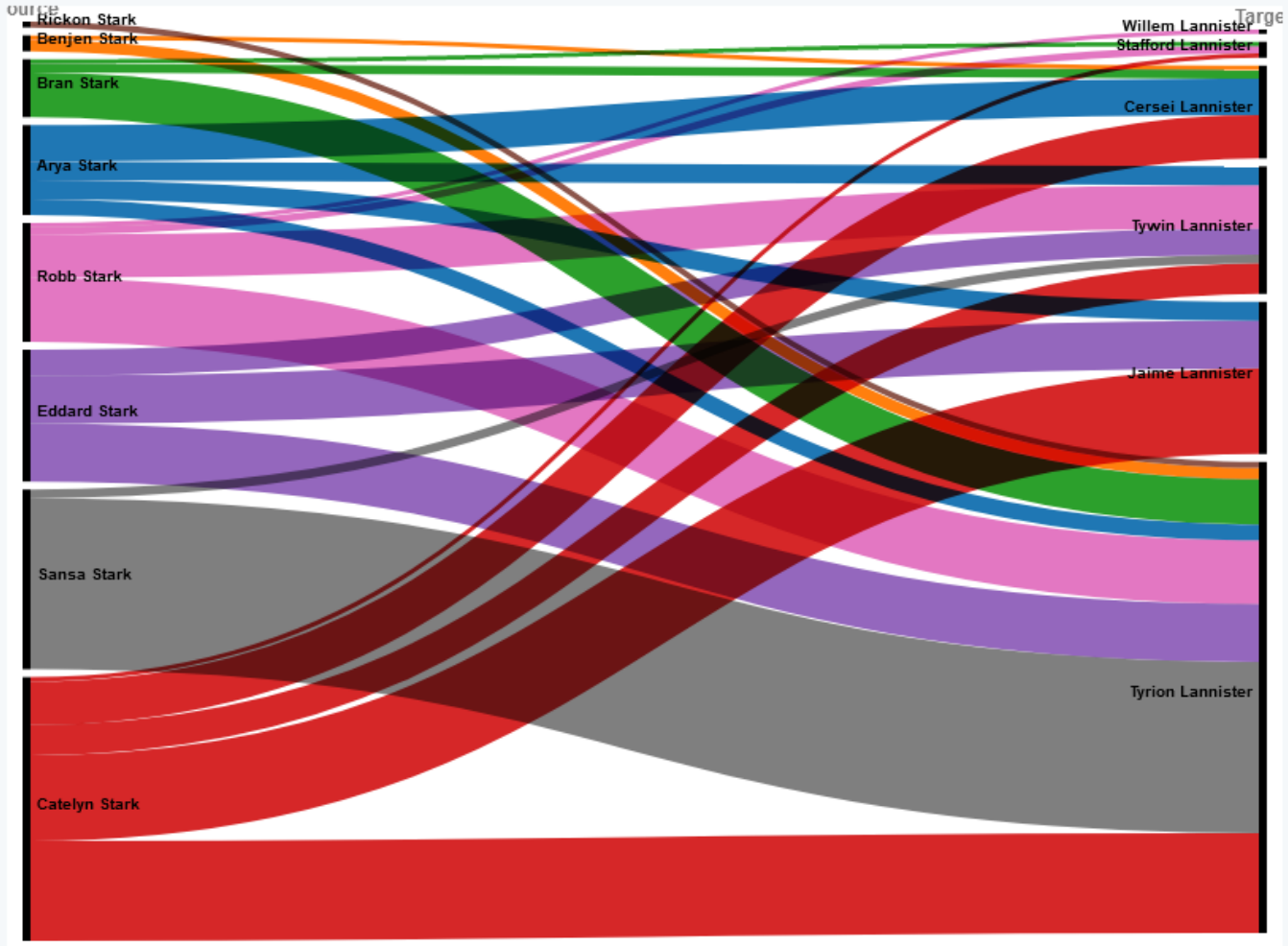
Margin (bottom) 10

Margin (left) 10

CHART

COLORS

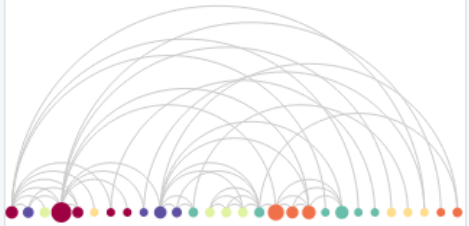
LABELS



comparison to arc diagram (same data)

2. Choose a chart

Show All charts



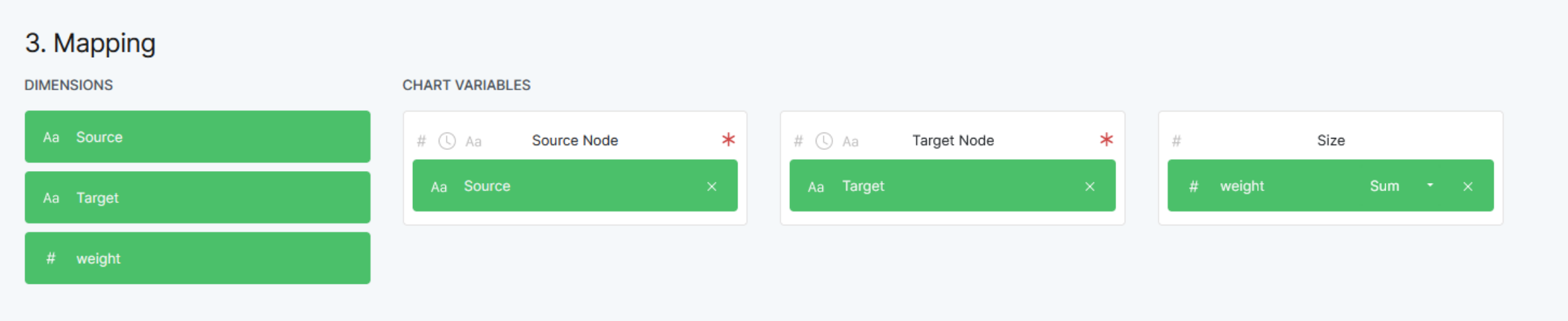
Arc Diagram

A particular kind of network graph, allows seeing relationships among nodes. Nodes are displayed on the horizontal axis, and links as clockwise arcs. An arc above the nodes means a connection from the left to the right, while below means a connection from the right node to the left one.

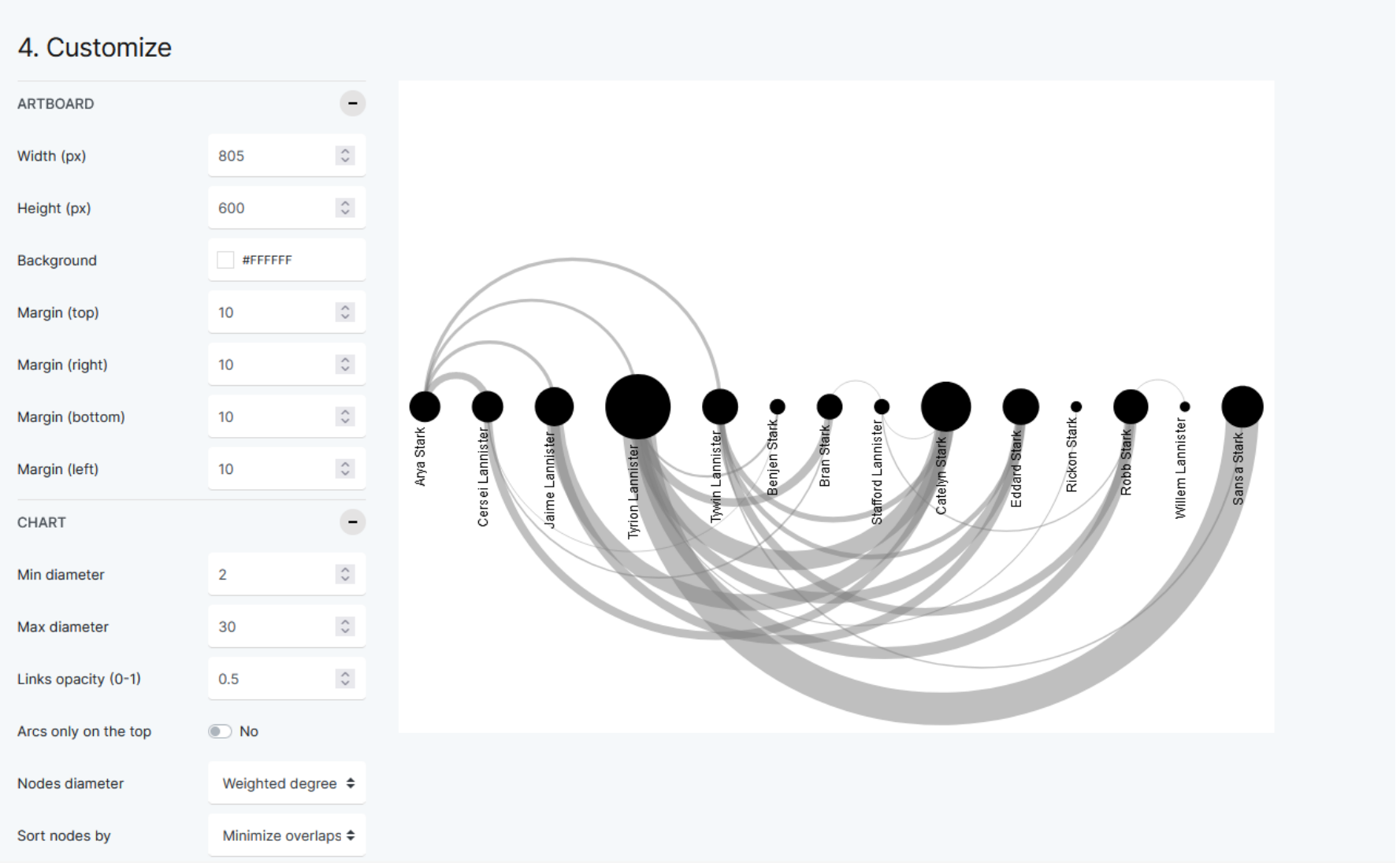
Code Tutorial

Alluvial Diagram Correlations, proportions	Arc Diagram Networks	Bar chart Correlations
Multi-set bar chart Correlations, proportions	Stacked bar chart Correlations, proportions	Beeswarm plot Distributions, time series, proportions
Box plot Distributions	Bubble chart Correlations, proportions	Bumpchart Time series, correlations, proportions
Calendar heatmap Time chunks, proportions	Circle Packing Hierarchies, proportions	Circular dendrogram Hierarchies, proportions
Contour plot Correlations, distributions	Convex hull Correlations, proportions	Linear dendrogram Hierarchies, proportions
Gantt chart Time series, correlations	Hexagonal binning Correlations, distributions	Horizon graph Time series, correlations
Line chart Time series, correlations	Matrix Plot Correlations, time series, proportions	Parallel coordinates Correlations, distributions

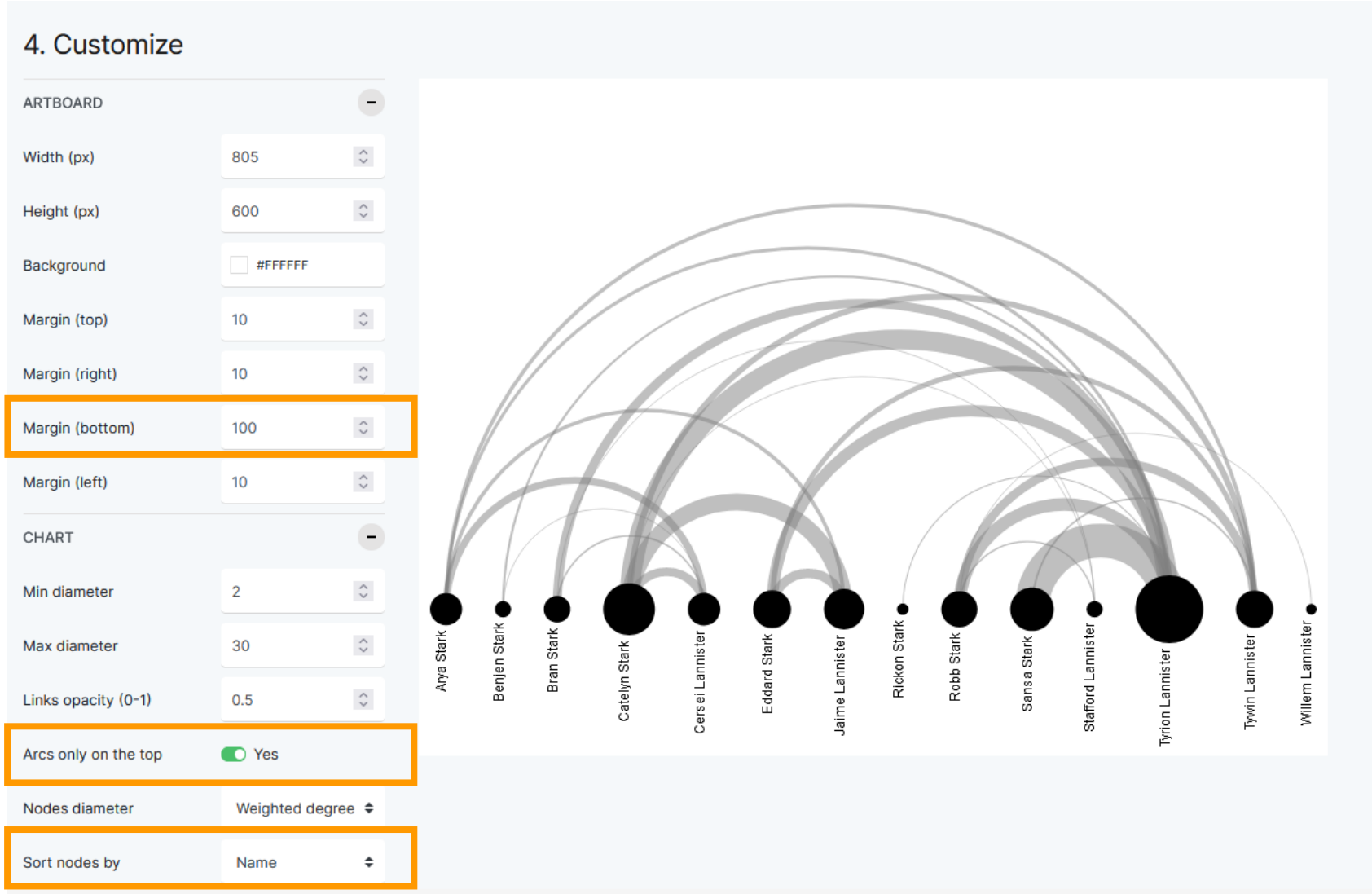
comparison to arc diagram (same data)



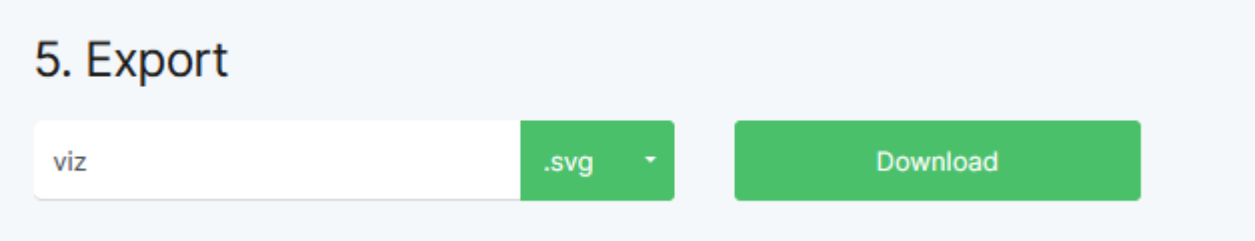
comparison to arc diagram (same data)



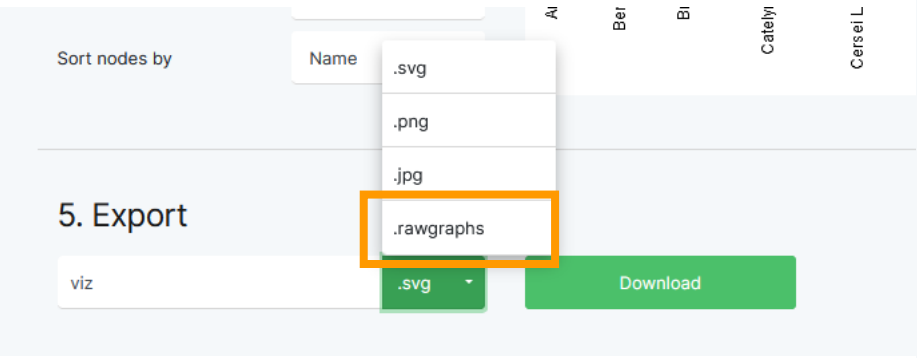
comparison to arc diagram (same data)

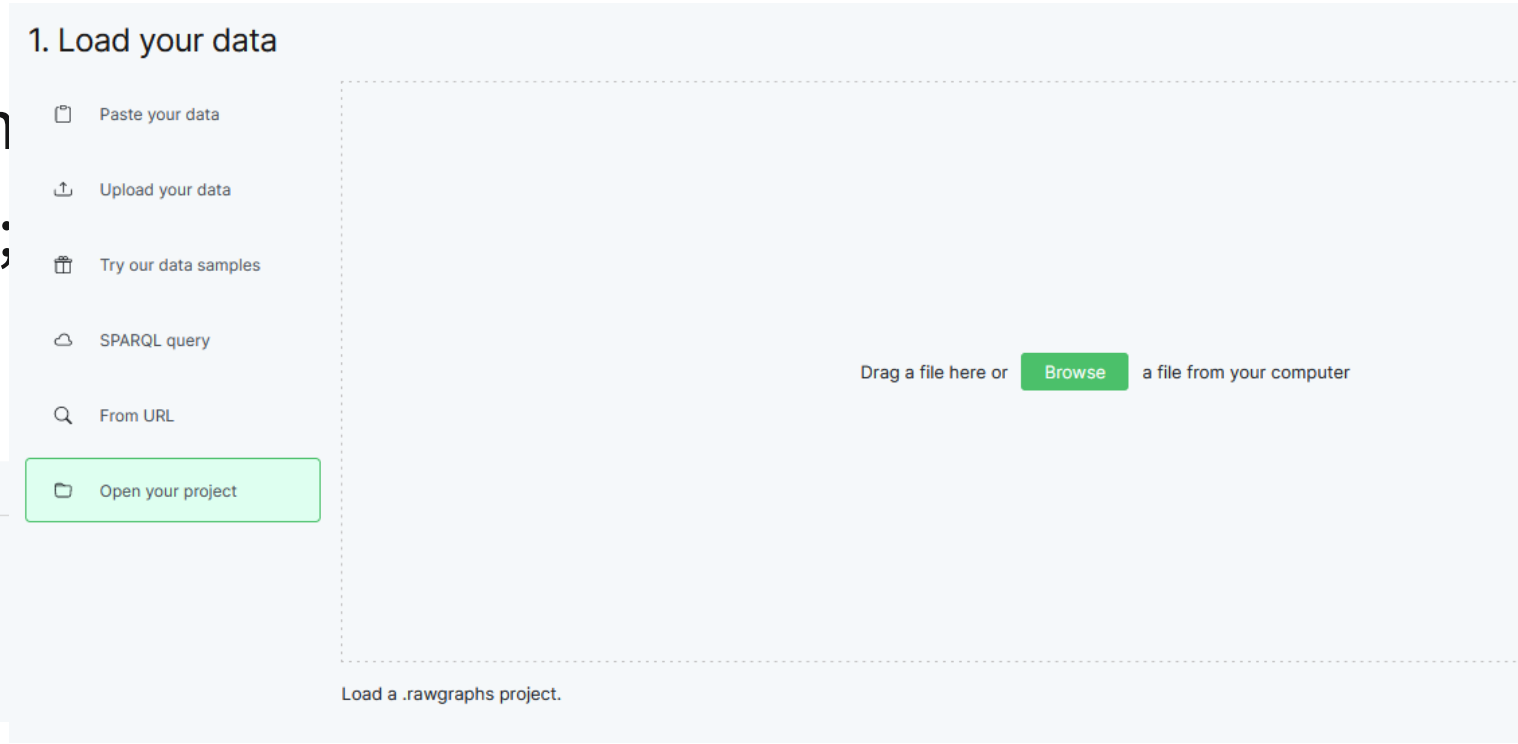


export



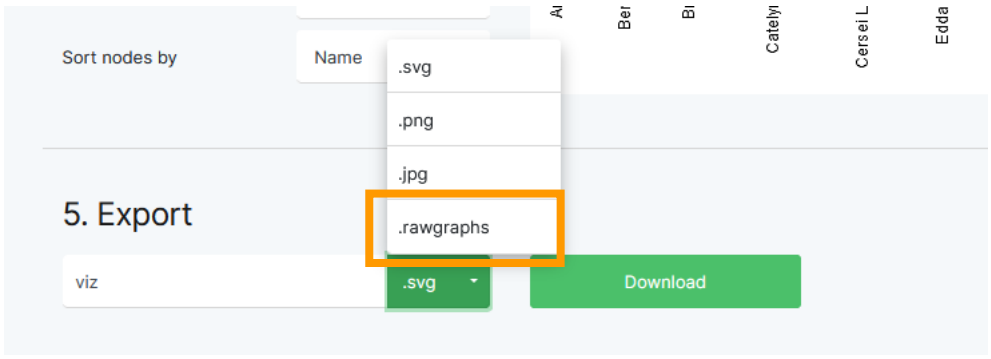
- Continue editing & refinen
- Download .rawgraphs file;

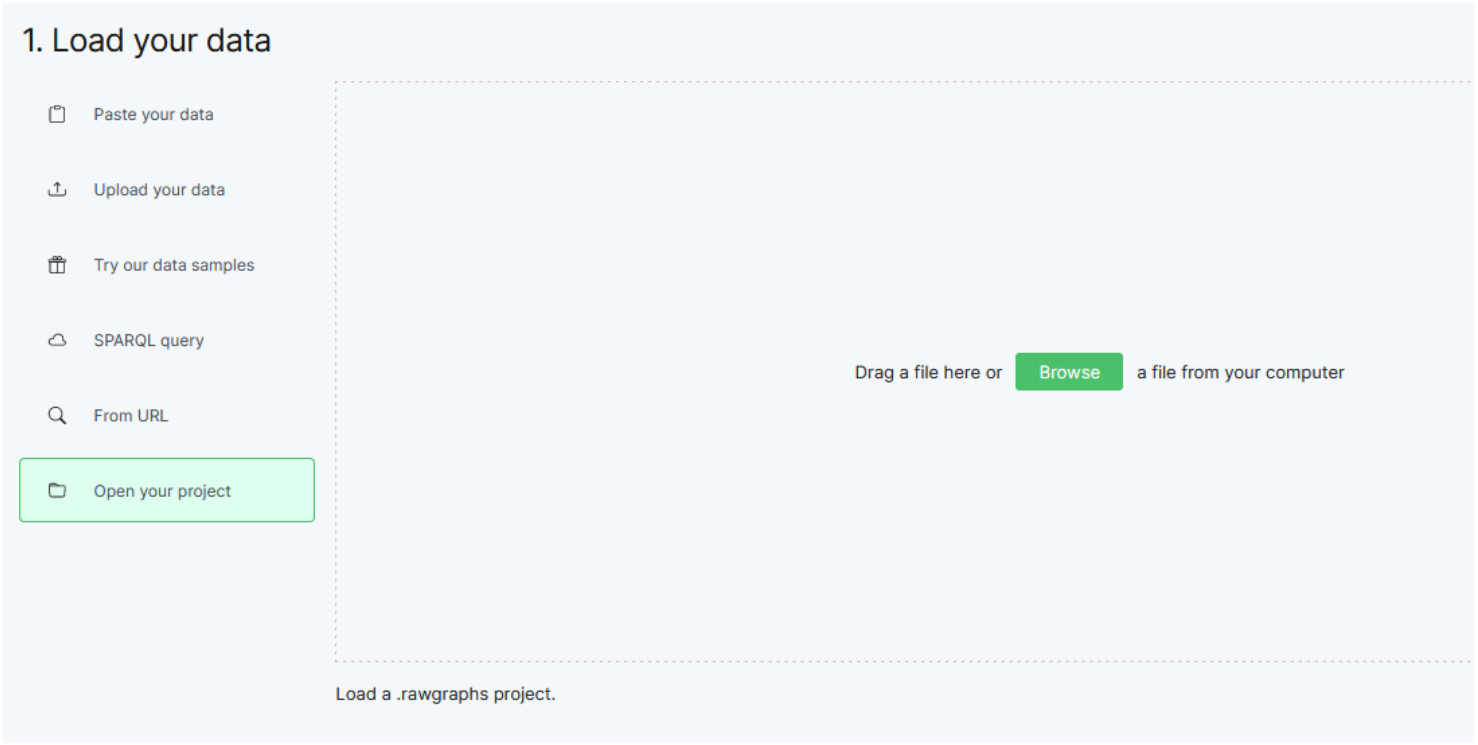




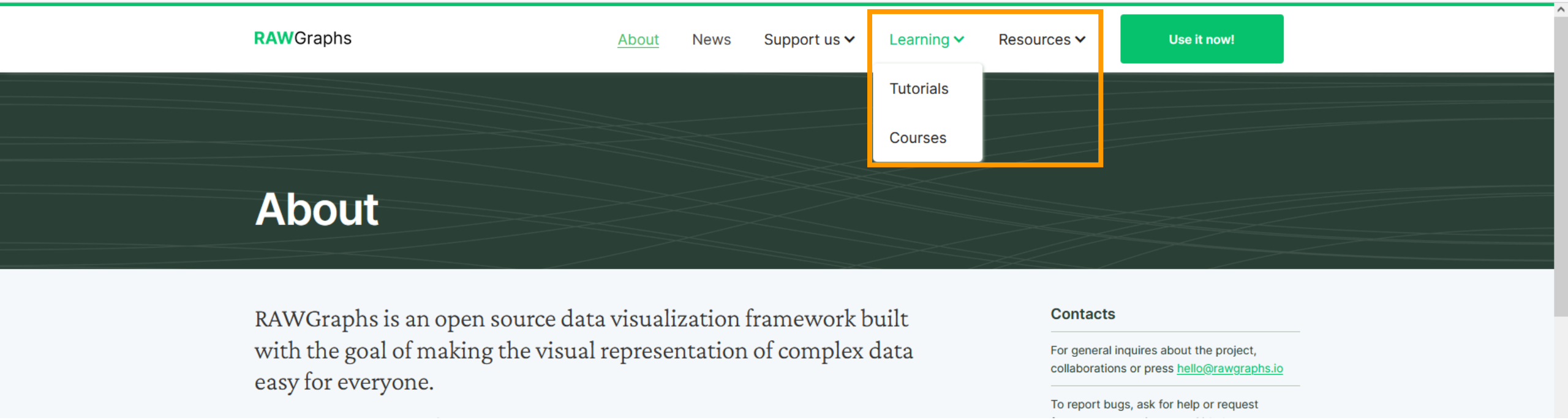
download .rawgraphs file

- Download .rawgraphs file; re-load in RawGraphs later





more information



https://www.rawgraphs.io/