



# **DATA VISUALIZATION WITH TABLEAU**

**A short workshop for HKBU Library**

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# THE IMPORTANCE OF DATA VISUALIZATION

# TOOLS FOR DATA VISUALIZATION

## Business Intelligence (BI) Tools

- Microsoft Power BI
- Tableau

## Template Tools

- Flourish Studio
- Data Wrapper
- EChart

## Data Visualization Libraries and Frameworks

- Python Libraries ( Matplotlib, plotly, Bokeh )
- R Libraries ( ggplot2 )
- JavaScript Libraries ( D3.js, Chart.js )

# **LIMITATIONS OF TEMPLATE TOOLS**

**Limited Customization**

**Data Complexity Handling**

**For Visualization only**

# BI TOOLS

For data exploration

EDA

Customization

<https://public.tableau.com/app/discover>

# TODAY'S ARRANGEMENT

1. Data requirement
2. Basic charts
3. Publication

# ARCHITECTURE OF A NORMALIZED DATASET- **ROWS**

NAME	AGE	ADDRESS
Robert Murphy	24	153 North Hill Field Road San Pedro, CA 90731
Anna Kowalsky	67	379 Lawrence Dr. Lynwood, CA 90262
Samantha Baker	85	1 West Woodsman Ave. Carmichael, CA 95608
Kevin Smith	34	8077 Cherry St. Hawthorne, CA 90250

A row is an entry of data into a table.

A case or a subject

Rows might share a relationship with a row in another table



# ARCHITECTURE OF A NORMALIZED TABLE - COLUMNS

NAME	AGE	ADDRESS
Robert Murphy	24	153 North Hill Field Road San Pedro, CA 90731
Anna Kowalsky	67	379 Lawrence Dr. Lynwood, CA 90262
Samantha Baker	85	1 West Woodsman Ave. Carmichael, CA 95608
Kevin Smith	34	8077 Cherry St. Hawthorne, CA 90250

A column is an element within a row. In the table setup, the column dictates what type of information is stored within all rows within the table.



# BAR CHART-COMPARE GROUPS

←

→

↶

↷

Connections

Add

titanic copy

Text file

Files

☐ Use Data Interpreter

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

titanic copy.csv

New Union

New Table Extension

titanic copy

titanic copy.csv

titanic copy.csv

12 fields 891 rows

#	#	#	Abc	Abc	#	#	#	Abc	#	Abc	Abc
titanic copy.csv	titanic copy.csv	titanic copy.c...	titanic copy.csv	titanic copy.c...	titanic copy.c...	titanic copy.c...	titanic copy.c...	titanic copy.csv	titanic copy.c...	titanic copy.c...	titanic copy.csv
Passenger Id	Survived	Pclass	Name	Sex	Age	Sib Sp	Parch	Ticket	Fare	Cabin	Embarked
1	0	3	Braund, Mr. Owen Harris	male	22.0000	1	0	A/5 21171	7.250	null	S
2	1	1	Cummings, Mrs. John Bradley (...)	female	38.0000	1	0	PC 17599	71.283	C85	C
3	1	3	Heikinen, Miss. Laina	female	26.0000	0	0	STON/O2. 3101282	7.925	null	S
4	1	1	Futrelle, Mrs. Jacques Heath (...)	female	35.0000	1	0	113803	53.100	C123	S
5	0	3	Allen, Mr. William Henry	male	35.0000	0	0	373450	8.050	null	S
6	0	3	Moran, Mr. James	male	null	0	0	330877	8.458	null	Q
7	0	1	McCarthy, Mr. Timothy J	male	54.0000	0	0	17463	51.863	E46	S
8	0	3	Palsson, Master. Gosta Leonard	male	2.0000	3	1	349909	21.075	null	S
9	1	3	Johnson, Mrs. Oscar W (Elisab...	female	27.0000	0	2	347742	11.133	null	S
10	1	2	Nasser, Mrs. Nicholas (Adele ...)	female	14.0000	1	0	237736	30.071	null	C
11	1	3	Sandstrom, Miss. Marguerite ...	female	4.0000	1	1	PP 9549	16.700	G6	S
12	1	1	Bonnell, Miss. Elizabeth	female	58.0000	0	0	113783	26.550	C103	S
13	0	3	Saunderscock, Mr. William Henry	male	20.0000	0	0	A/5. 2151	8.050	null	S
14	0	3	Andersson, Mr. Anders Johan	male	39.0000	1	5	347082	31.275	null	S
15	0	3	Vestrom, Miss. Hulda Amanda...	female	14.0000	0	0	350406	7.854	null	S
16	1	2	Hewlett, Mrs. (Mary D Kingco...	female	55.0000	0	0	248706	16.000	null	S

Fields

Type	Field Name	Physical Table	Remote Field Na...
#	Passenger Id	titanic copy.csv	PassengerId
#	Survived	titanic copy.csv	Survived
#	Pclass	titanic copy.csv	Pclass
Abc	Name	titanic copy.csv	Name
Abc	Sex	titanic copy.csv	Sex
#	Age	titanic copy.csv	Age
#	Sib Sp	titanic copy.csv	SibSp
#	Parch	titanic copy.csv	Parch
Abc	Ticket	titanic copy.csv	Ticket
#	Fare	titanic copy.csv	Fare
Abc	Cabin	titanic copy.csv	Cabin
Abc	Embarked	titanic copy.csv	Embarked

# QUESTIONS

- 1. Compare the total number of survivors and non-survivors**
- 2. Compare survival rates by gender**
- 3. Compare survival rates by class**

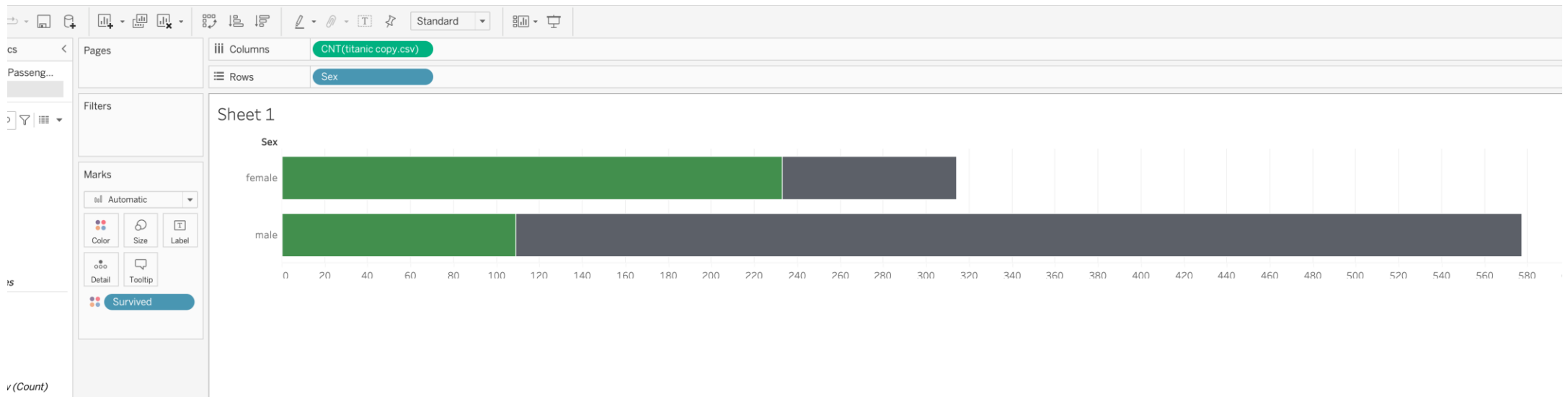
**Learning:**

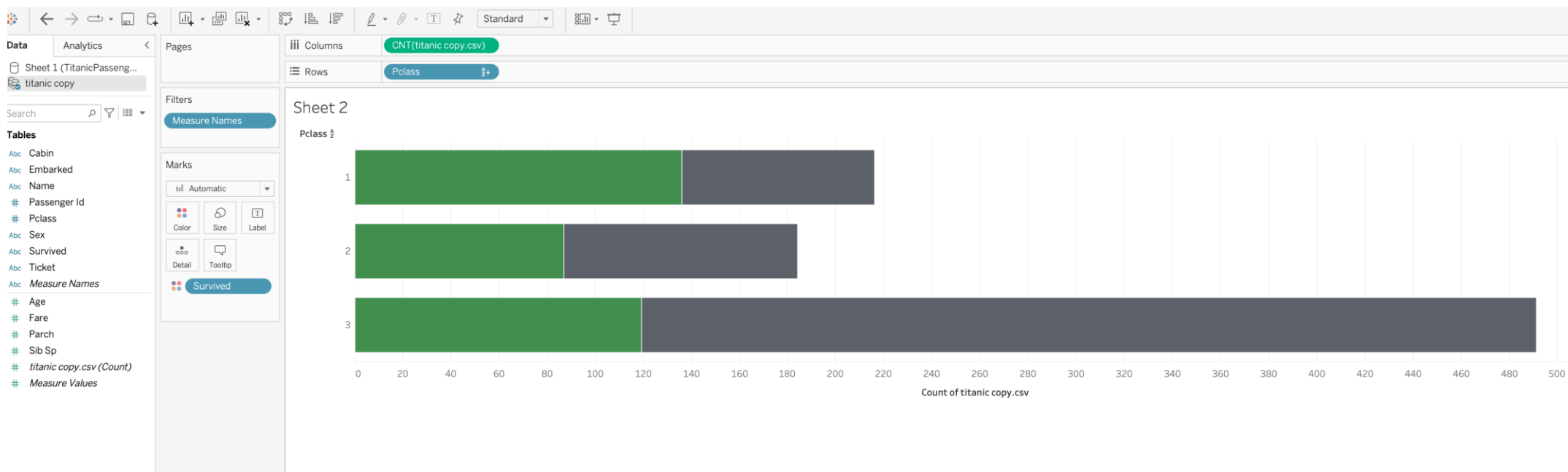
**Producing bar charts (side by side/stacked)**

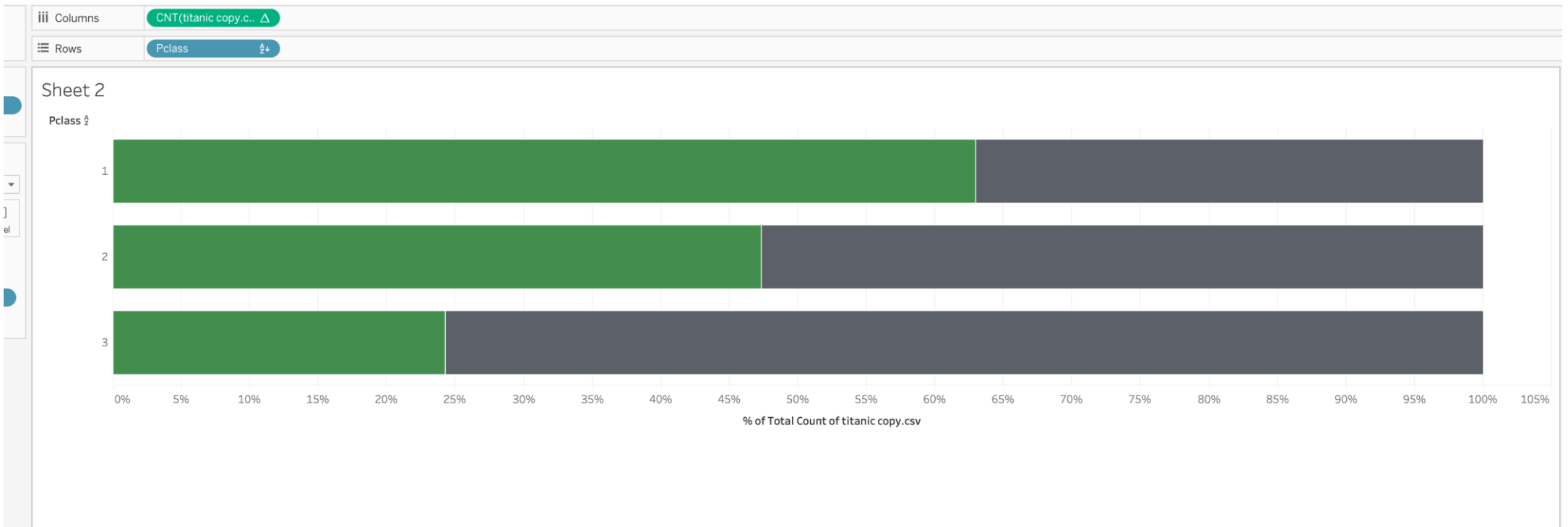
**Sorting**

**Percentage of total**

# NUMBER BY GENDER AND SURVIVING STATUS







# **LINE CHART/AREA CHART-CHANGES**

**Visualizing population changes over time**

Columns

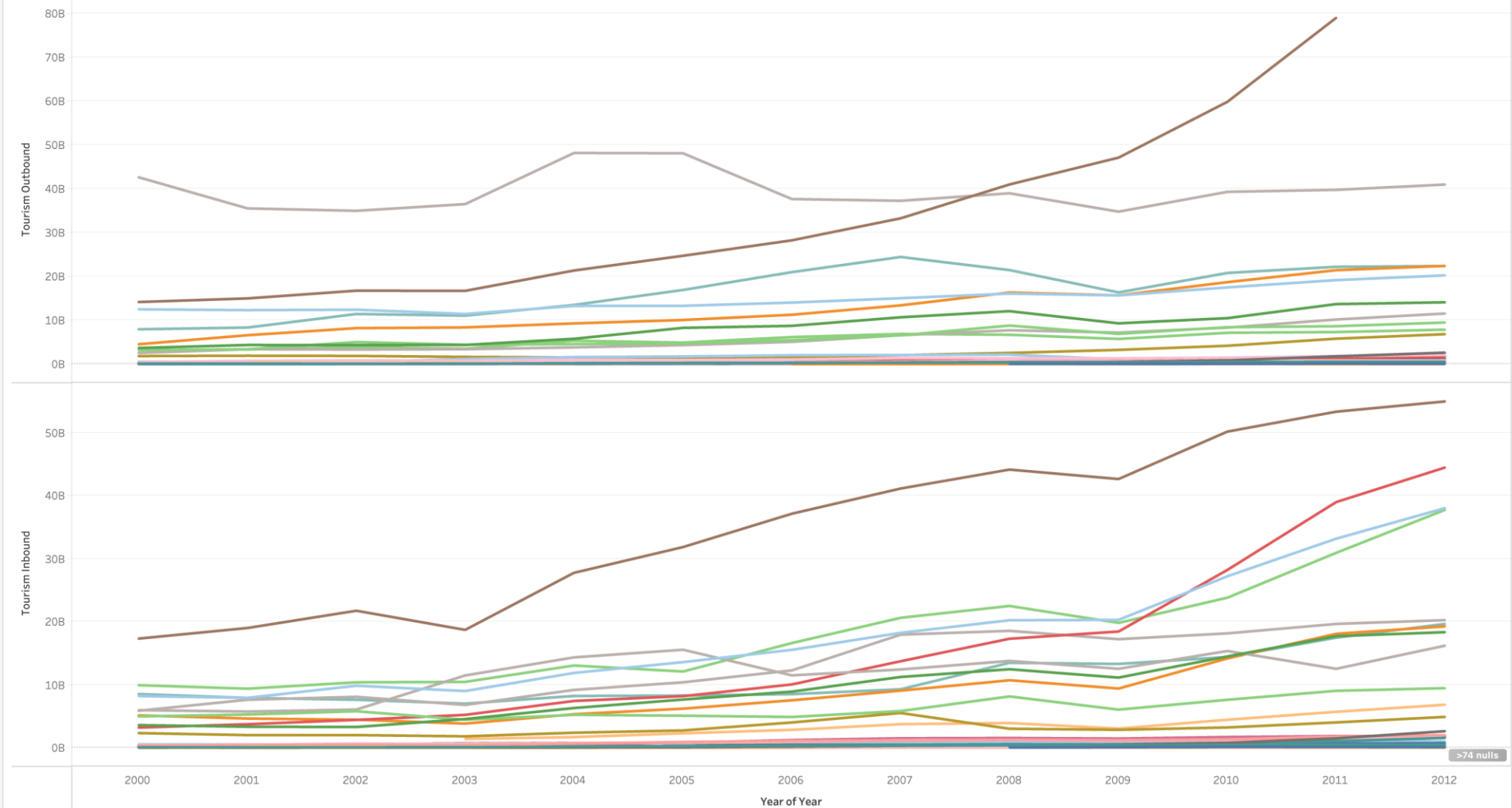
YEAR(Year)

Rows



SUM(Tourism Outbou..

SUM(Tourism Inbou..

Sheet 7

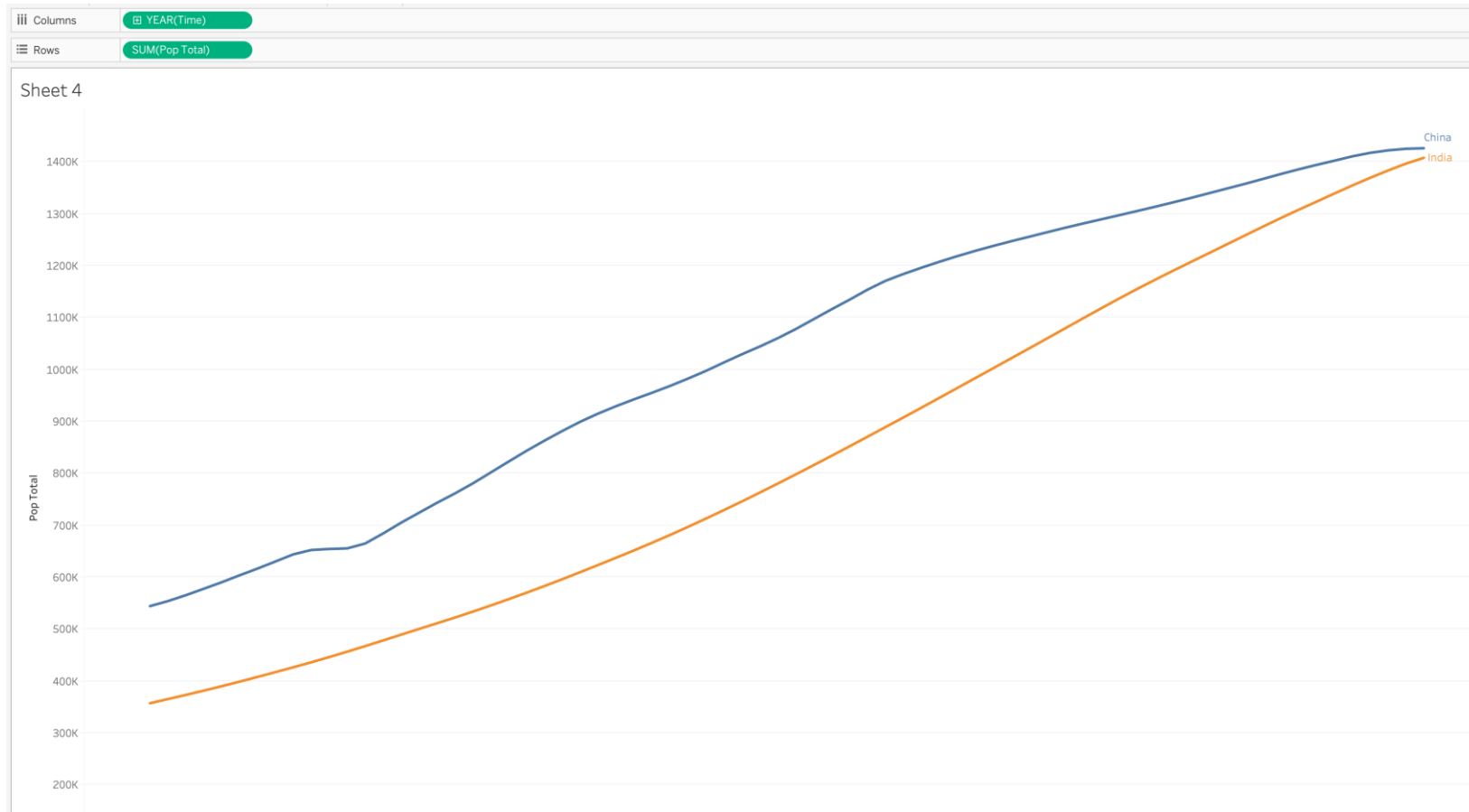




Name Sheet1				Abc Sheet1	Abc Sheet1	 Sheet1	# Sheet1	# Sheet1	# Sheet1	# Sheet1
				Location	Variant	Time	Age Grp	Pop Male	Pop Female	Pop Total
Fields										
Type	Field Name	Physical Table	Remote Field Na...							
Abc	Location	Sheet1	Location							
Abc	Variant	Sheet1	Variant							
	Time	Sheet1	Time							
#	Age Grp	Sheet1	AgeGrp							
#	Pop Male	Sheet1	PopMale							
#	Pop Female	Sheet1	PopFemale							
#	Pop Total	Sheet1	PopTotal							

China	Medium	1/1/1950	76	420.86	613.92	1,034.78
China	Medium	1/1/1950	77	380.25	559.03	939.29
China	Medium	1/1/1950	78	321.96	481.81	803.77
China	Medium	1/1/1950	79	270.01	413.98	683.99
China	Medium	1/1/1950	80	232.44	370.63	603.07
China	Medium	1/1/1950	81	201.19	336.93	538.13
China	Medium	1/1/1950	82	167.76	294.40	462.16
China	Medium	1/1/1950	83	134.05	245.54	379.59
China	Medium	1/1/1950	84	107.47	205.20	312.66
China	Medium	1/1/1950	85	85.83	171.70	257.54
China	Medium	1/1/1950	86	66.64	139.24	205.88
China	Medium	1/1/1950	87	51.30	110.91	162.21
China	Medium	1/1/1950	88	38.24	85.50	123.74
China	Medium	1/1/1950	89	27.43	63.66	91.09
China	Medium	1/1/1950	90	19.09	46.05	65.14
China	Medium	1/1/1950	91	12.66	31.45	44.11
China	Medium	1/1/1950	92	8.40	21.20	29.60
China	Medium	1/1/1950	93	5.51	14.11	19.61
China	Medium	1/1/1950	94	3.34	8.77	12.11

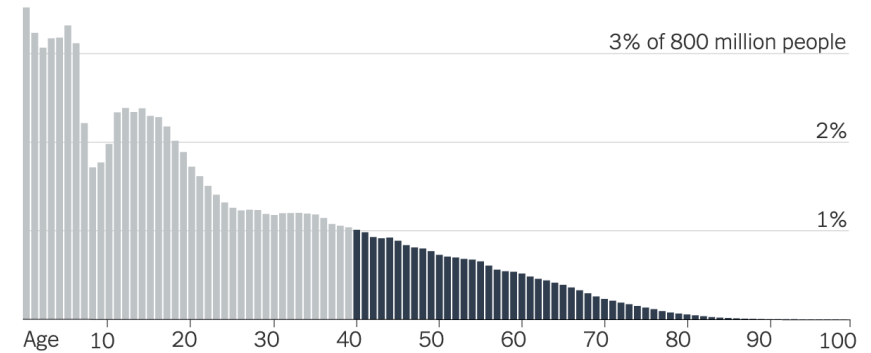
- Learning:
- 1. filtering
  - 2. Representation of time
  - 3. Line chart and area chart



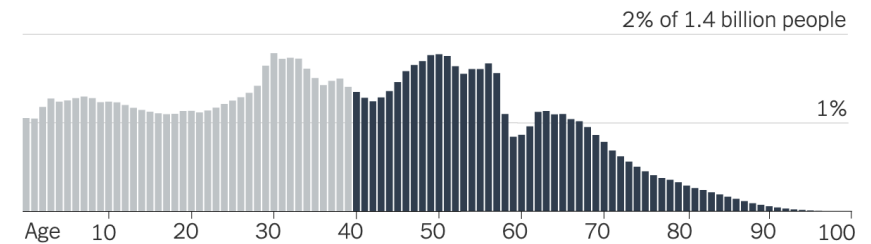
# LET'S TRY TO PRODUCE THIS ONE

## China's Population by Age

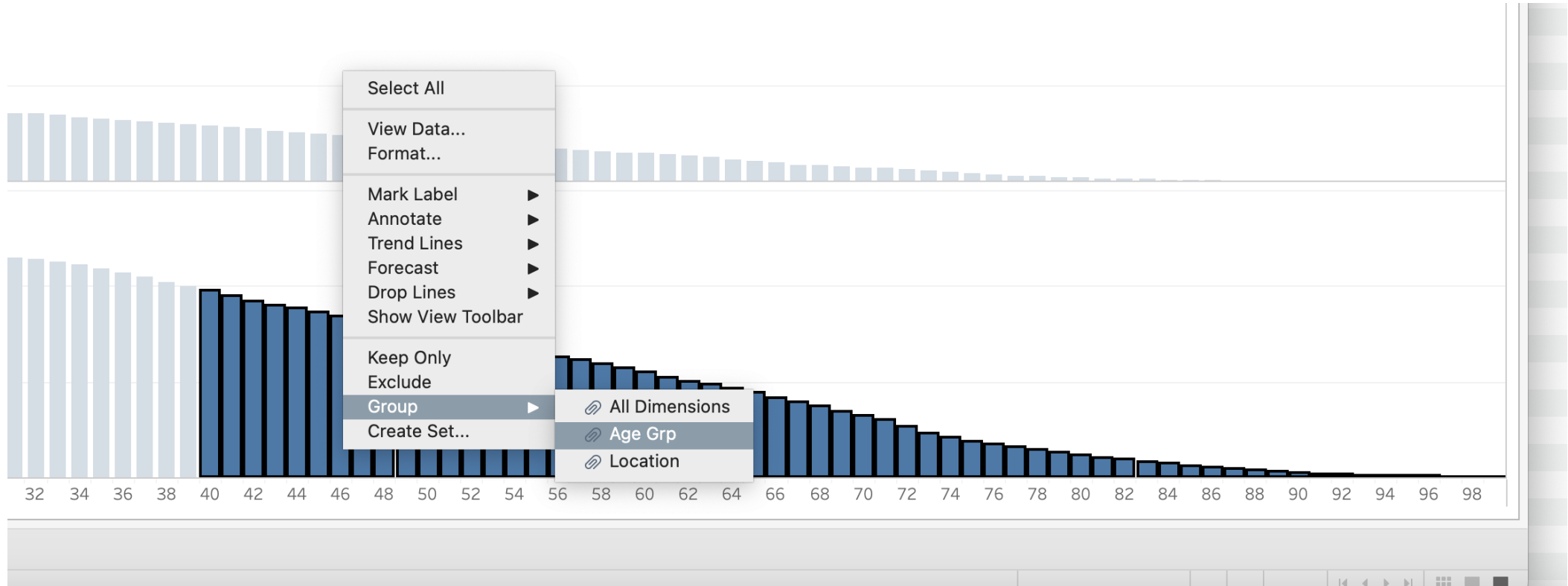
**In 1970**, 80% of China's population was younger than 40, and half of the country was under 20.

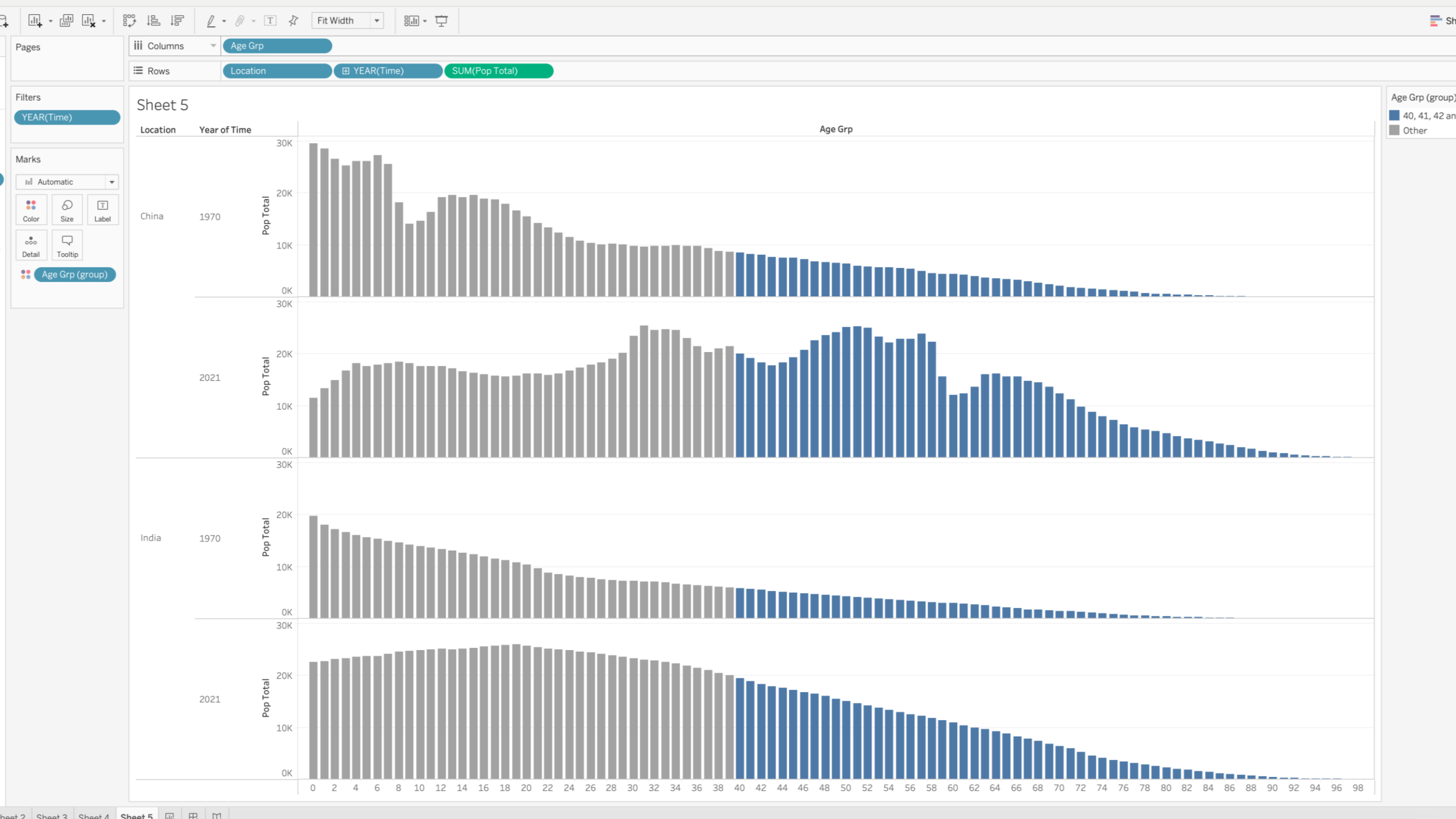


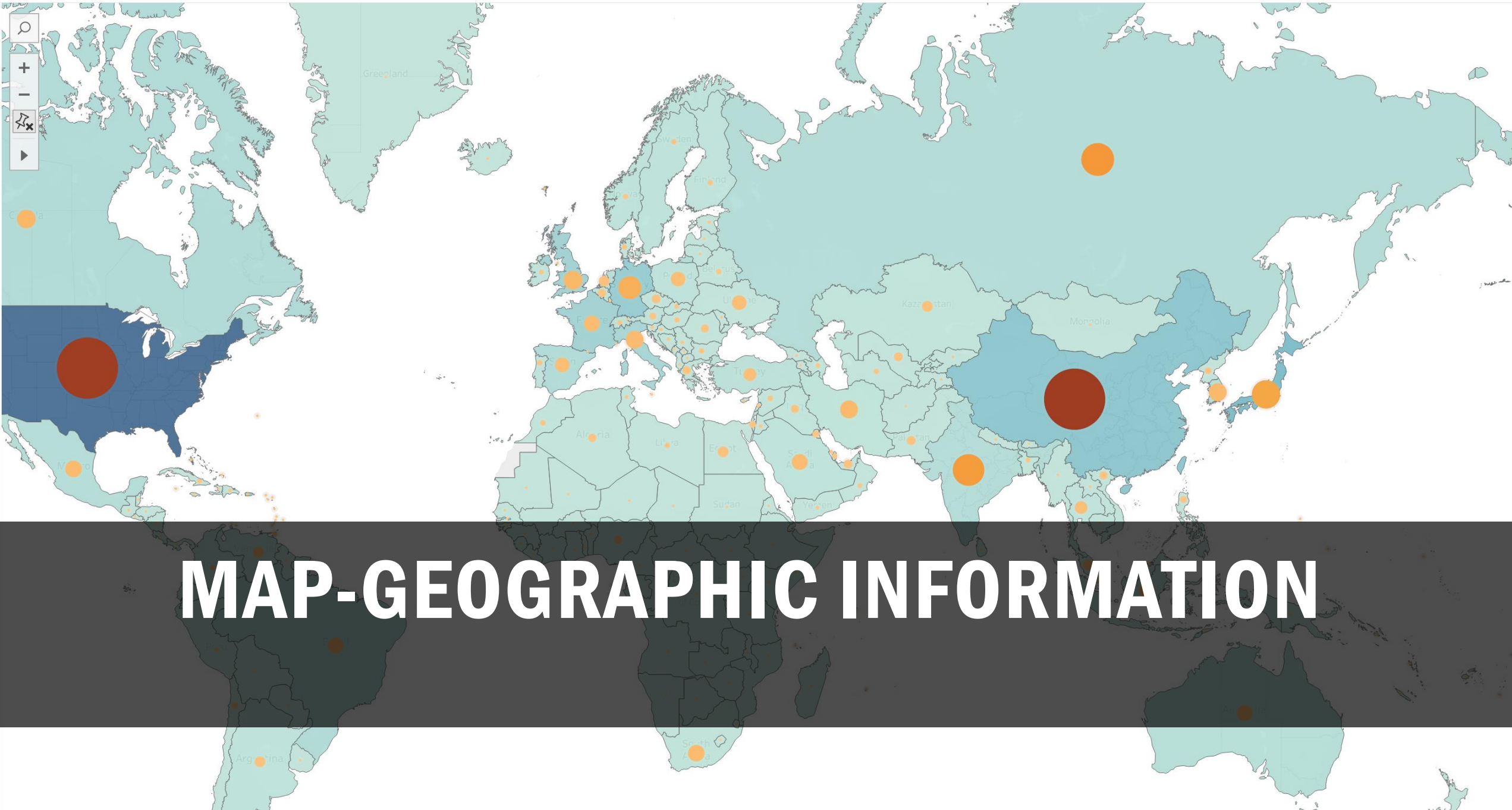
**In 2021**, half of the country was 40 or older, as China's distribution shifted to more closely resemble other developed nations.



Source: United Nations Population Division (2022)





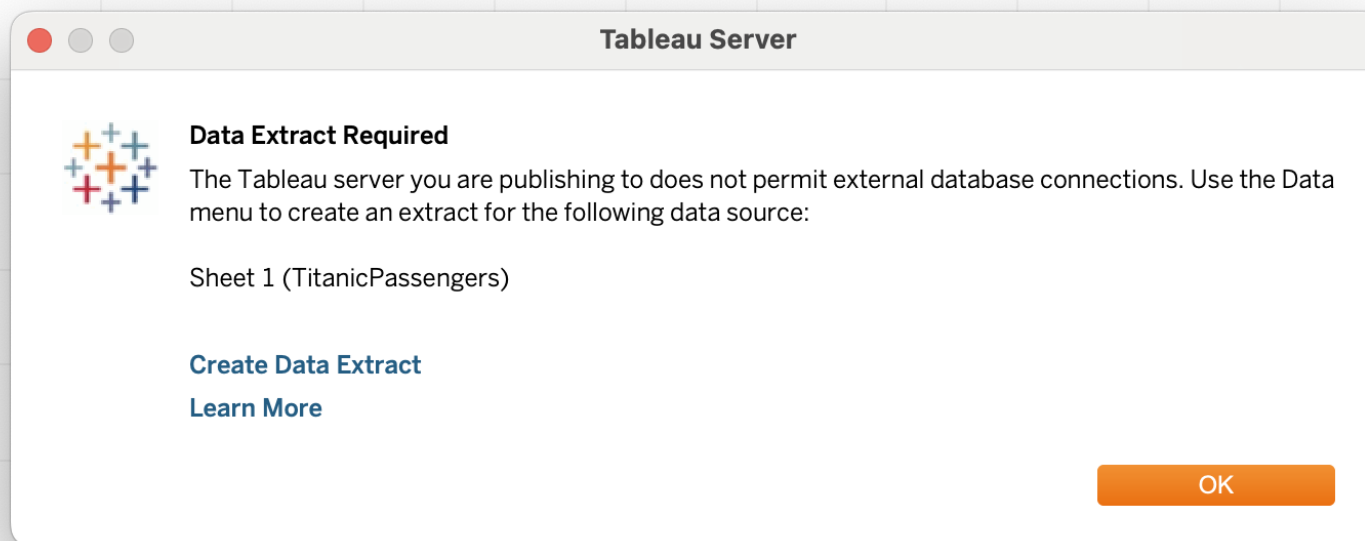


# MAP-GEOGRAPHIC INFORMATION

# SCATTER PLOT-SHOWING RELATIONSHIPS







Extract Data

Expand All

> Data Storage

Logical Tables Edit

> Filters

No filters applied Edit

> Aggregation

No data aggregated Edit

> Number of Rows

All rows Edit

> Incremental Refresh

Not enabled Edit

Learn more about setting up data extracts.

History...

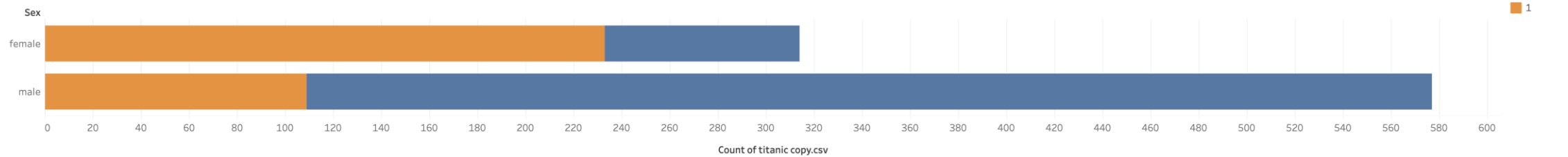
Hide All Unused Fields

Cancel

Save Settings

Who are the DataFam and what do they do on Tableau Public? Watch a 2-minute overview →test by WANG Yue

Sheet 1



# Q & A

**Thank you for you attention!**