Data Storytelling with Python and AI

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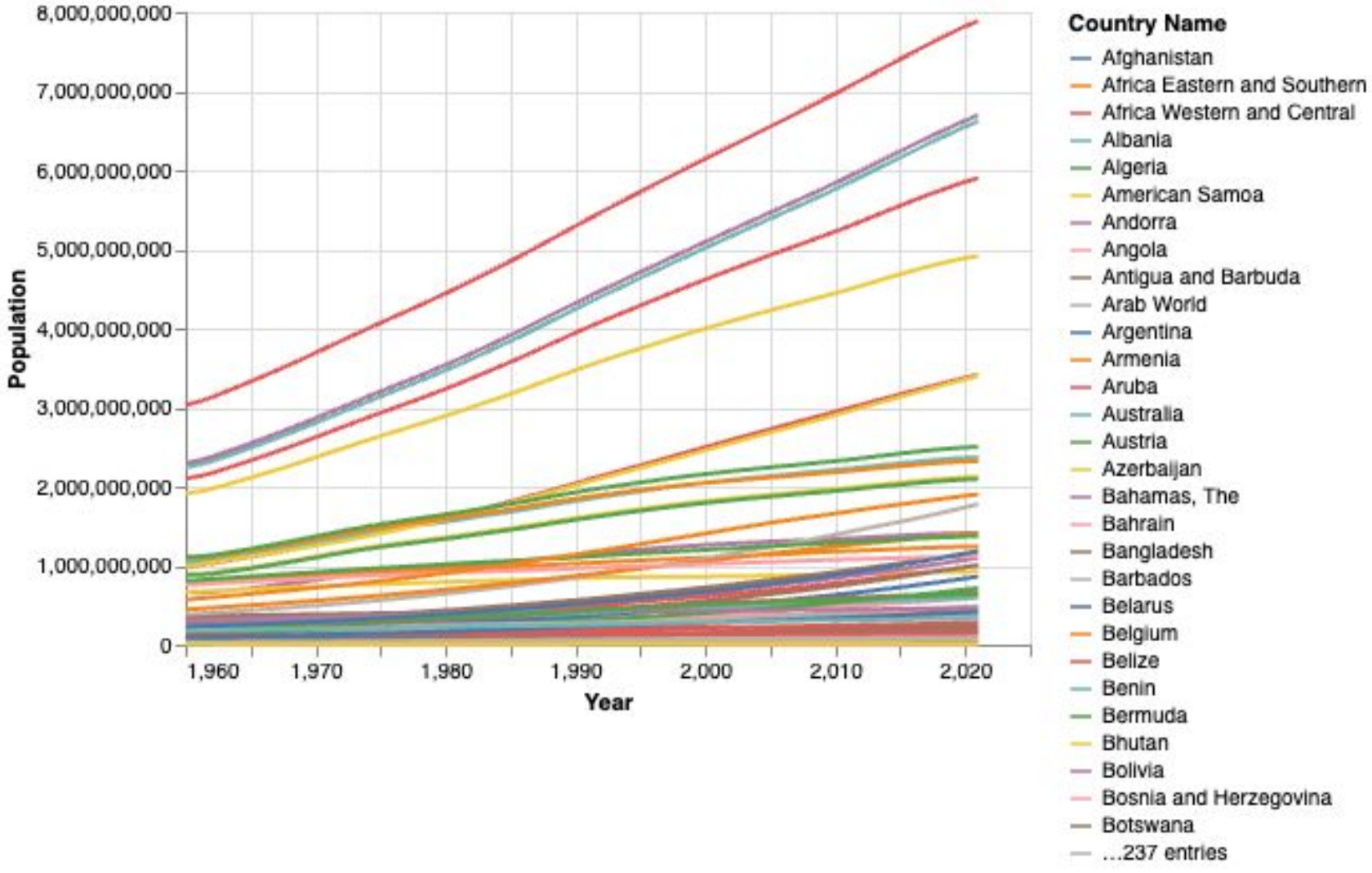
Author of Data Storytelling with Altair and AI (Manning)

Outline

1. Introducing Python Altair
2. Introducing Data Storytelling and the S-DIKW Pyramid
3. Combining Data Storytelling and AI
4. A Practical Case Study

https://github.com/alod83/hhai2025-tutorial

Module 1
Introducing Python Altair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Population
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Year
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Africa Eastern and Southern
Africa Western and Central
Albania
Algeria
American Samoa
Andorra
Angola
Antigua and Barbuda
Arab World
Argentina
Armenia
Aruba
Australia
Austria
Azerbaijan
Bahamas, The
Bahrain
Bangladesh
Barbados
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Belize
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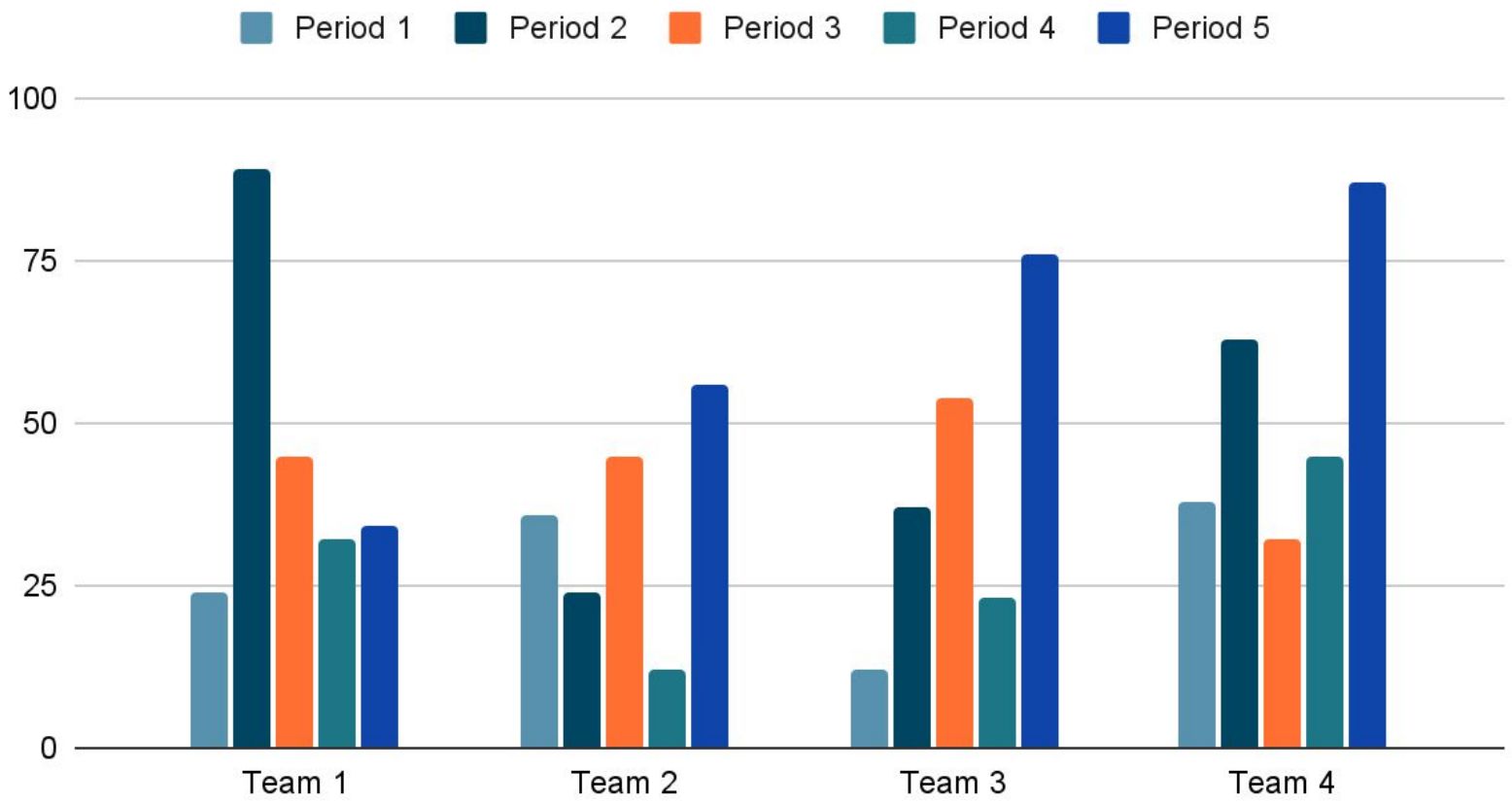
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
…237 entries

Points scored



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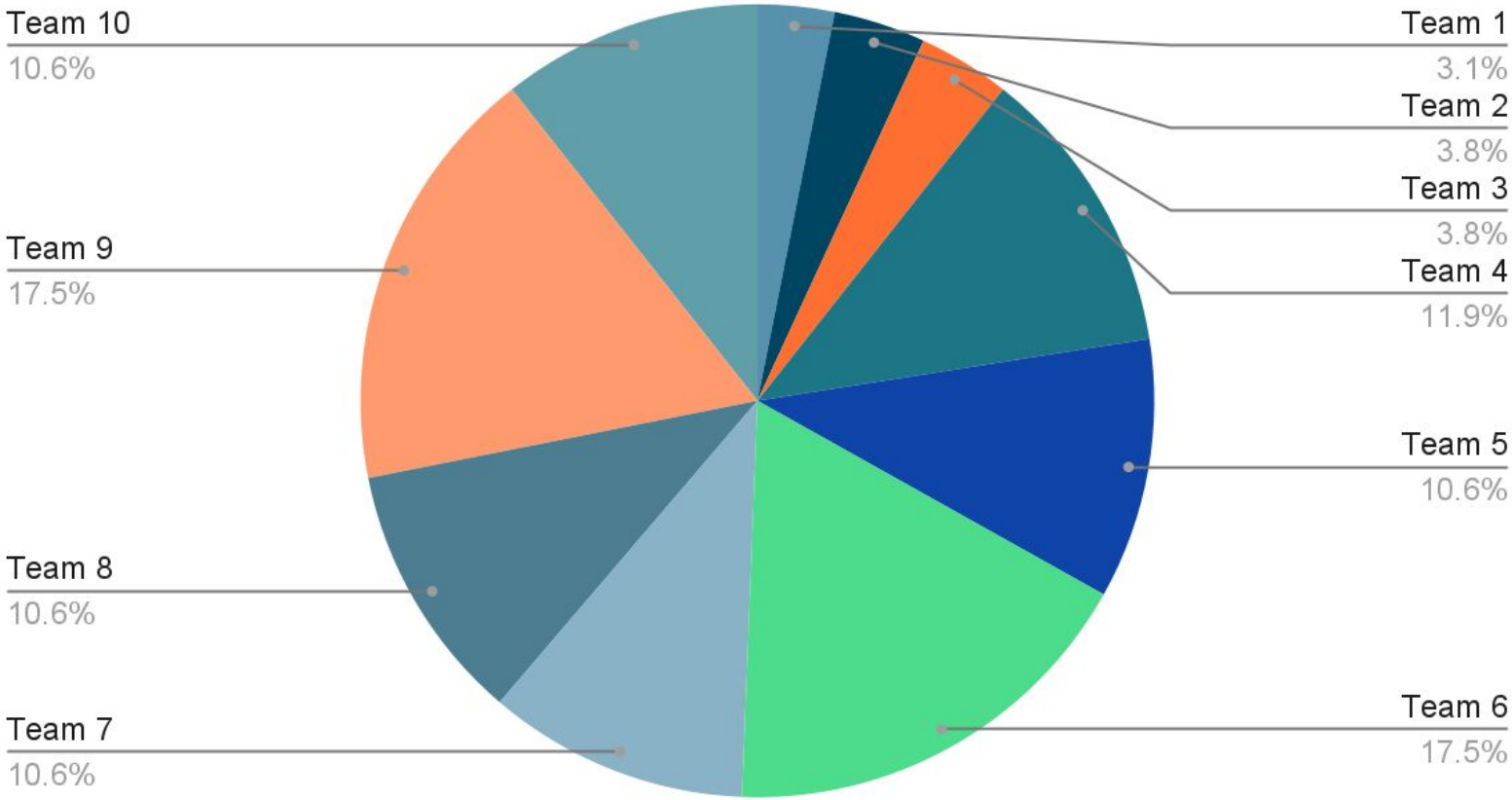
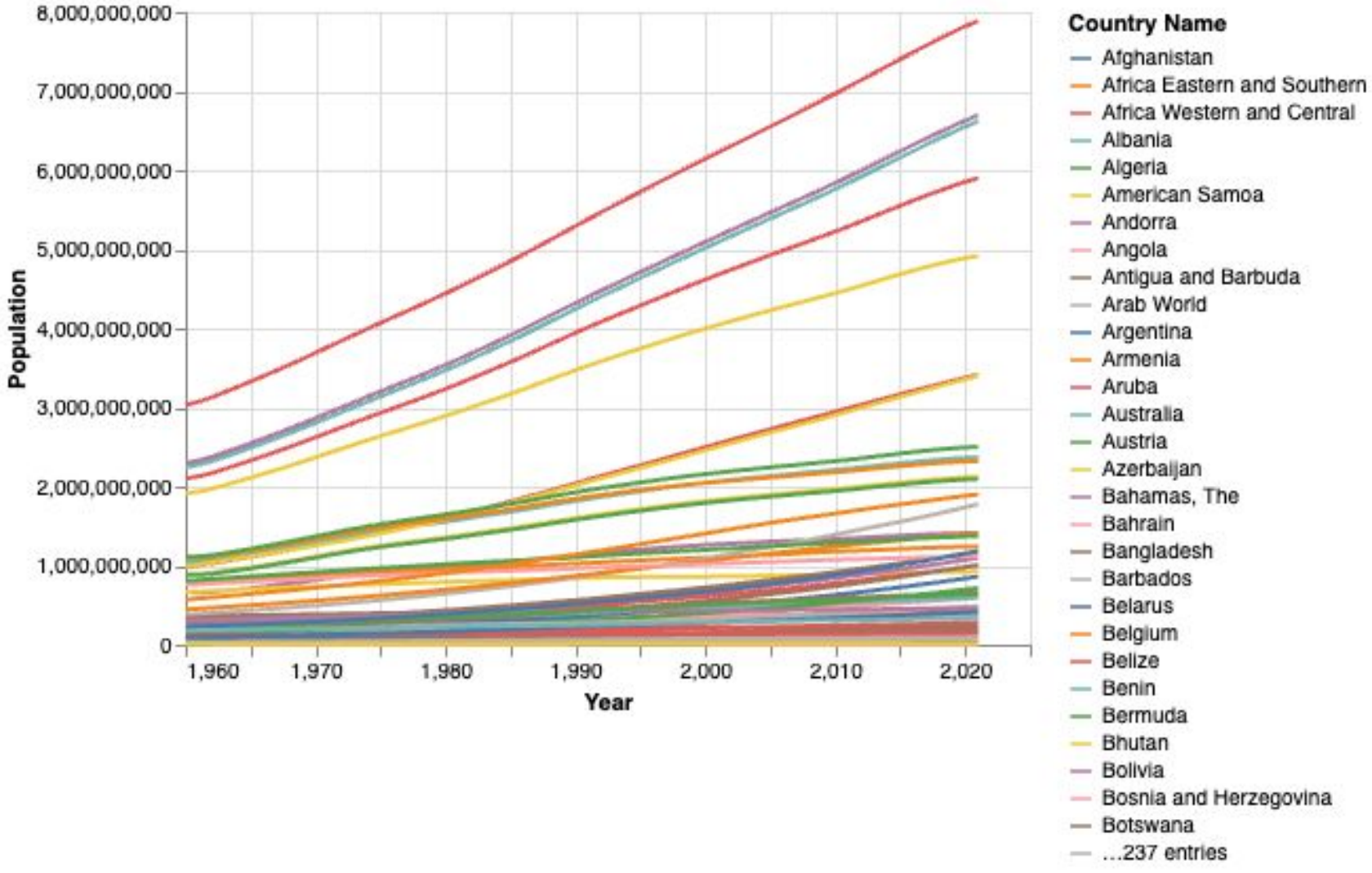


Too much information means no information.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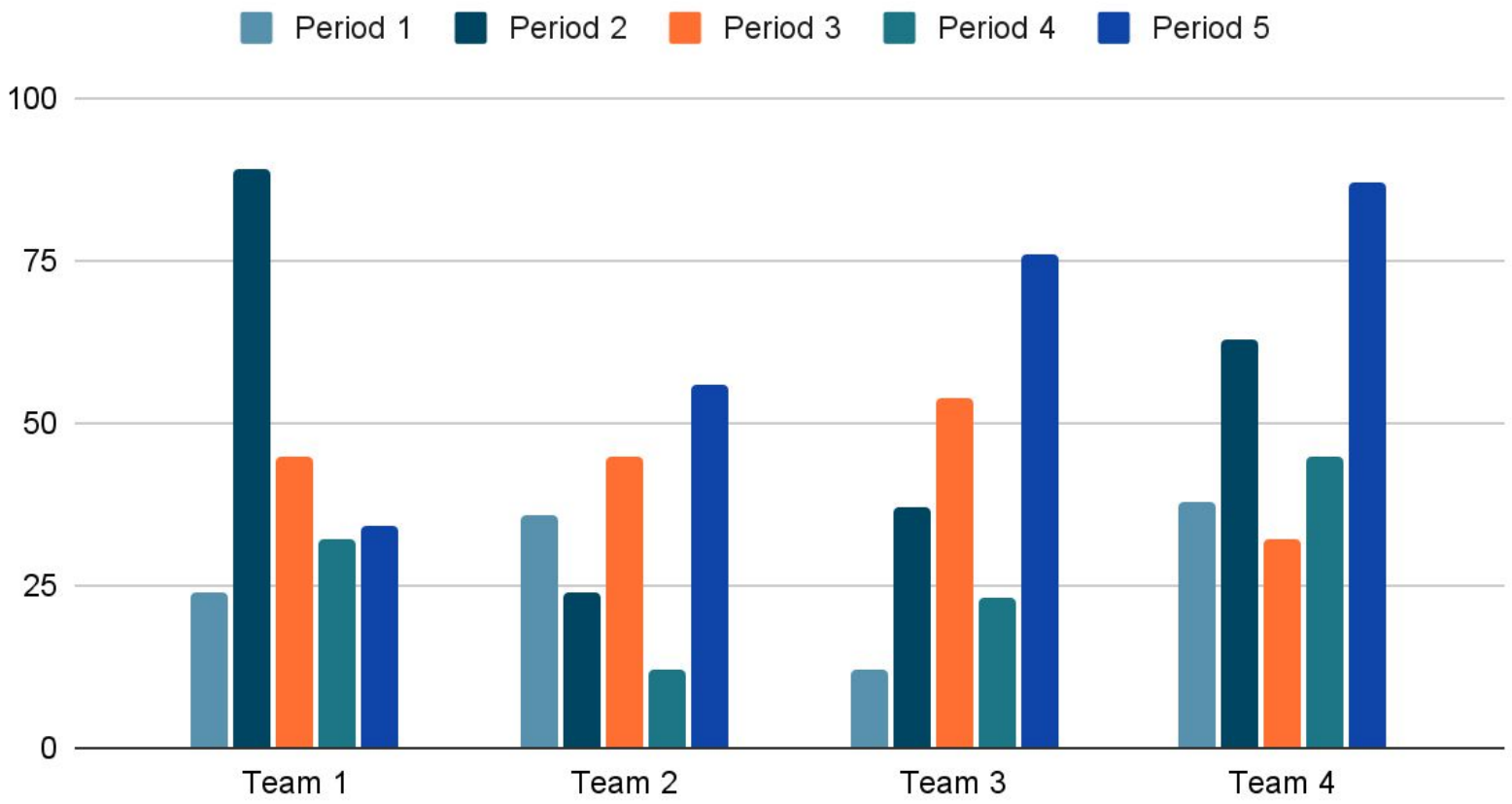

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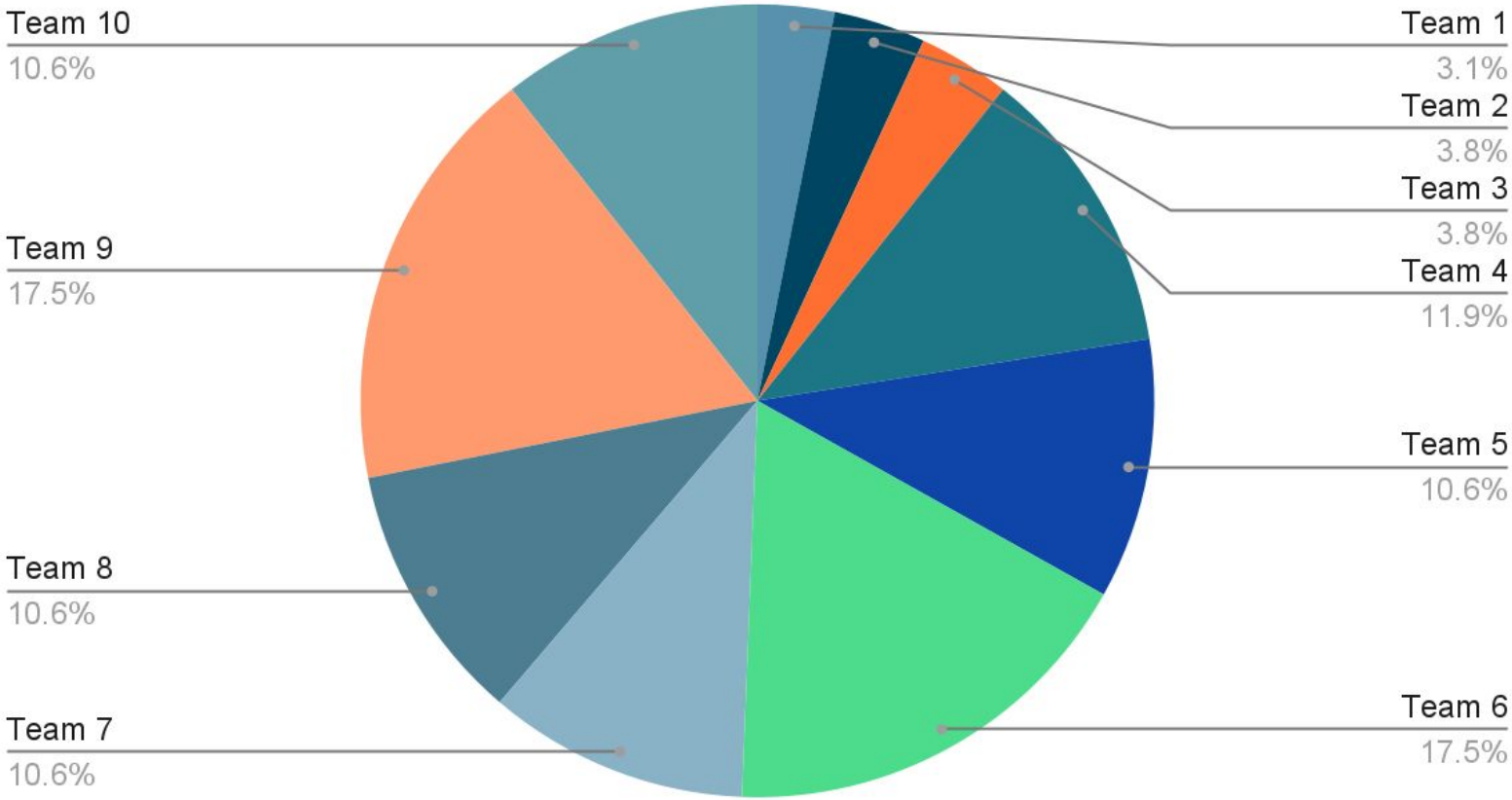


You must do the dirty work, not your audience.
The audience should be able to read your chart quickly.
You must spend time to build your chart.
Your audience should get the point of your chart quickly.

If I had more time, I would have written you a shorter letter. (Blaise Pascal)
Brevity takes time. (Matthew Dicks)

Making the dirty work in your chart means decluttering your chart.

Declutter a chart using the Focus rule

Focus Rule

Filter Out Non-Essentials. Remove unnecessary data, elements, or decorations (like excessive gridlines, 3D effects, or drop shadows) that do not contribute to the message of the chart.

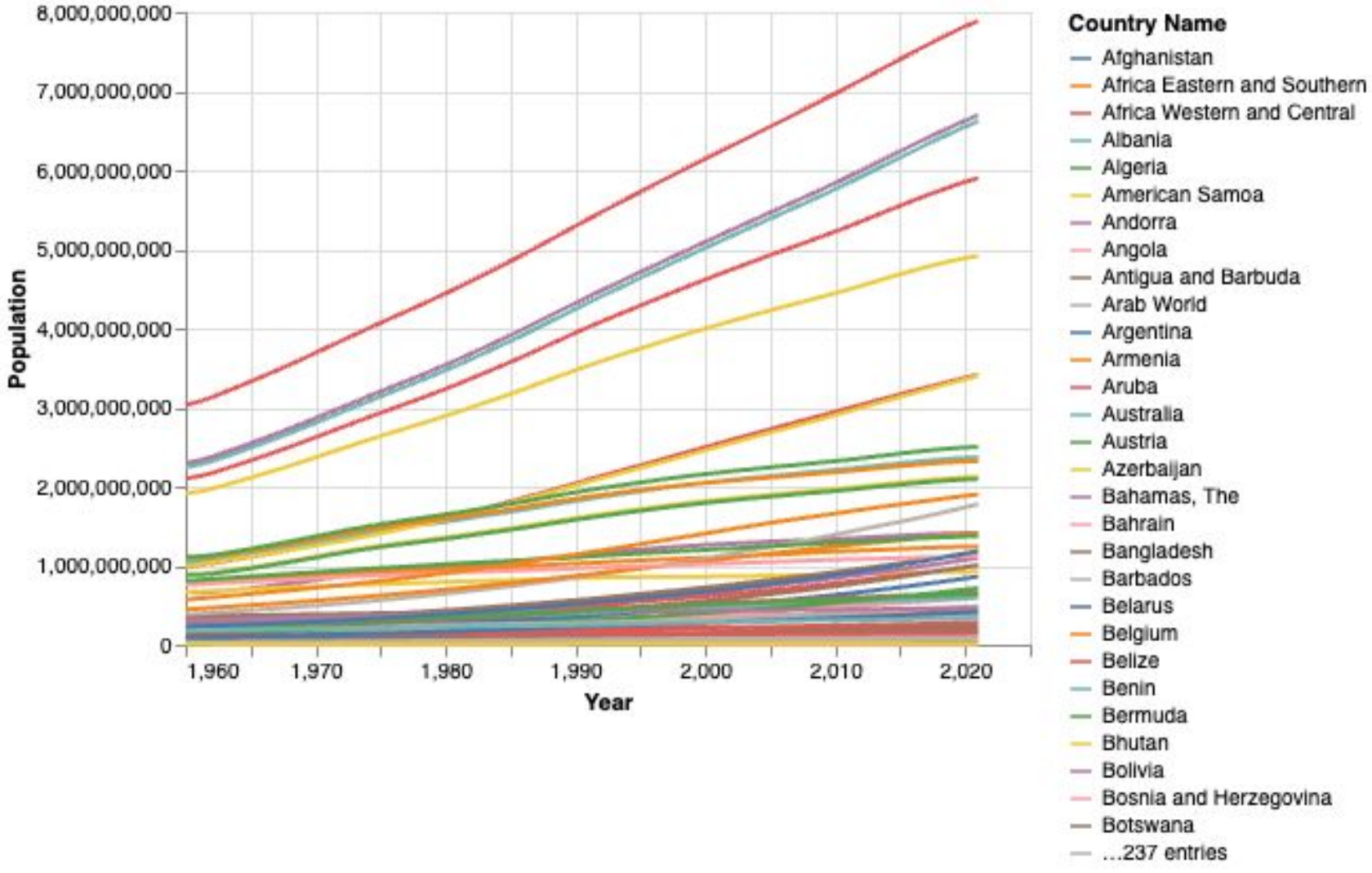
Organize for Clarity. Arrange the chart elements (titles, legends, labels) in a logical and readable way. Use consistent scales, sorting, and grouping to enhance understanding.

Choose the Right Chart Type. Select the chart type that best matches the data and message you want to convey. Avoid flashy or complex visuals if a simple bar or line chart will do.

Focus Rule

Use Visual Hierarchy. Highlight the most important data using color, size, or position to draw the viewer's attention. De-emphasize less important details.

Simplify Labels and Legends. Keep axis labels, titles, and legends concise and clear. Use plain language and avoid redundant or overly technical terms.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Australia
Austria
Azerbaijan
Bahamas, The
Bahrain
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Barbados
Belarus
Belgium
Belize
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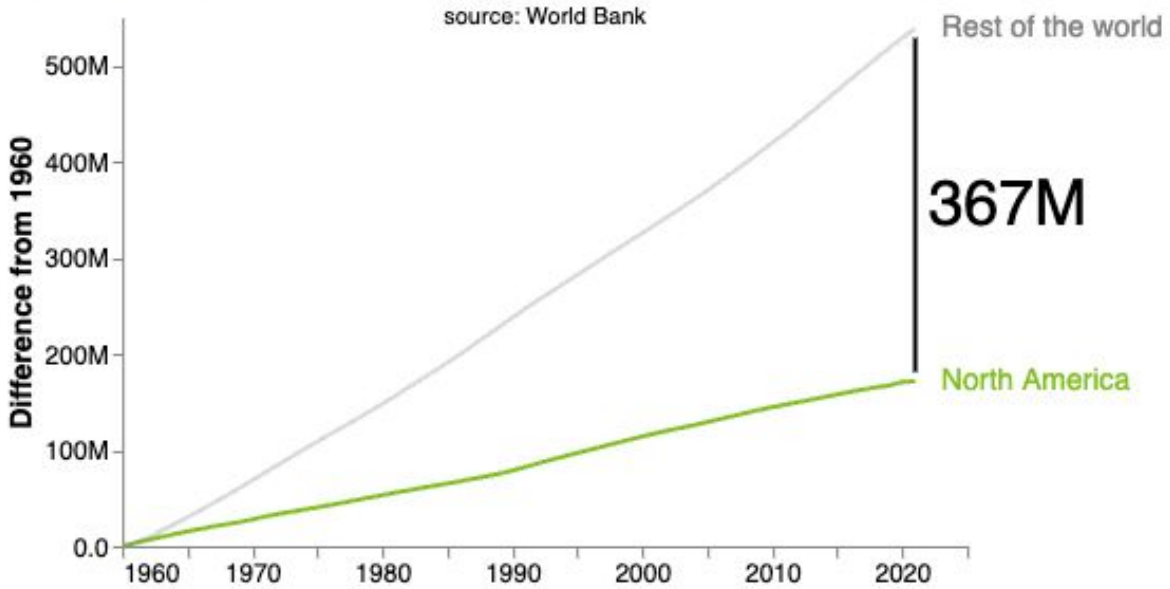
Botswana
…237 entries

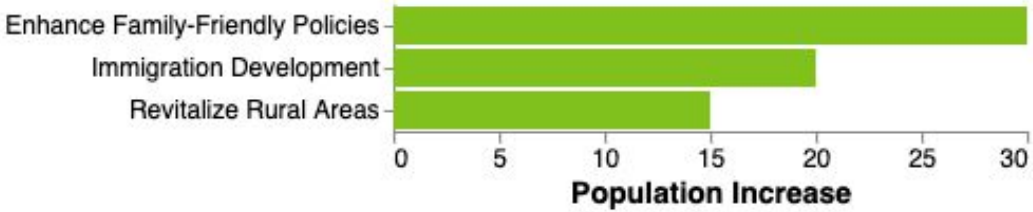
Population in North America over the last 50 years

Why this gap?

1. Lower Fertility Rate
2. Lower Immigration Rate
3. Higher Average Age



Strategies for population growth in North America



Use the FOCUS rule to declutter your chart.

Filter Out Non-Essentials.
Organize for Clarity.
Choose the Right Chart Type.
Use Visual Hierarchy.
Simplify Labels and Legends.

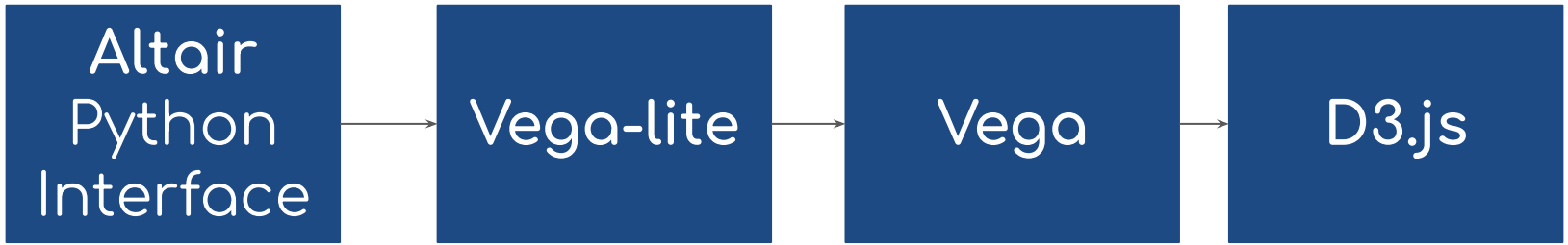
Python Altair makes applying the FOCUS rule easy.

Altair

The Vega-Altair library (Altair, for short) is a declarative Python library for statistical visualization based on the Vega and Vega-Lite visualization grammars.

Declarative libraries specify what we want to see in a chart. We can specify the data and the type of visualization we want, and the library creates the visualization for us automatically.

Imperative libraries focus on building a visualization manually, for example specifying the desired axis, size, legend, and labels (e.g. Matplotlib)


Altair
Python
Interface
Vega-lite
Vega
D3.js

Altair Parameters

Marks: define the type of chart we want to build (e.g. bar chart, line chart, ...)

Encodings: mapping of visual properties (**channels**) to data columns in the DataFrame

Visual properties include axes, colors, size, ...

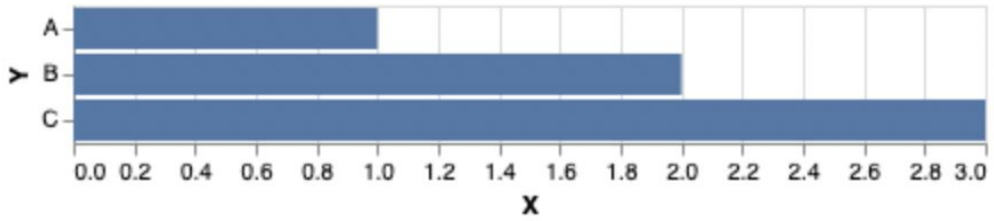
```
pip install altair
```

A First Example

```
import pandas as pd
import altair as alt

df = pd.DataFrame({
    'X' : [3,2,4],
    'Y' : ['M','N','O']
})


chart = alt.Chart(df
).mark_bar(
).encode(
     x = 'X:Q',
     y = 'Y:N'
)
```



Encoding Channels

- x, y
- color, size, opacity,
- Tooltip, text

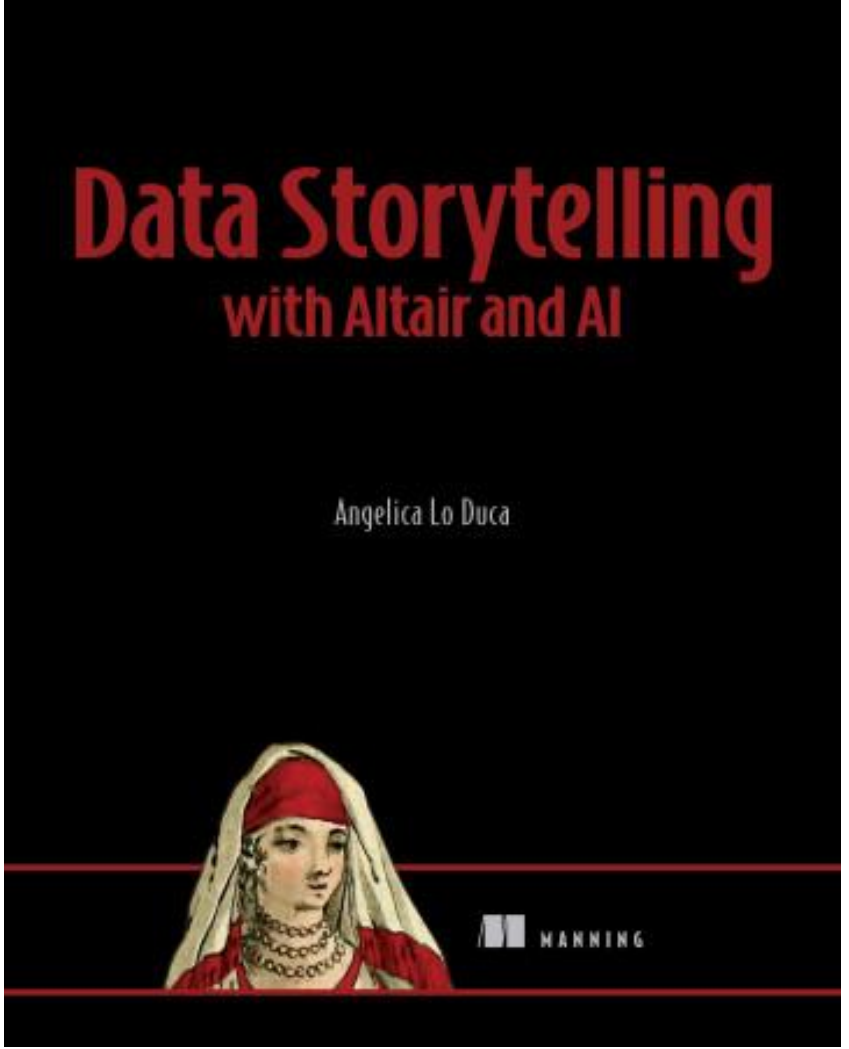
Data Types in Encodings

- :Q = Quantitative
- :N = Nominal
- :O = Ordinal
- :T = Temporal

References

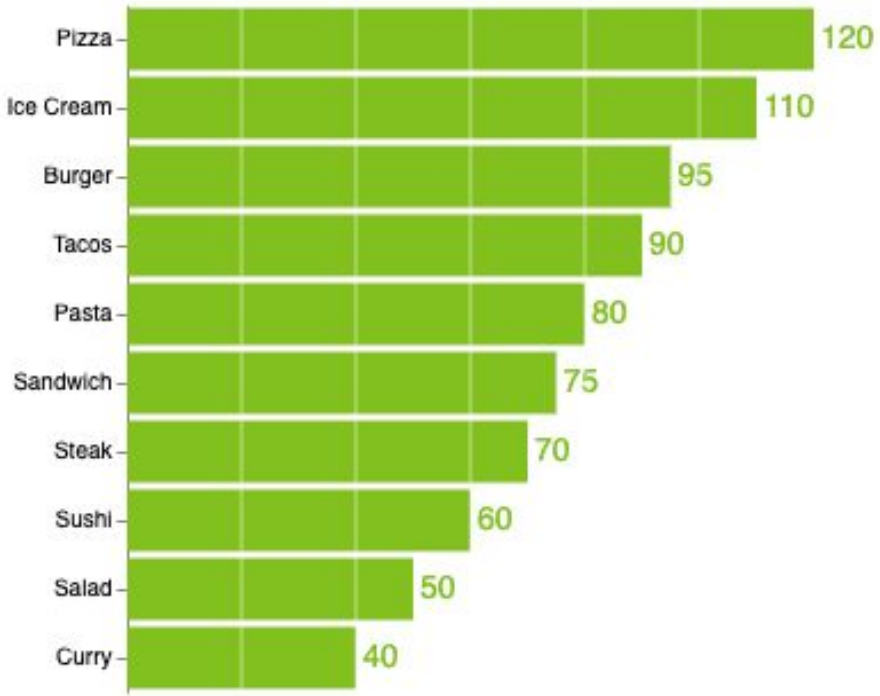
- https://altair-viz.github.io/
- https://github.com/alod83/Data-Storytelling-with-Altair-and-AI/
  - Many examples of charts under 06/
- Lo Duca, A. (2024). Data Storytelling with Altair and AI. Manning Publications.

Now it’s time to practice!



Exercise 1 - Bar Chart

- https://github.com/alod83/Data-Storytelling-with-Altair-and-AI/
  - 06
    - Bar-charts
      - bar-chart.py



Exercise 2 - Donut Chart

- https://github.com/alod83/Data-Storytelling-with-Altair-and-AI/
  - 06
    - cooking-charts
      - donut-chart.py