



# **RAW**Graphs

The missing link between spreadsheets and data visualization.



## From Sketching to Coding

Visualization as a Thinking Process

DH'23 workshop

# what is RAWGraphs?

- [DensityDesign Research](#), Milan
- [Calibro](#) Design Studio, Milan
- [Inmagik](#), Bergamo

D E N -  
S I T Y  
G N +

**Calibro**



→ 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 visualization

# where can I get RAWGraphs?

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

RAWGraphs

About

News

Support us ▼

Learning ▼

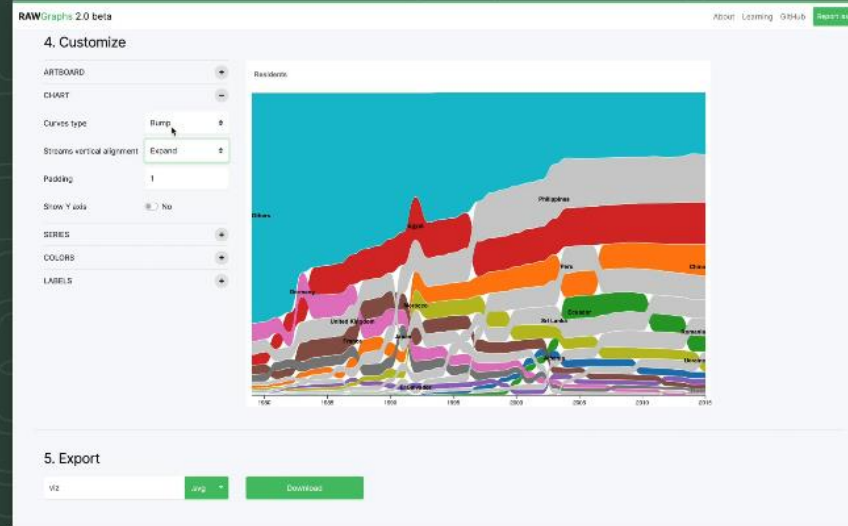
Resources ▼

Use it now!

A free and open source  
tool for data visualization

Use it now!

Github



# what is RAWGraphs good for?

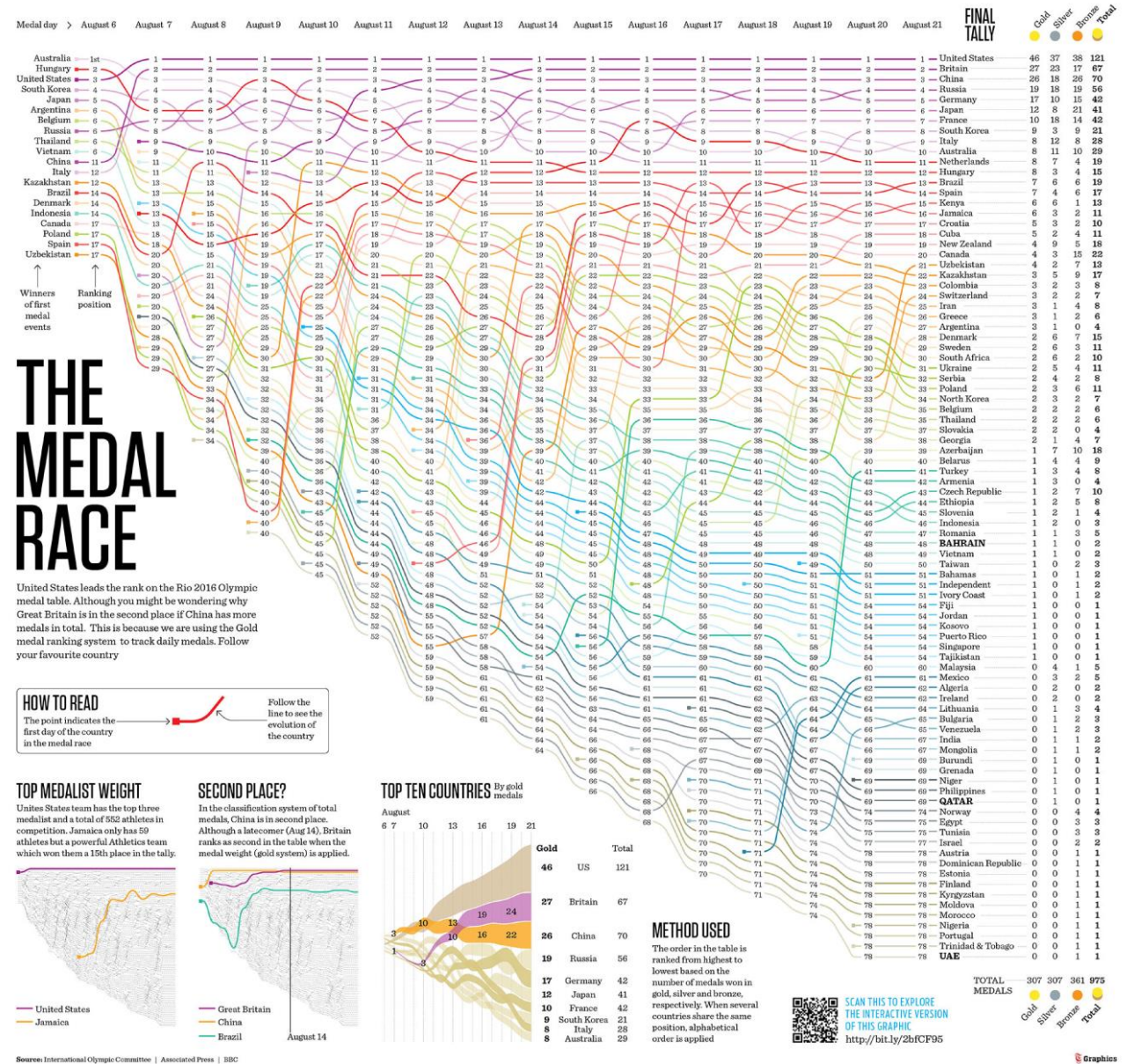
- Visualizing tabular & relational data using standard visualizations
- Simple creation of static visualizations
- Good export functions to edit graphs in vector graphics applications (e.g., Adobe Illustrator, [Inkscape](#), or [Figma](#))
  - .svg
  - .png
  - .jpg
  - .rawgraphs
- Good for quick explorations and computational sketches
- Good for designing custom static visualization (e.g., for print reports)

# what is RAWGraphs 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!
  - Figma <https://www.figma.com/>
  - [Adobe Illustrator](#)
  - [Inkscape](#)

# RAWGraphs example visualizations

# the medal race

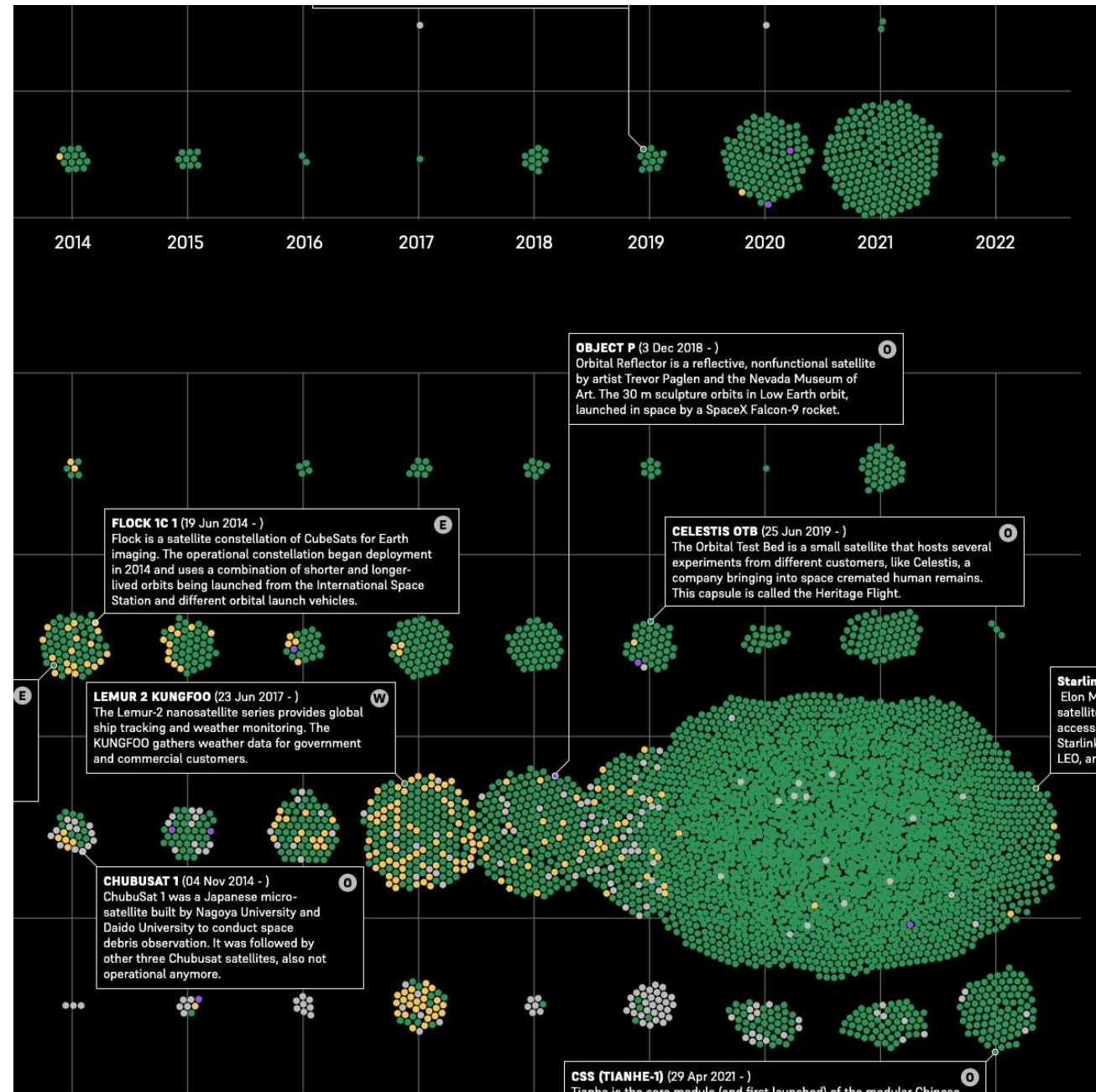


<https://www.rawgraphs.io/gallery/the-medal-race>



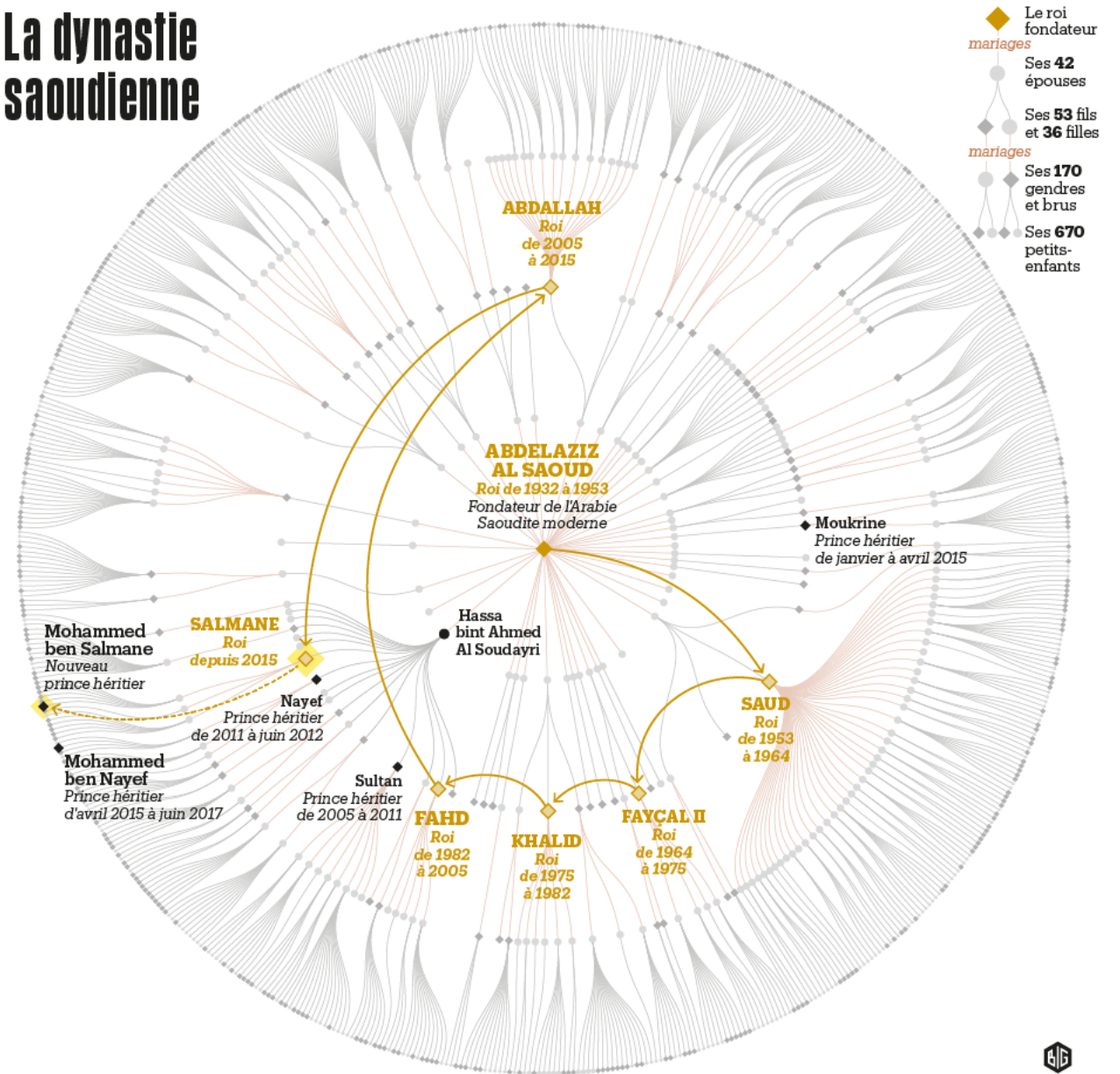
# satellite chart

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



# Royal family of Saudi Arabia

## La dynastie saoudienne



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



creating visualizations in RAWGraphs

# 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 (<https://dh23-vis-workshop.github.io/>)


# RAWGraphs overview


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

# 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

Source: Kaggle

## Lannister vs Starck relationships

Arc diagrams

Source: T. Breid via Kaggle

## Letter Frequency by Language

Matrix plot (Heatmap)

Source: Wikipedia

## Most populated cities per continent

Circle packing

Source: Wikidata

## Netflix Original Series 2013/2017

Bar chart

Source: M. Schroyer via Data World

## New York mean wage per occupation

Beeswarm plot

Source: NYC Open Data

## Olympics Medals

Streamgraph

Source: D. Agrawal via Kaggle

## Orchestras by musical instrument

Treemap

Source: Wikipedia

# 1. Load your data

## DATA PARSING OPTIONS

Column separator

Tab

Thousands separator

,

Decimals separator

.

Date Locale

en-GB

## DATA TRANSFORMATION

Stack on

Column

Reset

Change data

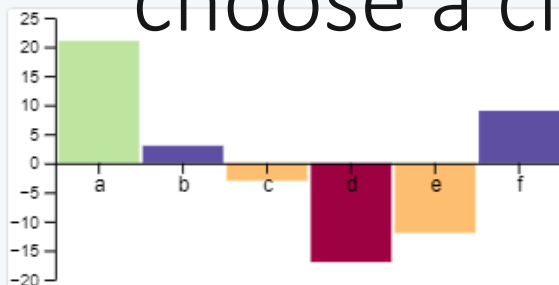
	Aa Genre ↓↑	Aa Title ↓↑	Aa Subgenre ↓↑	# Premiere_Year ↓↑	Aa Status ↓↑	# Seasons ↓↑	# Episodes ↓↑
1	Animation	Star Wars: The Clone	Animation	2014	Ended	1	13
2	Comedy	Arrested Development	Comedy	2013	Renewed	1	15
3	Comedy	Russell Peters vs. th	Docu-Series	2013	Ended	1	4
4	Comedy	BoJack Horseman	Adult Animation	2014	Renewed	3	36
5	Comedy	Trailer Park Boys (se	Mockumentary	2014	Pending	4	40
6	Comedy	Unbreakable Kimmy Sch	Comedy	2015	Pending	3	39
7	Comedy	Grace and Frankie	Comedy-drama	2015	Renewed	3	39
8	Comedy	Master of None	Comedy-drama	2015	Pending	2	20

109 rows (872 cells) have been successfully parsed, now you can choose a chart!

Copy to clipboard

## 2. Choose a chart

choose a chart



### Bar chart

It displays a categorical dimension and related amounts. Each bar represents a category, width is proportional to the quantitative dimension.

[Code](#) [Tutorial](#)

Show All charts ▾



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



Pie chart



Radar Chart



Sankey Diagram



# choose a chart – tutorial

[TUTORIAL](#) Latest update: January 28, 2022

## How to make a barchart

In this guide you'll learn how to create a barchart. The goal is to visualize the top-rated TV series genres between 2013 and 2017.

RG How to make Bar Chart RAWGraphs Tutorial

Copy link

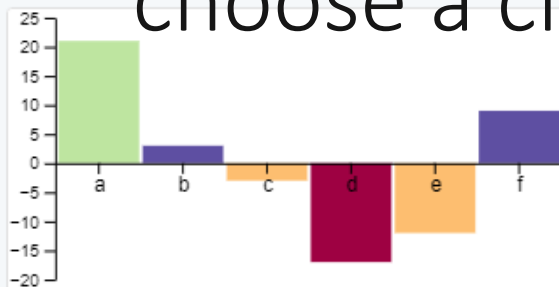
How to make Bar Chart

Watch on YouTube

Download the resources

## 2. Choose a chart

choose a chart



### Bar chart

It displays a categorical dimension and related amounts. Each bar represents a category, width is proportional to the quantitative dimension.

[Code](#) [Tutorial](#)

Show All charts ▾



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  
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Bumpchart  
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Calendar heatmap  
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Hierarchies, proportions



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Linear dendrogram  
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Time series, correlations



Hexagonal binning  
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Horizon graph  
Time series, correlations



Line chart  
Time series, correlations



Matrix Plot  
Correlations, time series, proportions



Parallel coordinates  
Correlations, distributions



Pie chart



Radar Chart



Sankey Diagram

data attributes



visual variabes



3. Mapping

DIMENSIONS

- Aa Genere
- Aa Title
- Aa Subgenre
- # Premiere\_Year
- Aa Status
- # Seasons
- # Episodes
- # IMDB\_Rating

CHART VARIABLES

# Aa ⌚ Bars \*

Drop dimension here

# Aa ⌚ Series

Drop dimension here

# Size

Drop dimension here

# Aa ⌚ Color

Drop dimension here

### 3. Mapping

DIMENSIONS

Aa Genre

Aa Title

Aa Subgenre

# Premiere\_Year

Aa Status

# Seasons

# Episodes

# IMDB\_Rating

CHART VARIABLES

# Aa ⌚ Bars \*

Aa Genre ×

# Aa ⌚ Series

Drop dimension here

# Size

# IMDB\_Rating Sum ▾ ×

Aa ⌚ Color

Aa Genre CSV (unique) ▾ ×

Orange arrow from Genre to Bars

Orange arrow from IMDB\_Rating to Size

Orange arrow from Color to Genre

## 4. Customize

### ARTBOARD

−

Width (px)

805

Height (px)

600

Background

☐ #FFFFFF

Margin (top)

20

Margin (right)

10

Margin (bottom)

20

Margin (left)

50

Show legend

☐ No

Legend width

200

### CHART

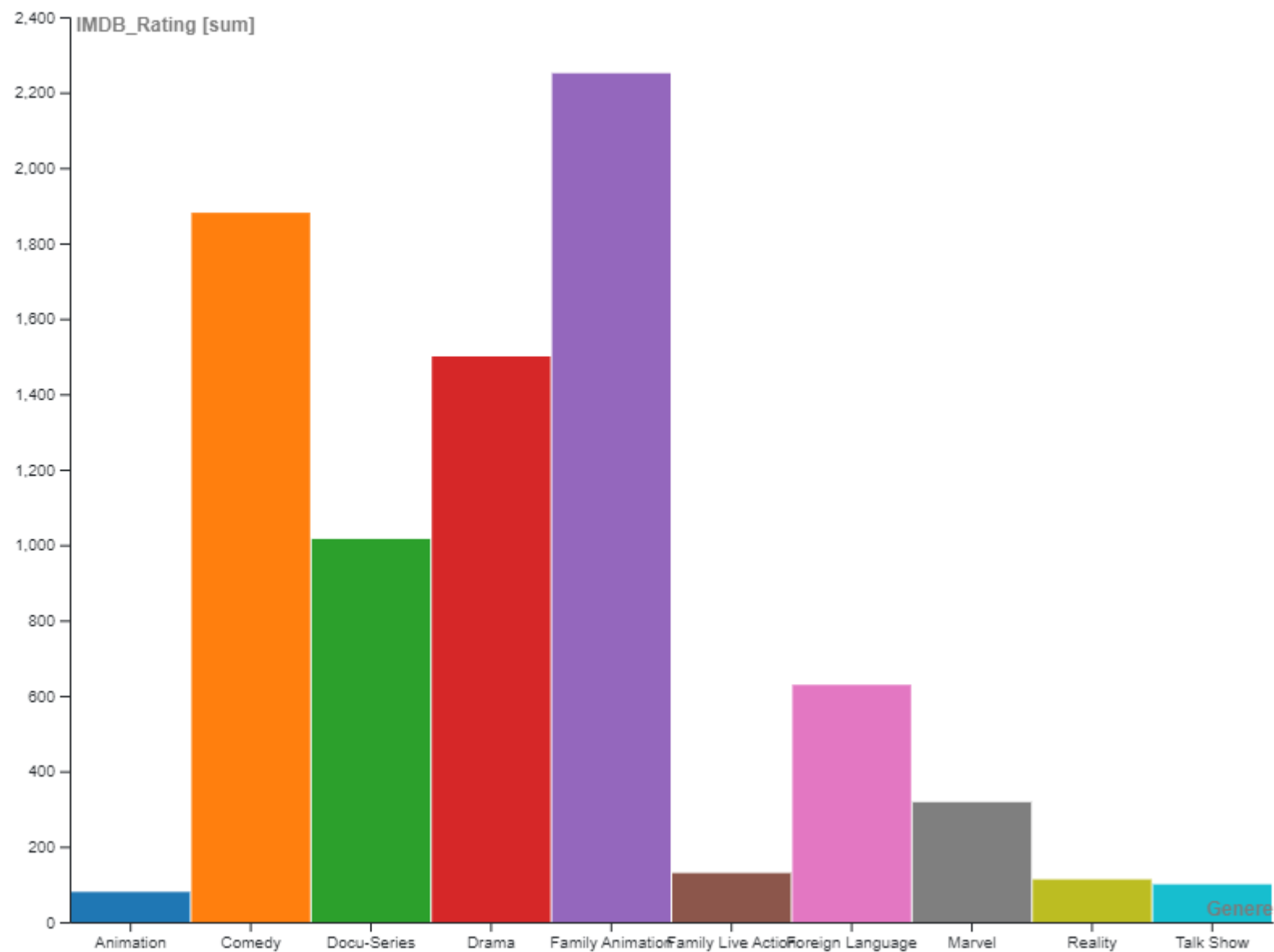
+

### SERIES

+

### COLORS

+



## 4. Customize

ARTBOARD



CHART



Padding

1

Bars orientation

Vertically



Sort bars by

Name



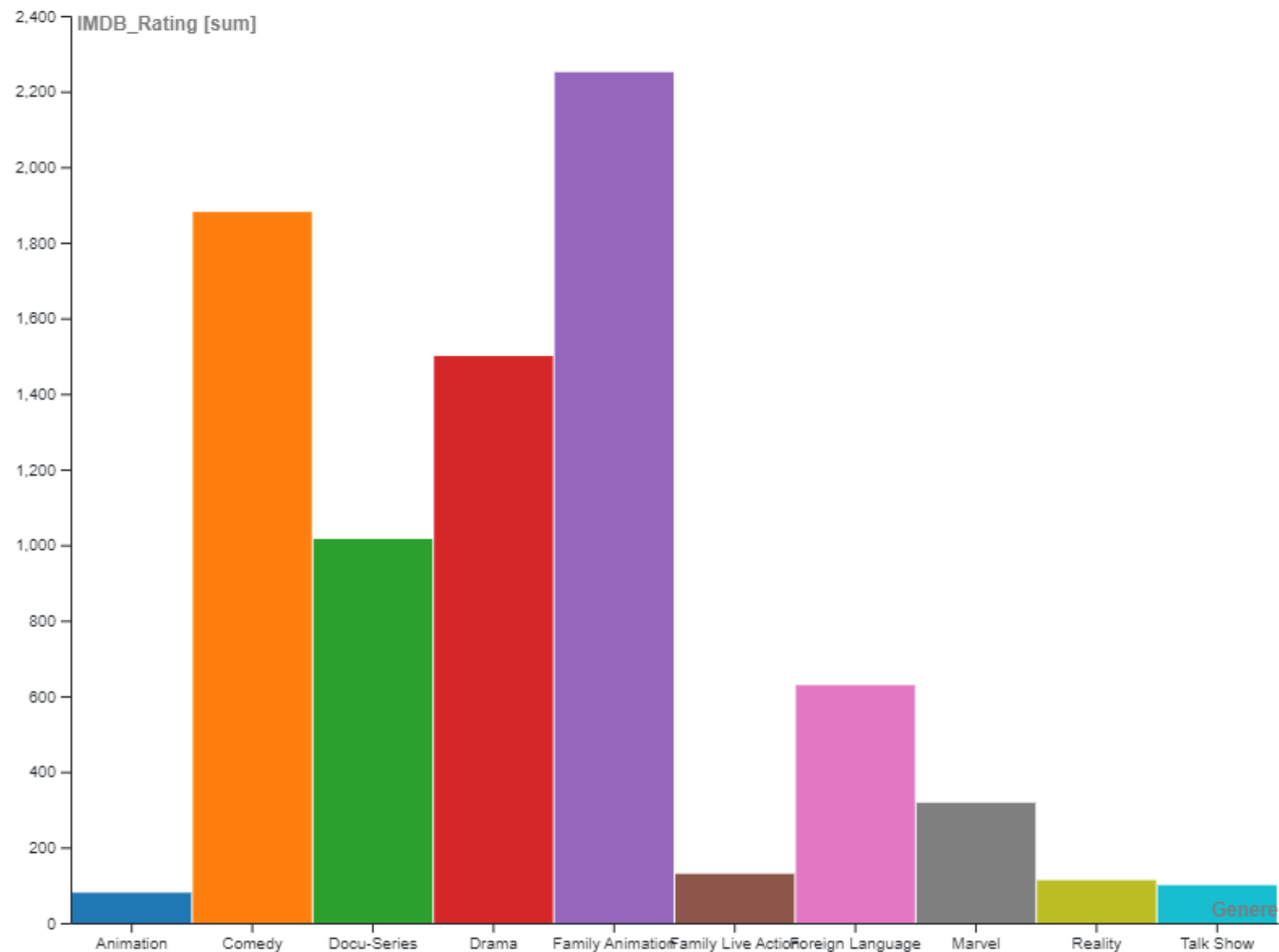
SERIES



COLORS



IMDB\_Rating [sum]



ARTBOARD



CHART



Padding

1

Bars orientation

Horizontally



Sort bars by

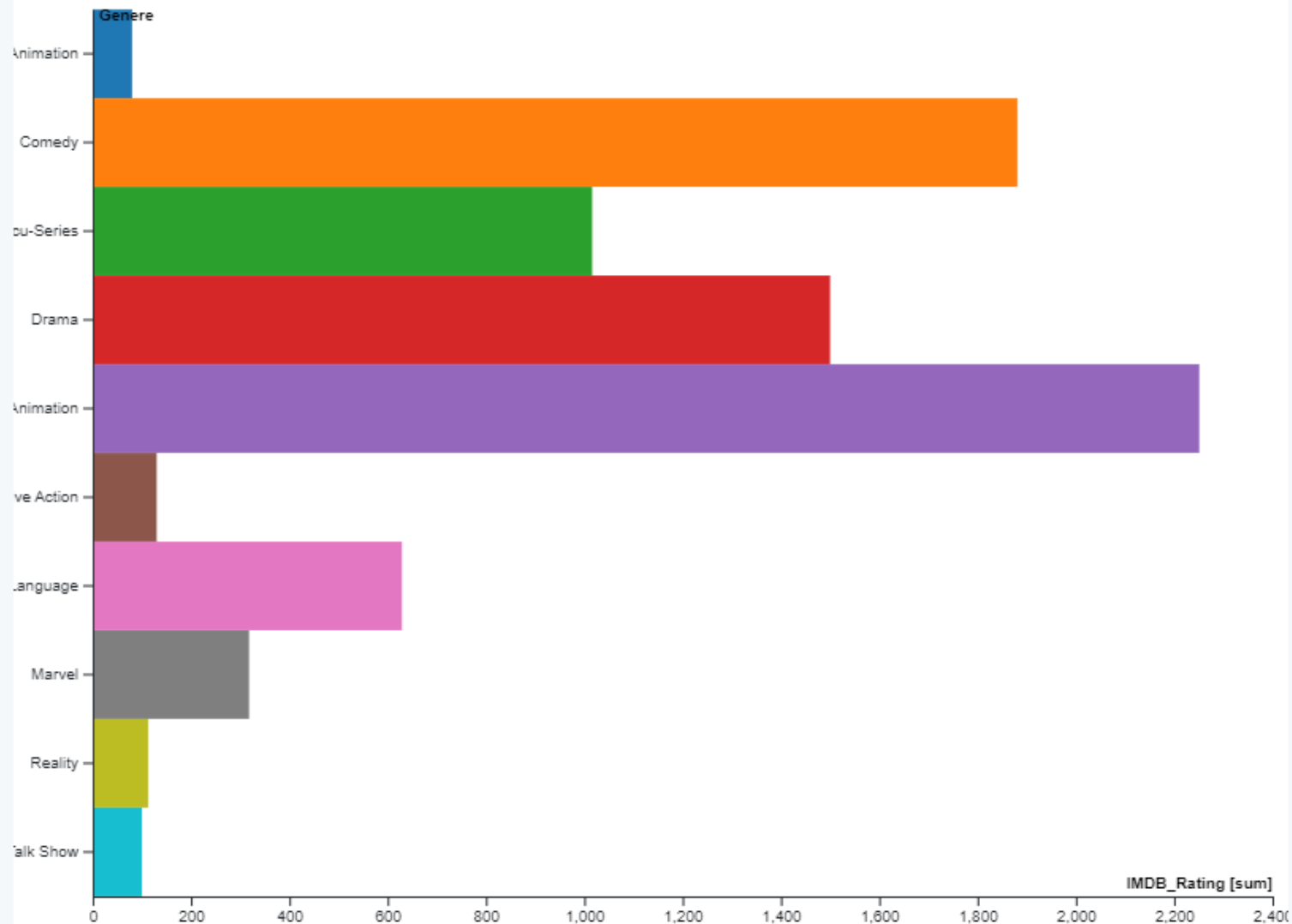
Name



SERIES



COLORS



## 5. Export

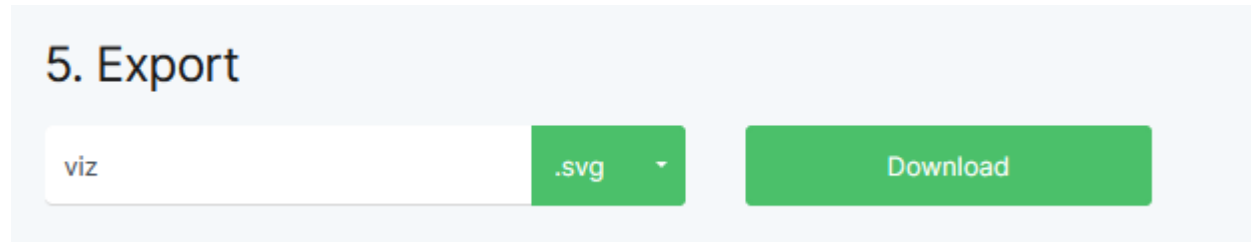
viz

.svg



Download

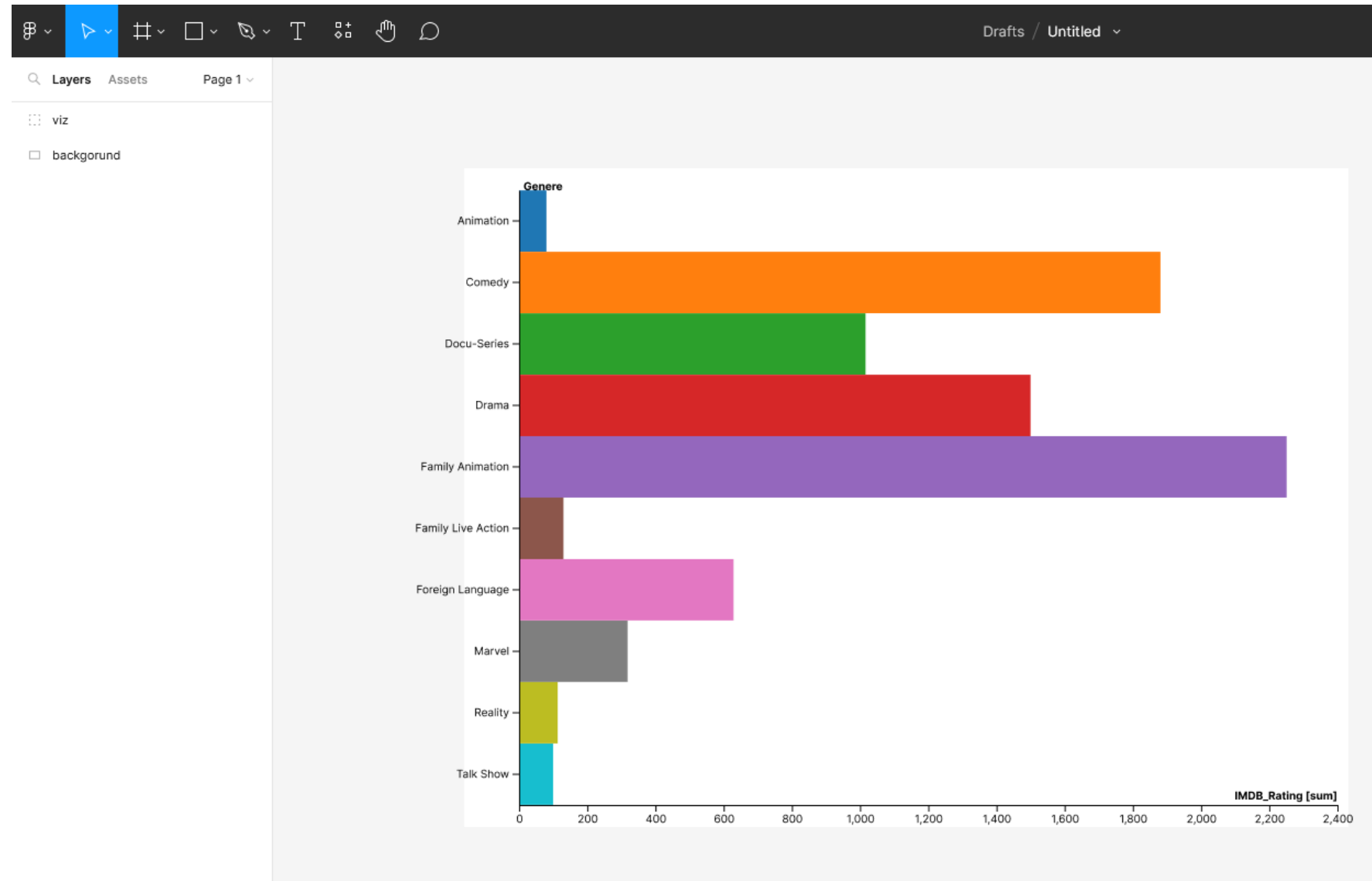
# export visualization file (.svg)



- Continue editing & refinement in any vector graphics editor
  - Figma <https://www.figma.com/>
  - [Adobe Illustrator](#)
  - [Inkscape](#)

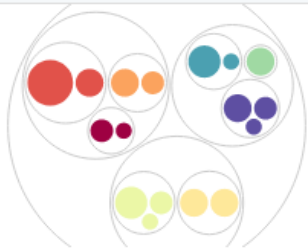


# load & edit .svg in Figma



# choose a different chart

## 2. Choose a chart



### 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](#)

Show All charts ▾



**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**

### 3. Mapping

#### DIMENSIONS

Aa Genere

Aa Title

Aa Subgenre

# Premiere\_Year

Aa Status

# Seasons

# Episodes

# IMDB\_Rating

#### CHART VARIABLES

# ⌚ Aa Hierarchy \*

Aa Genere ×

Aa Subgenre ×

Aa Title ×

Drop another dimension here

# ⌚ Aa Label

Drop dimensions here

# Size

# IMDB\_Rating Sum ▾ ×

# ⌚ Aa Color

Aa Genere CSV (unique) ▾ ×

## 4. Customize

### ARTBOARD

Width (px)

805

Height (px)

600

Background

☐ #FFFFFF

Margin (top)

20

Margin (right)

20

Margin (bottom)

20

Margin (left)

20

Show legend

☐ No

Legend width

200

### CHART

### COLORS

### LABELS

Show outline

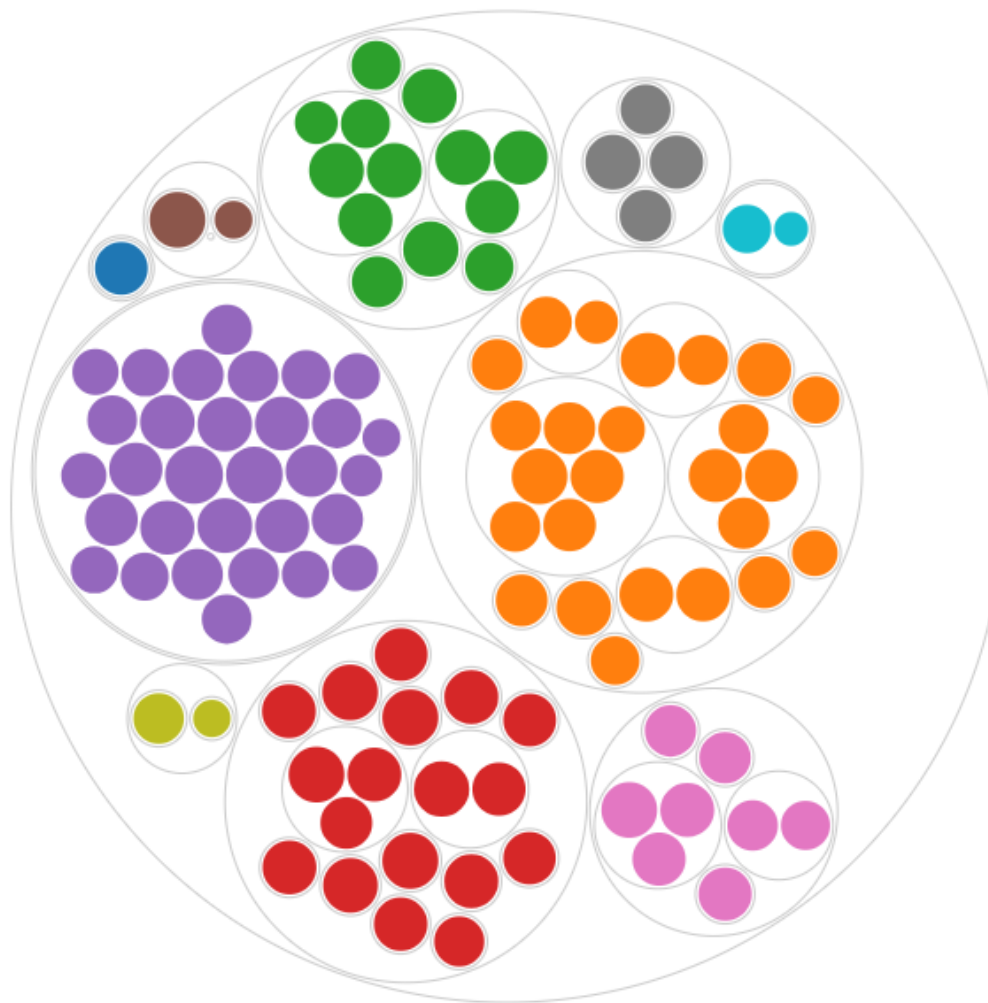
☐ No

Show hierarchy labels

☐ No

Hierarchy labels position

On point



## 4. Customize

### ARTBOARD

Width (px)

805

Height (px)

600

Background

☐ #FFFFFF

Margin (top)

20

Margin (right)

20

Margin (bottom)

20

Margin (left)

20

Show legend

☒ Yes

Legend width

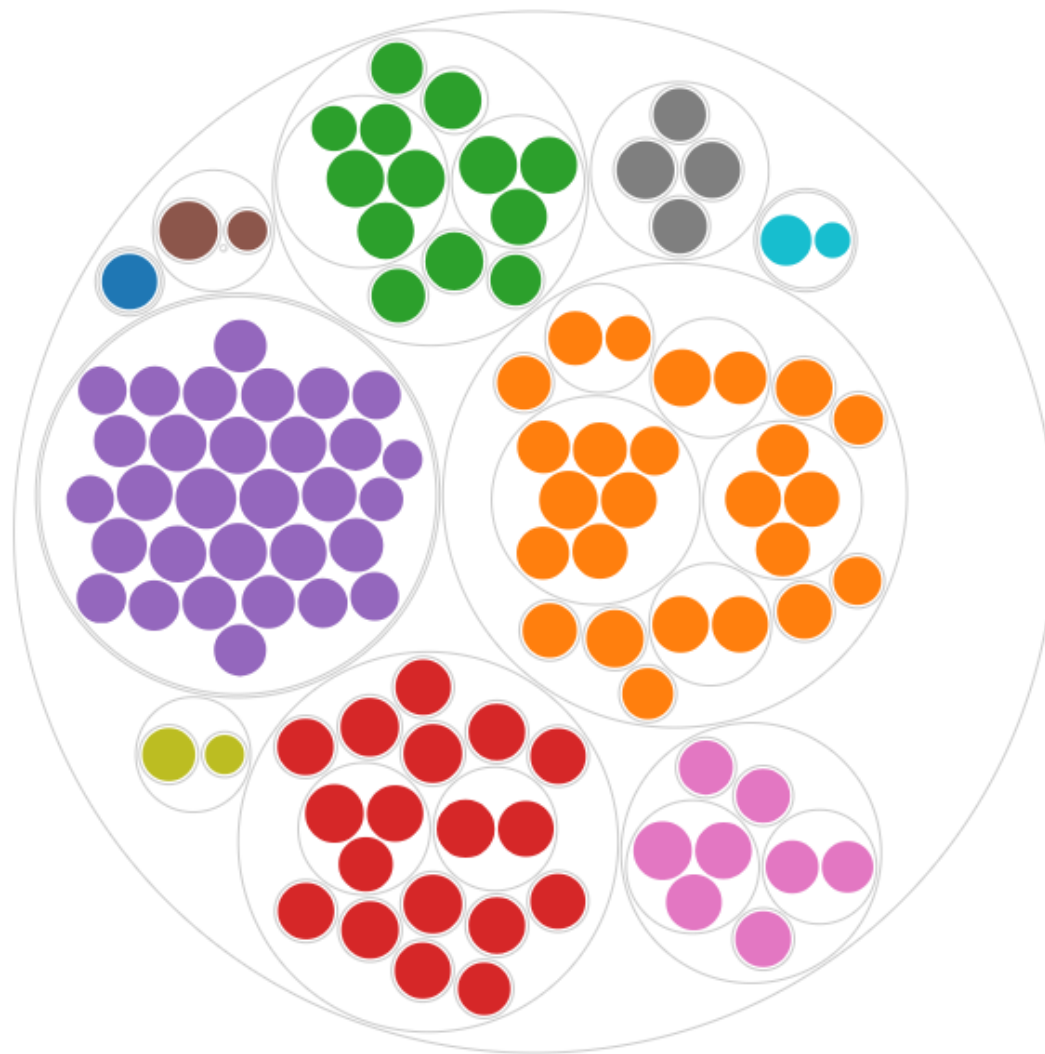
200

The final output will be 1005px \* 600px including the legend.

### CHART

### COLORS

### LABELS



### IMDB\_Rating [sum]

0.0

96.0

### Genre [csvDistinct]

- Animation
- Comedy
- Docu-Series
- Drama
- Family Animation
- Family Live Action
- Foreign Language
- Marvel
- Reality
- Talk Show

### 3. Mapping

#### DIMENSIONS

Aa Genere

Aa Title

Aa Subgenre

# Premiere\_Year

Aa Status

# Seasons

# Episodes

# IMDB\_Rating

#### CHART VARIABLES

# ⌚ Aa Hierarchy \*

Aa Genere ×

Aa Subgenre ×

Aa Title ×

Drop another dimension here

# ⌚ Aa Label

Aa Title CSV (unique) ×

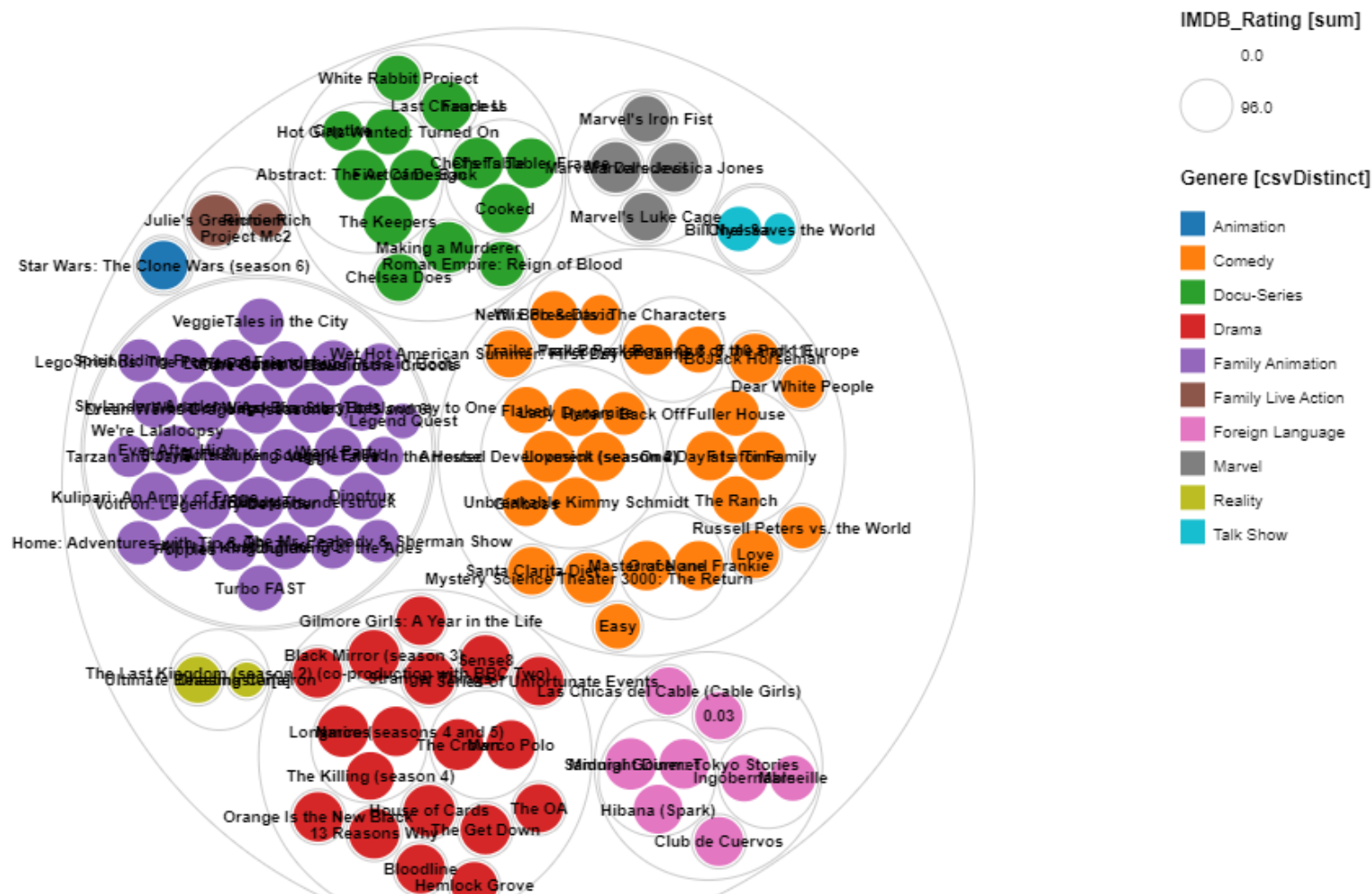
Drop another dimension here

# Size

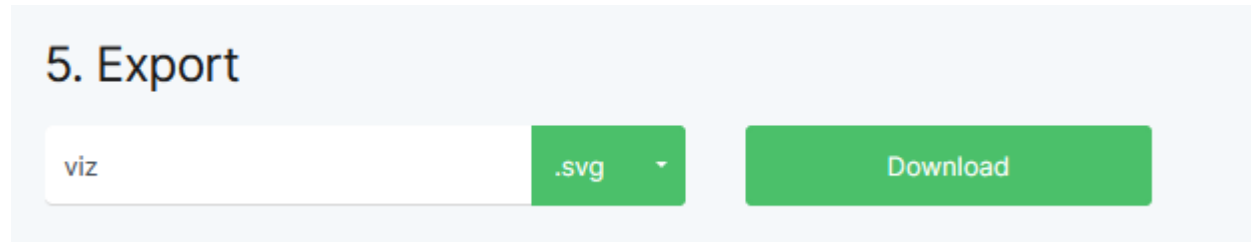
# IMDB\_Rating Sum ▾ ×

# ⌚ Aa Color

Aa Genere CSV (unique) ▾ ×



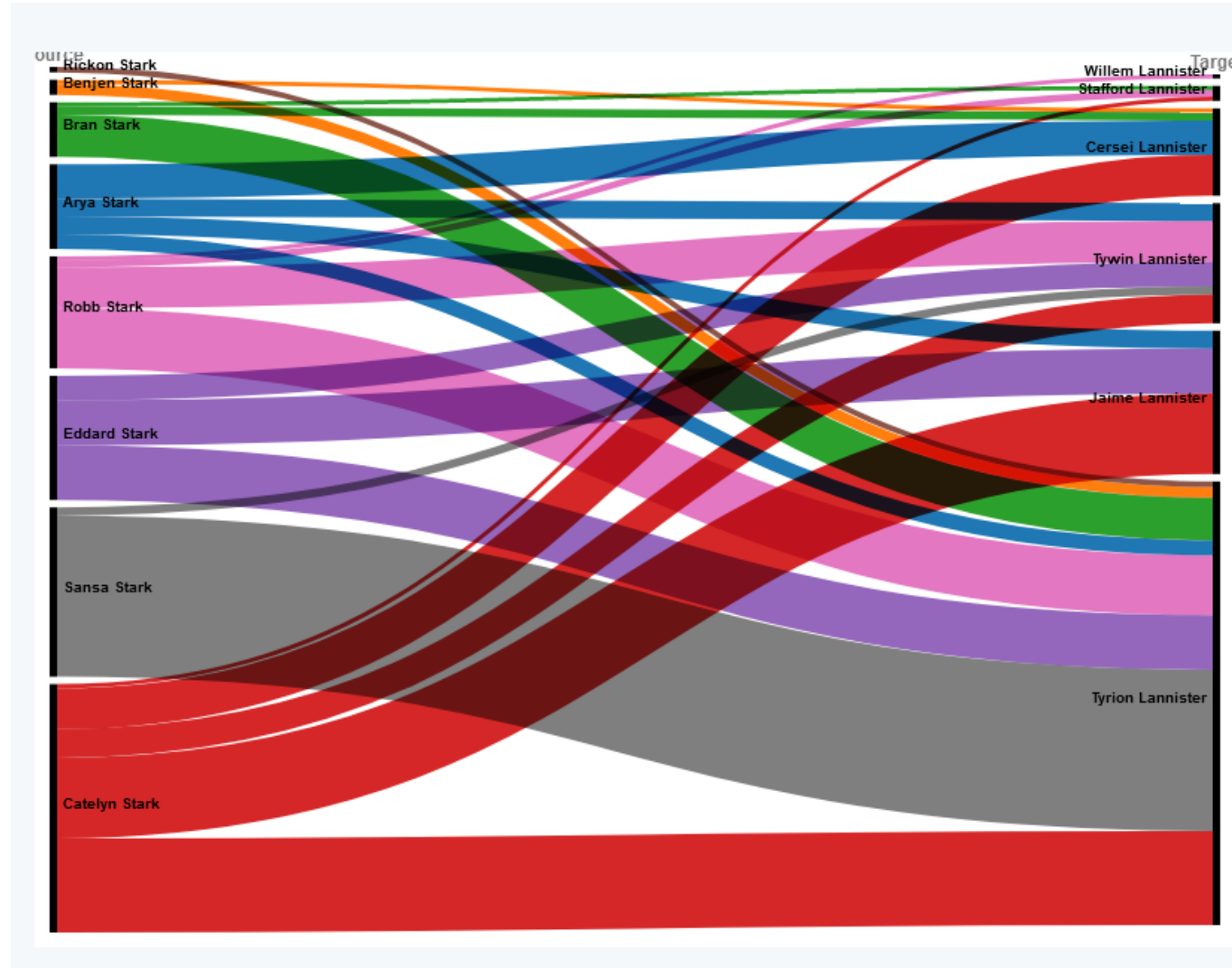
# export visualization file (.svg)



- Continue editing & refinement in any vector graphics editor
  - Figma <https://www.figma.com/>
  - [Adobe Illustrator](#)
  - [Inkscape](#)









# alluvial (flow) diagram example



# alluvial (flow) diagram example

## 1. Load your data

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

<b>Aromas of wine and frequency</b> Sunburst Diagram  Source: Own work	<b>Energy flows in UK (2050)</b> Sankey diagram  Source: gov.uk	<b>EU Index of consumer prices</b> Horizon Graph  Source: Eurostat	<b>Felidae classification (cats and friends)</b> Dendrogram, Circular dendrogram  Source: Special thanks to interns
<b>FIFA players statistics</b> Radar Chart  Source: K. Gadiya via Kaggle	<b>Foreign residents in Milan</b> Bumpchart  Source: Comune di Milano	<b>GDP sector composition</b> Pie chart, Stacked barchart  Source: Wikipedia	<b>Happiness index</b> Multiset Barchart  Source: World Happiness Report
<b>Hate crimes in New York</b> Alluvial Diagram  Source: NYC Open Data	<b>Highest grossing movies in history</b> Bubble chart  Source: Wikipedia	<b>Iris flowers</b> Convex hull, Parallel Coordinates  Source: R. Fisher	<b>Italians PMs and Presidents</b> Gantt chart  Source: Wikidata
<b>Kobe Bryant shoots</b> Hexagonal Binning, Voronoi diagram  Source: Kaggle	<b>Lannister vs Starck relationships</b> Arc diagrams  Source: T. Breid via Kaggle	<b>Letter Frequency by Language</b> Matrix plot (Heatmap)  Source: Wikipedia	<b>Most populated cities per continent</b> Circle packing  Source: Wikidata
<b>Netflix Original Series 2013/2017</b> Bar chart	<b>New York mean wage per occupation</b> Beeswarm plot	<b>Olympics Medals</b> Streamgraph	<b>Orchestras by musical instrument</b> Treemap

# alluvial (flow) diagram example

## 1. Load your data

### DATA PARSING OPTIONS

Column separator Tab

Thousands separator ,

Decimals separator .

Date Locale en-GB

### DATA TRANSFORMATION

Stack on Column

Reset

Change data

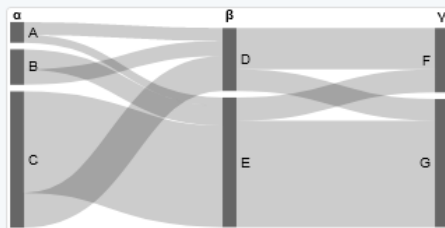
	Aa Source	Aa Target	# weight
1	Arya Stark	Cersei Lannister	25
2	Arya Stark	Jaime Lannister	13
3	Arya Stark	Tyrion Lannister	11
4	Arya Stark	Tywin Lannister	13
5	Benjen Stark	Cersei Lannister	3
6	Benjen Stark	Tyrion Lannister	8
7	Bran Stark	Cersei Lannister	6
8	Bran Stark	Stafford Lannister	3

**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



### 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](#)

Show All charts ▾



**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

## 3. Mapping

### DIMENSIONS

Aa Source

Aa Target

# weight

### CHART VARIABLES

# ⌚ Aa Steps \*

Aa Source ×

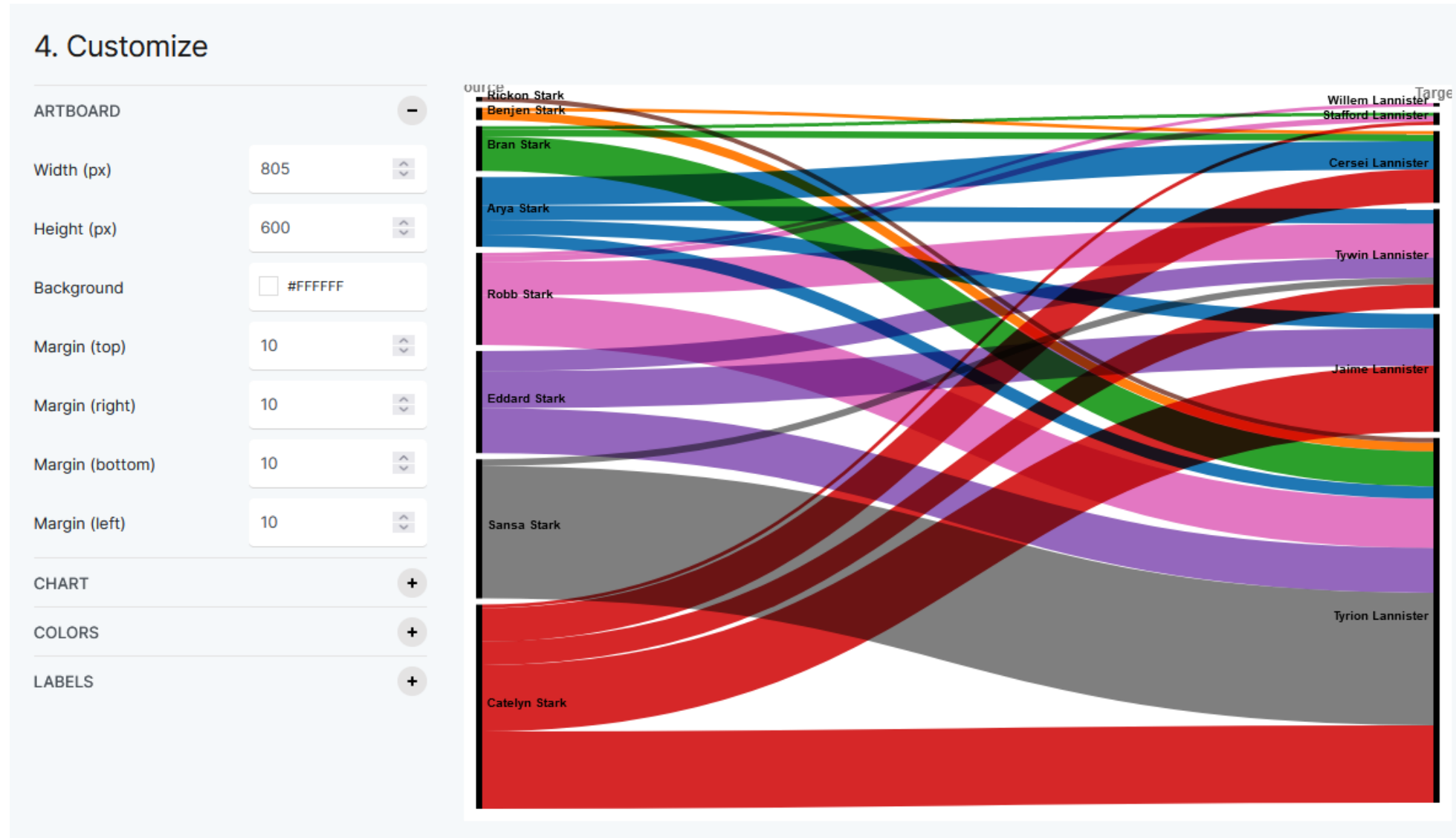
Aa Target ×

Drop another dimension here

# Size

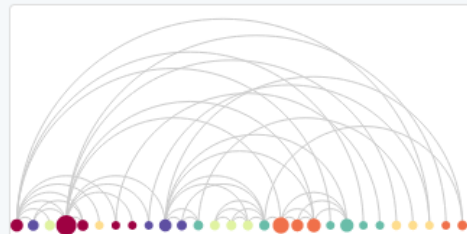
# weight Sum ▾ ×

# alluvial (flow) diagram example



# comparison to arc diagram (same data)

## 2. Choose a chart



### 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](#)

Show All charts ▾



**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



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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)

## 3. Mapping

### DIMENSIONS

Aa Source

Aa Target

# weight

### CHART VARIABLES

# ⌚ Aa Source Node \*

Aa Source ×

# ⌚ Aa Target Node \*

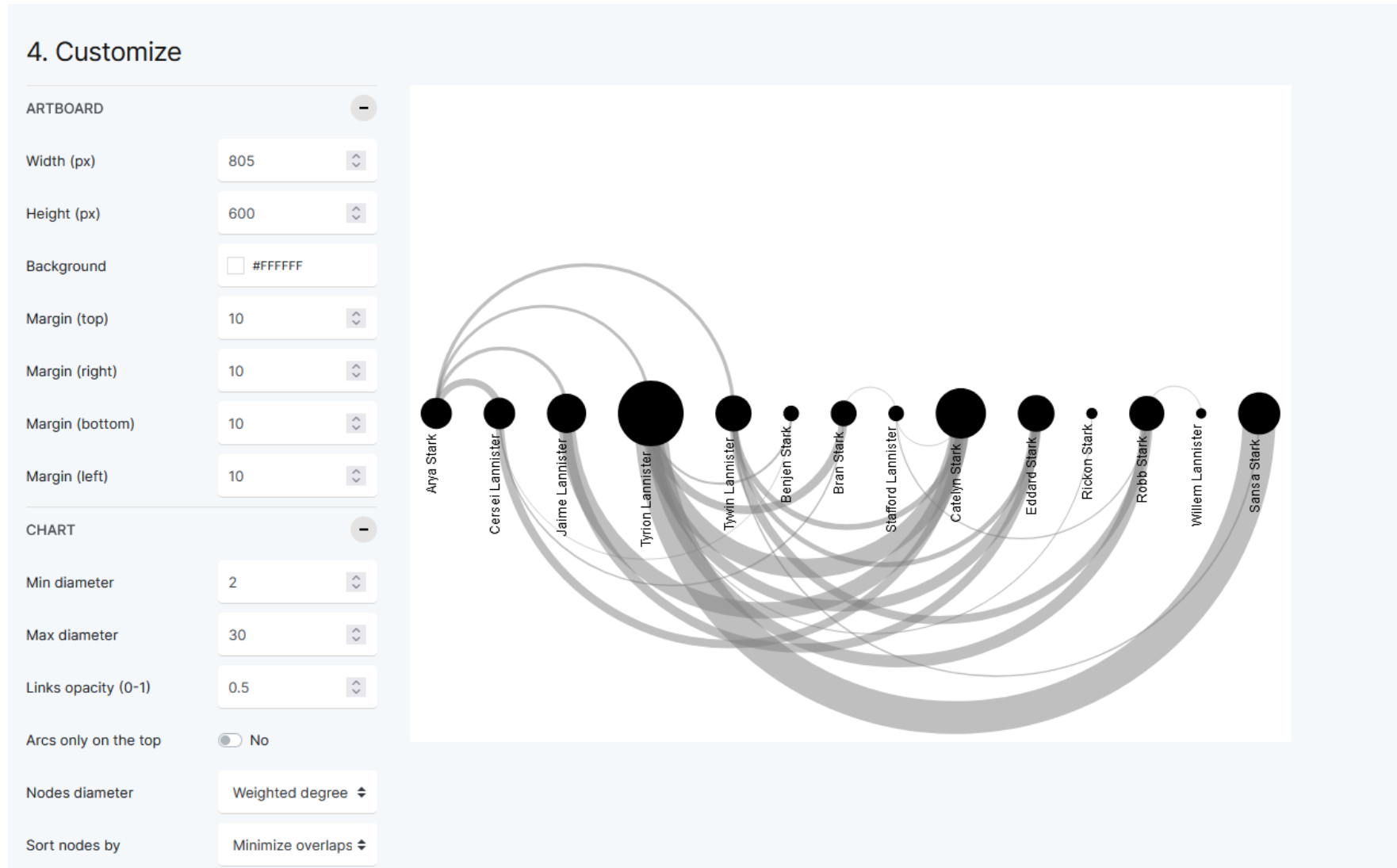
Aa Target ×

# Size

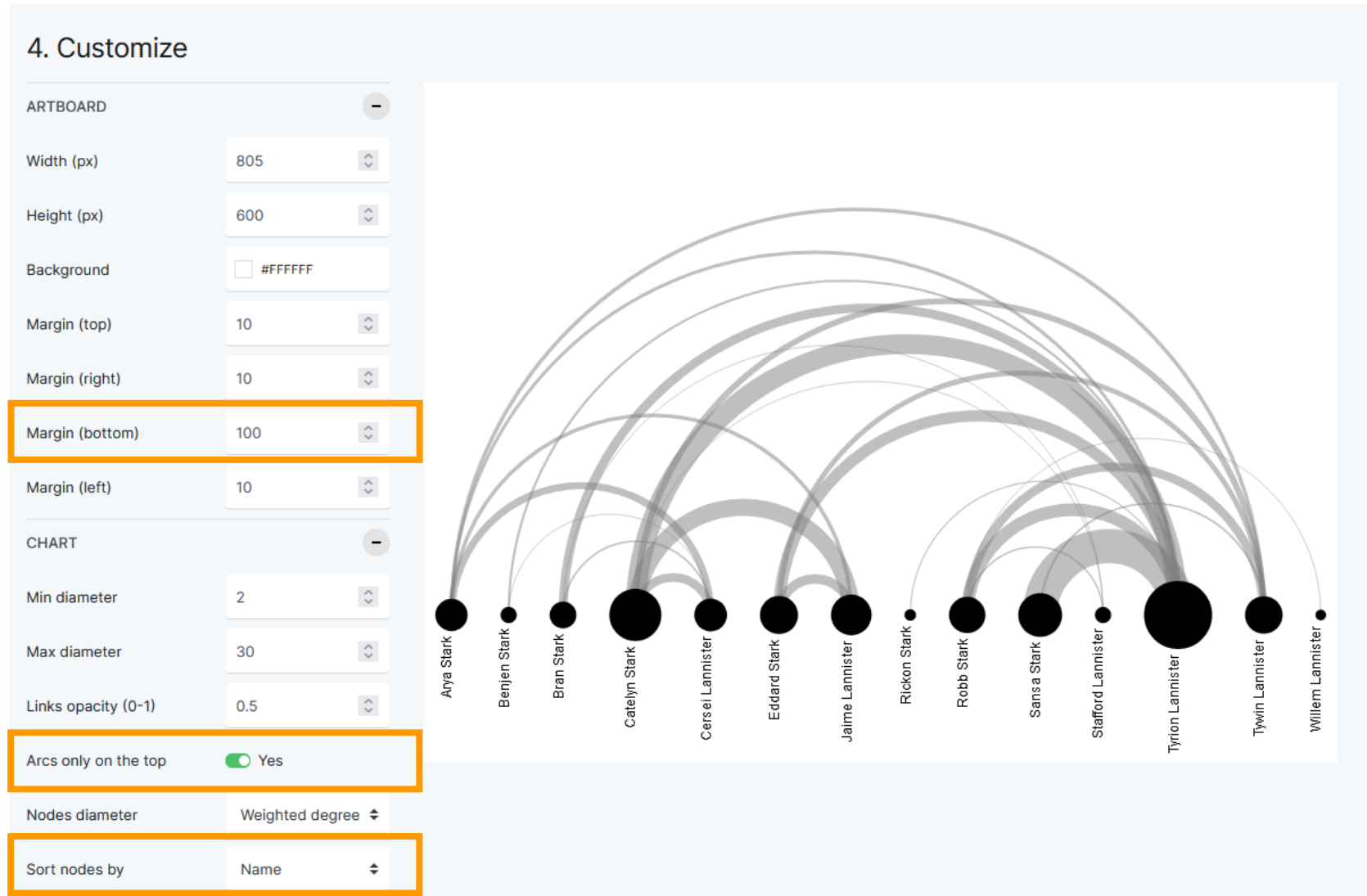
# weight Sum ▾ ×



# comparison to arc diagram (same data)



# comparison to arc diagram (same data)



# export

## 5. Export

viz

.svg

Download

- Continue editing & refinement
- Download .rawgraphs file;

## 5. Export

viz

Name

.svg

.png

.jpg

.rawgraphs

.svg

Download

## 1. Load your data

Paste your data

Upload your data

Try our data samples

SPARQL query

From URL

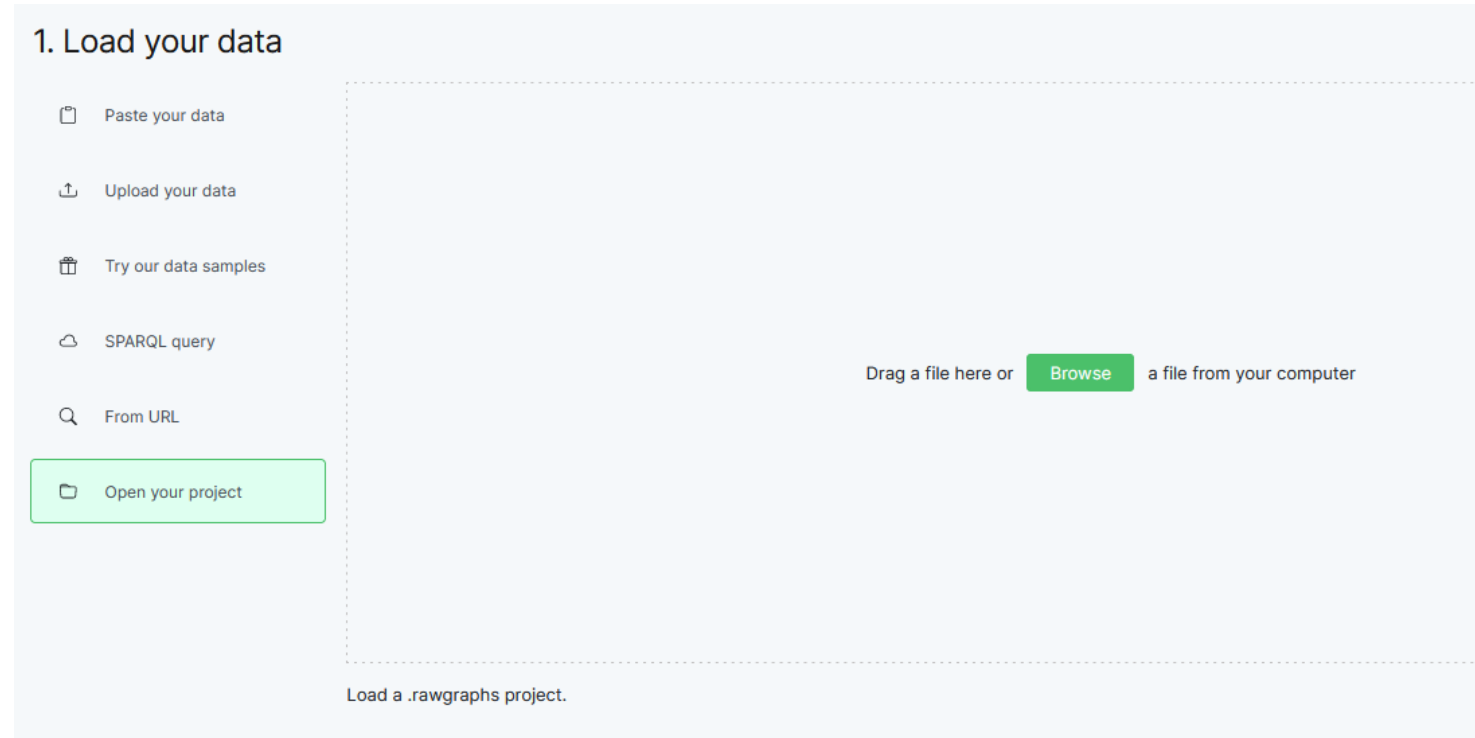
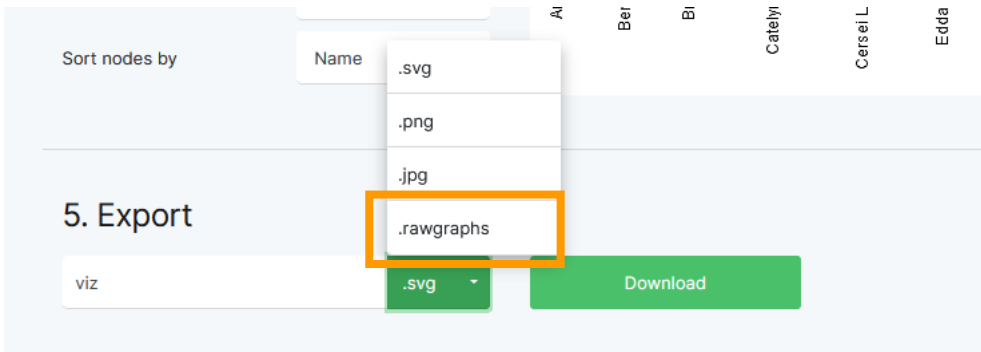
Open your project

Drag a file here or [Browse](#) a file from your computer

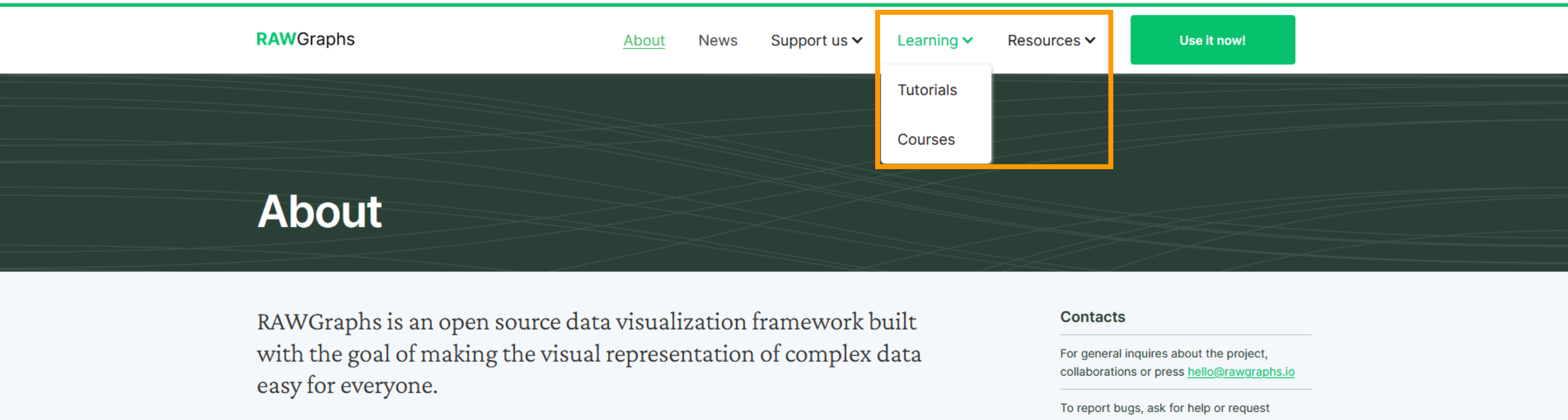
Load a .rawgraphs project.

# download .rawgraphs file

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



more information



<https://www.rawgraphs.io/>