

Data Analysis and Visualization

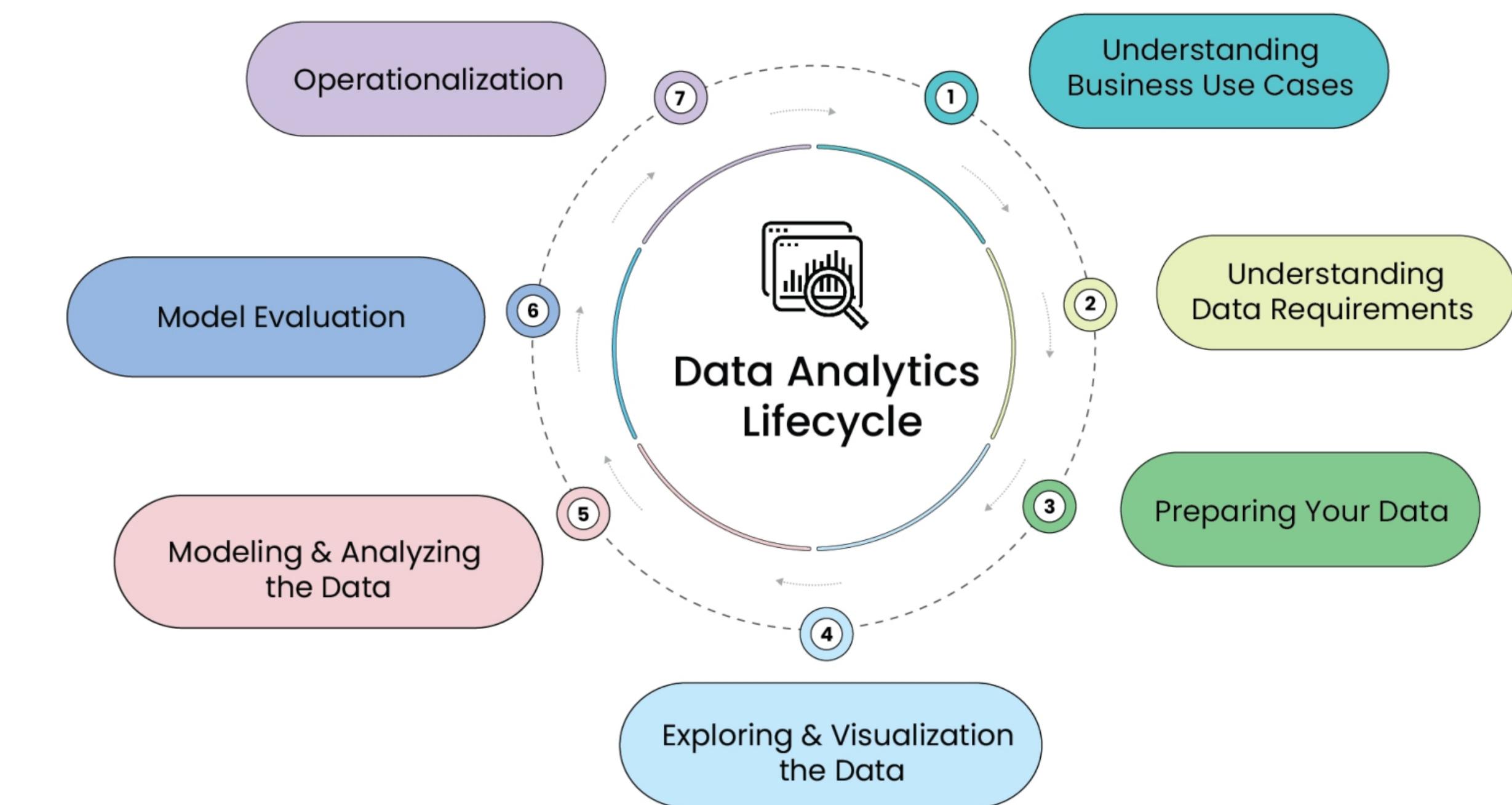
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Introduction to Data Analysis

Understanding Data Analysis

Data analysis is the *process of examining, cleaning, transforming, and modelling data to extract meaningful insights.*



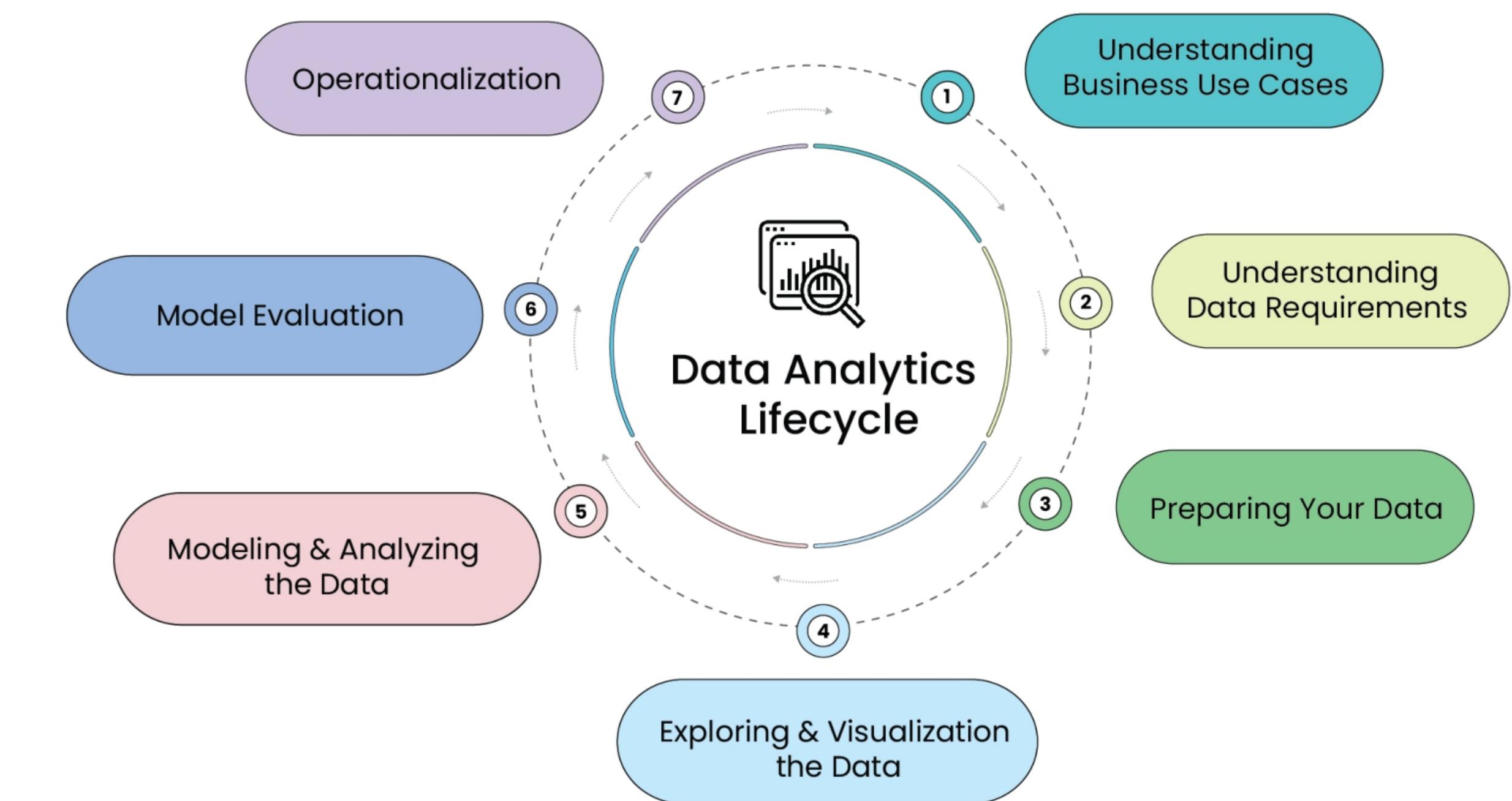
Introduction to Data Analysis

Understanding Data Analysis

Data analysis is the process of examining, cleaning, transforming, and modeling data to extract meaningful insights.

Key goals:

1. Identify *patterns and trends*
2. Support the *decision-making process*
3. Predict *future outcomes*



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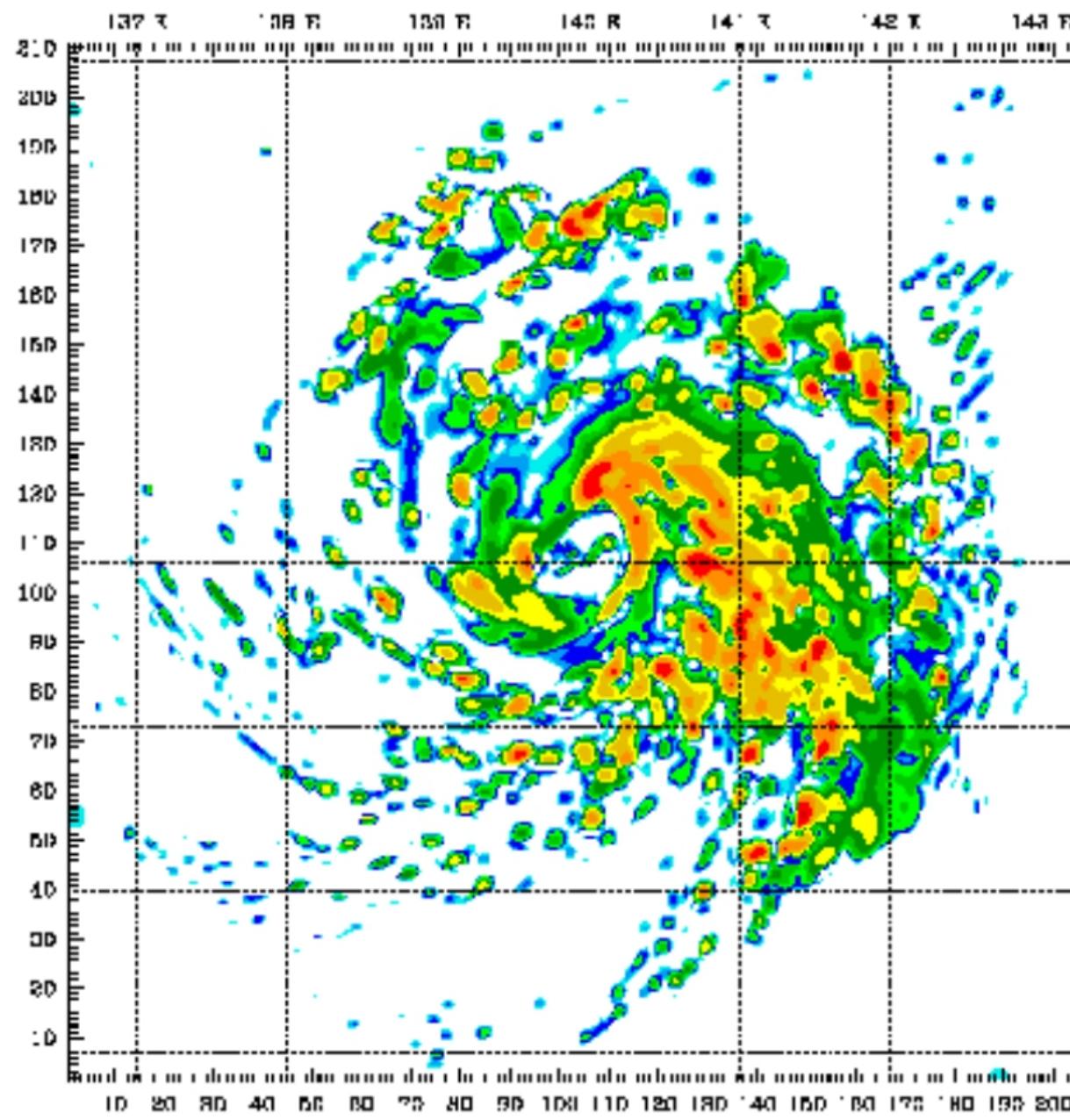
The Role of Data Analysis

- Optimizing processes (e.g., logistics, manufacturing)
- Enhancing customer experiences (e.g., personalization)
- Driving innovation (e.g., AI, machine learning)

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The Role of Data Analysis

Real world applications : predicting weather, tracking disease outbreaks, or creating recommendation systems.



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What is data visualization?

Data visualization is the graphical representation of information and data using visual elements like charts, graphs, and maps.

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Why data visualization is important?

Data visualization helps to:

- Identify relevant information in dataset
- Detect patterns and correlations
- Experiment and test hypotheses
- Communicate results effectively
- Identify relevant features for machine learning models

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Why data visualization is important?

“We don’t know really understand the data until we visualise them”



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Why visualization work

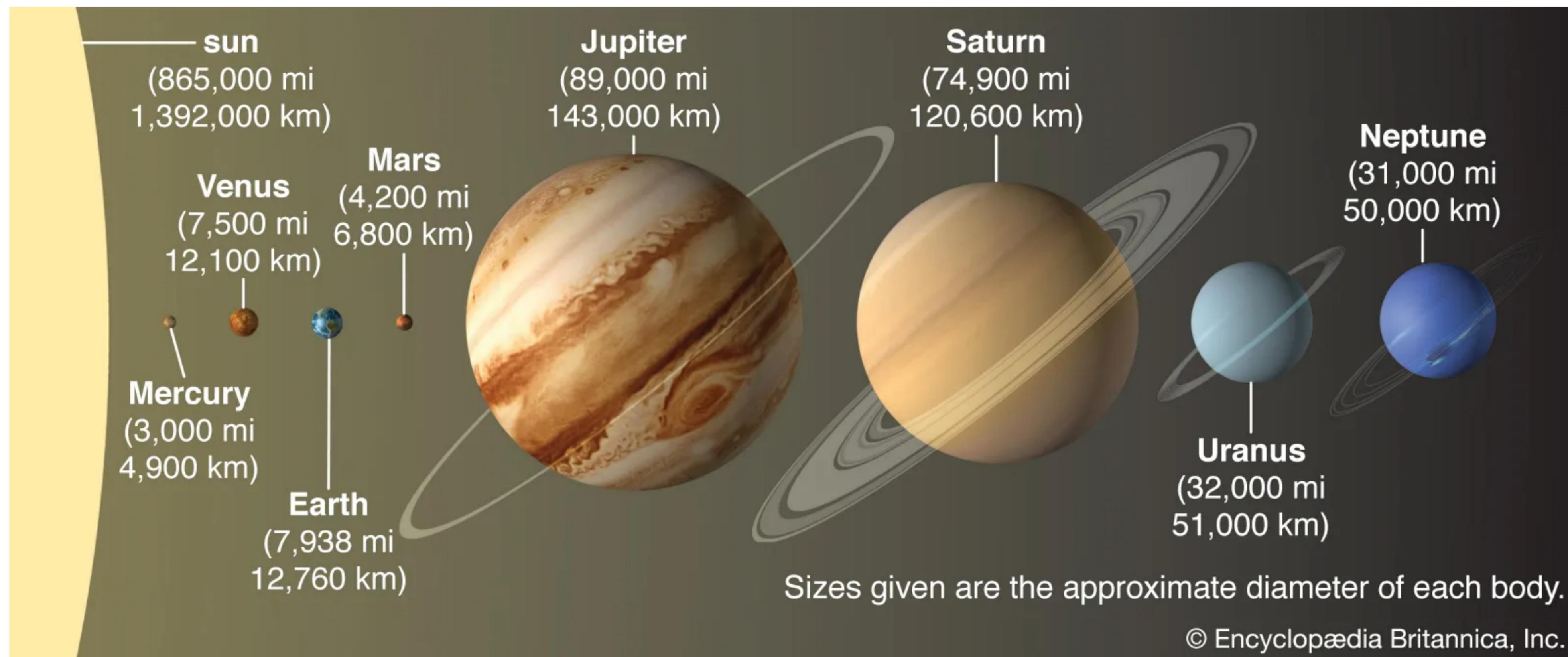
- Humans process visuals 60,000 times faster than text



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Why visualization work

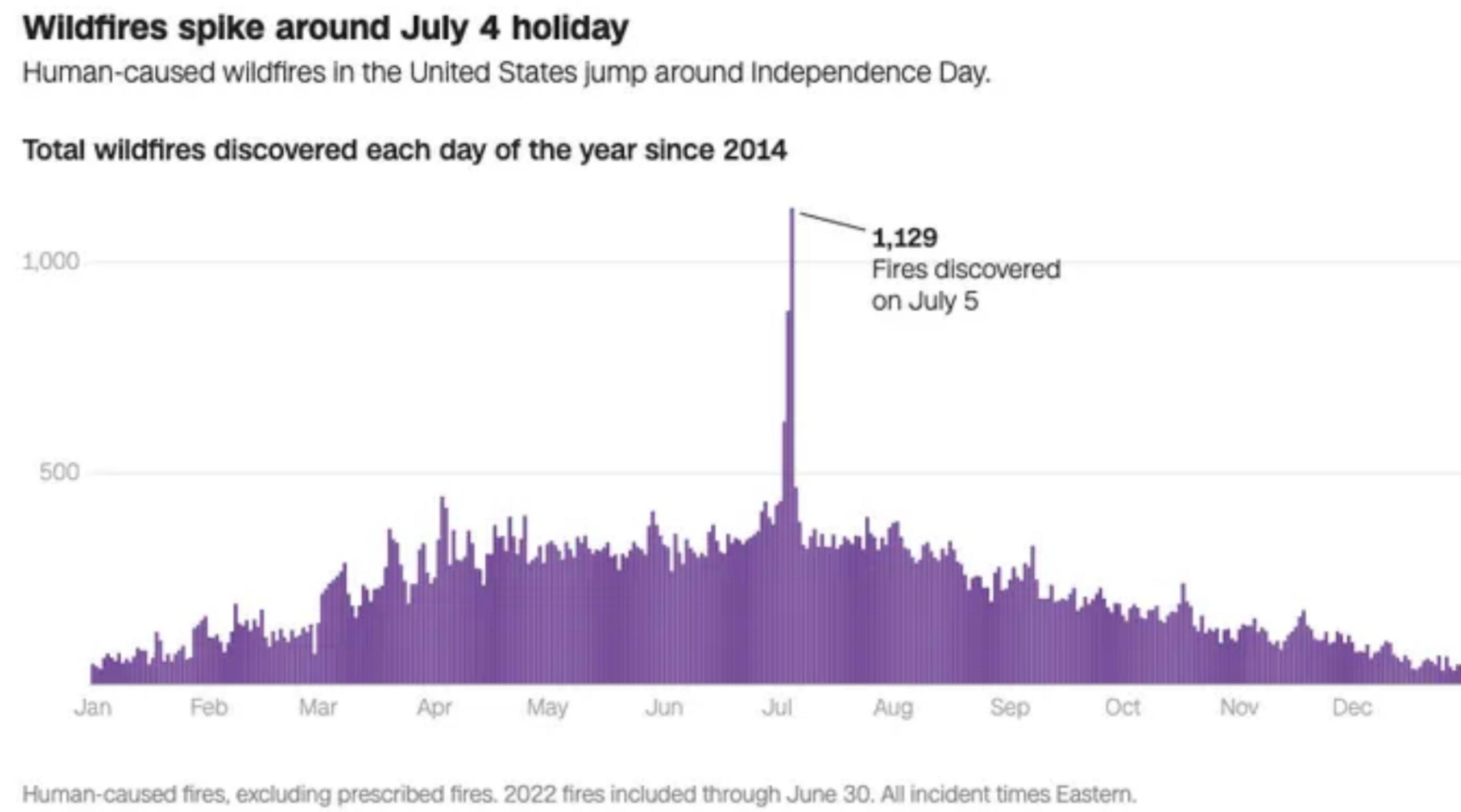
We remember 80% of what we see but only 20% of what we read



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Why visualization work

- Patterns and outliers are easier to spot visually



Sources: CNN analysis of data from the National Interagency Fire Center
Graphic: John Keefe, CNN

CNN

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Example



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Example



<https://www.maptive.com/data-visualization-examples/>

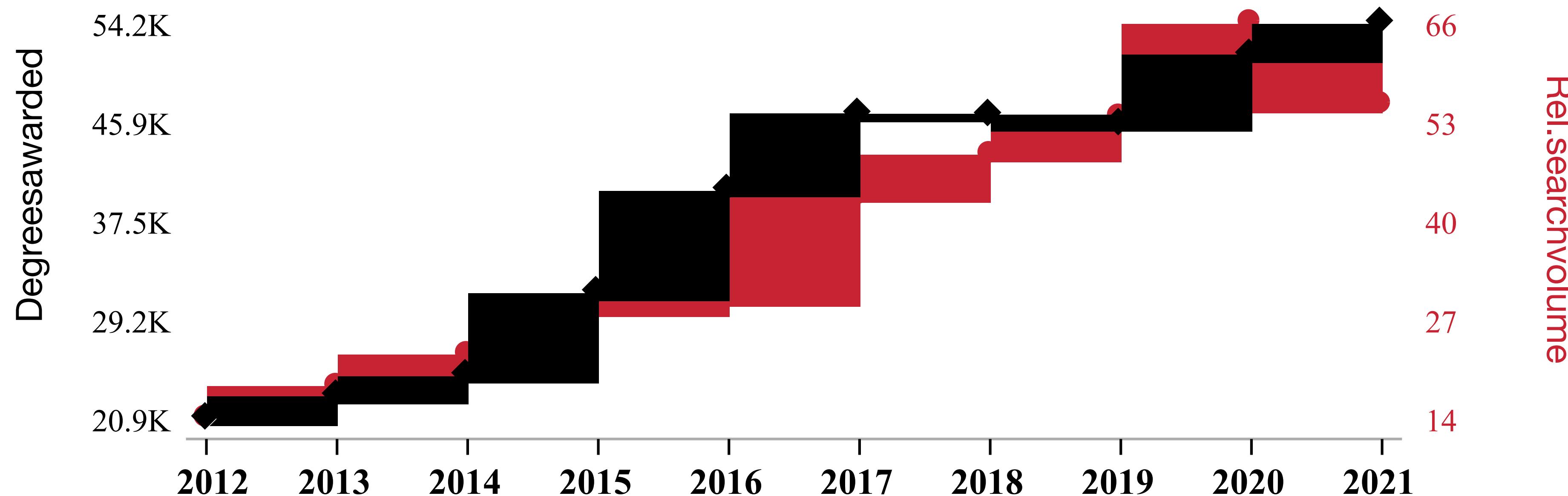
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Example

Master's degrees awarded
in information sciences

correlates with

Google searches for 'how to learn python'



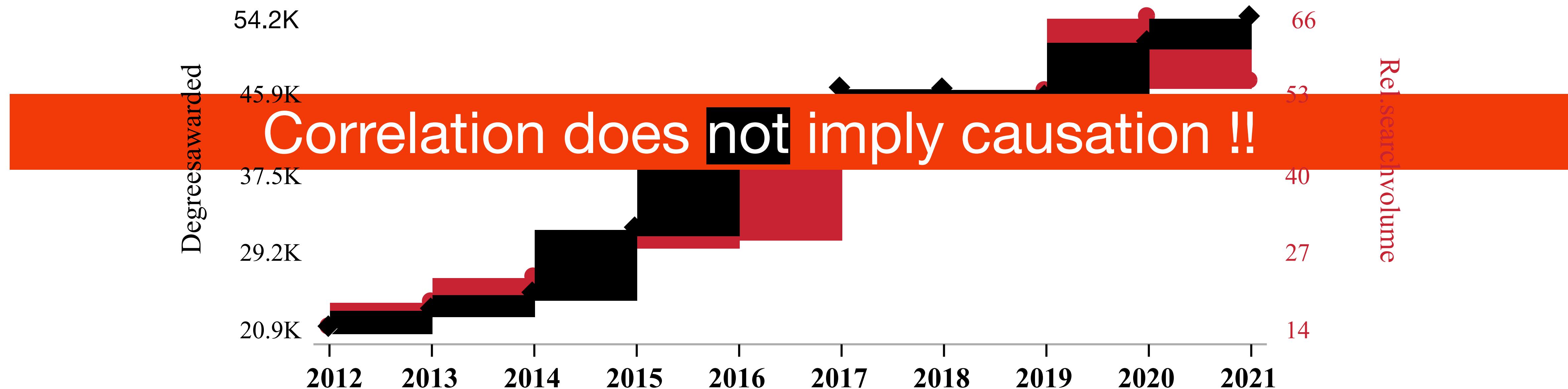
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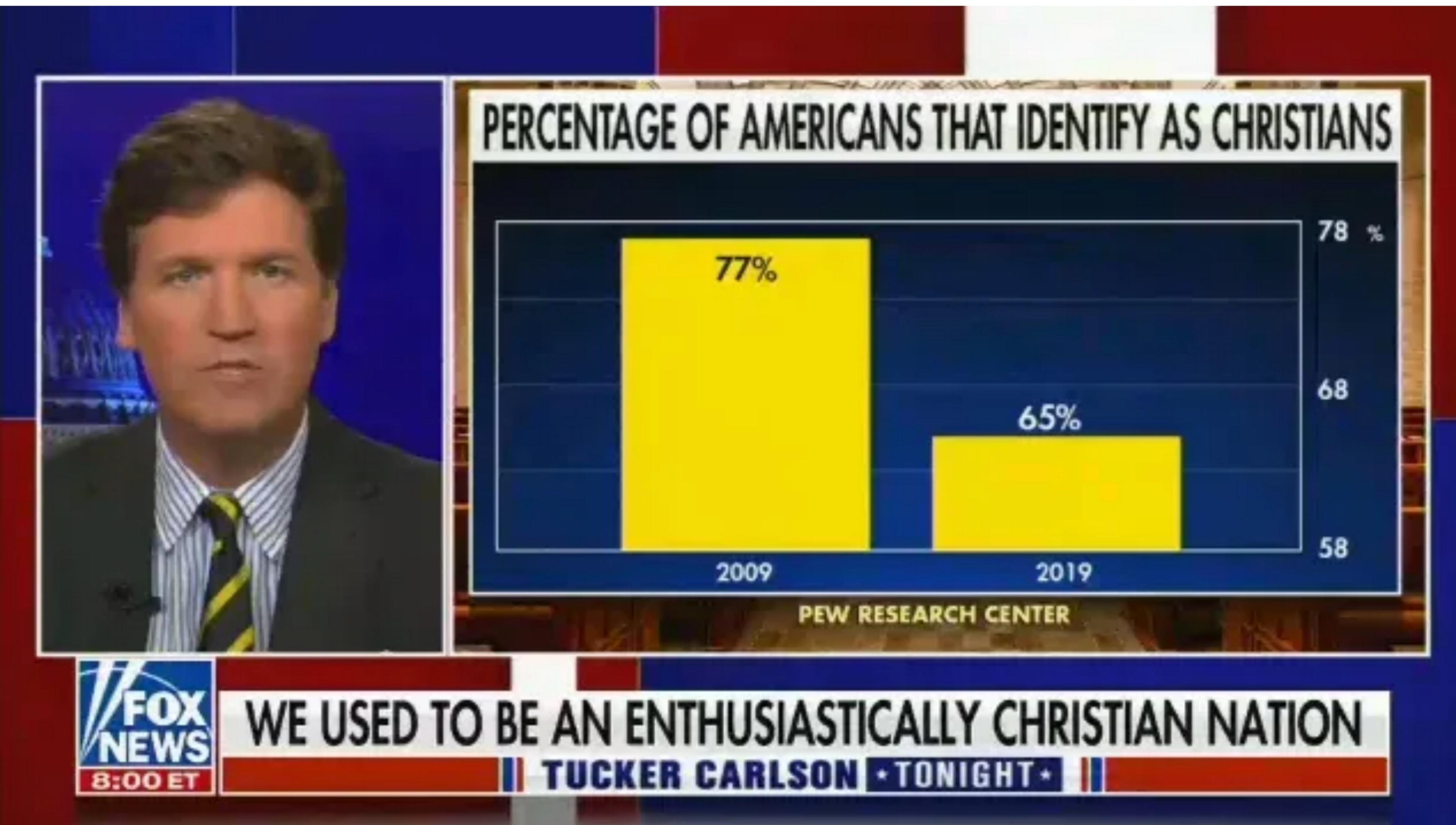
Google searches for 'how to learn python'



https://www.tylervigen.com/spurious/correlation/9207_masters-degrees-awarded-in-information-sciences_correlates-with_google-searches-for-how-to-learn-python

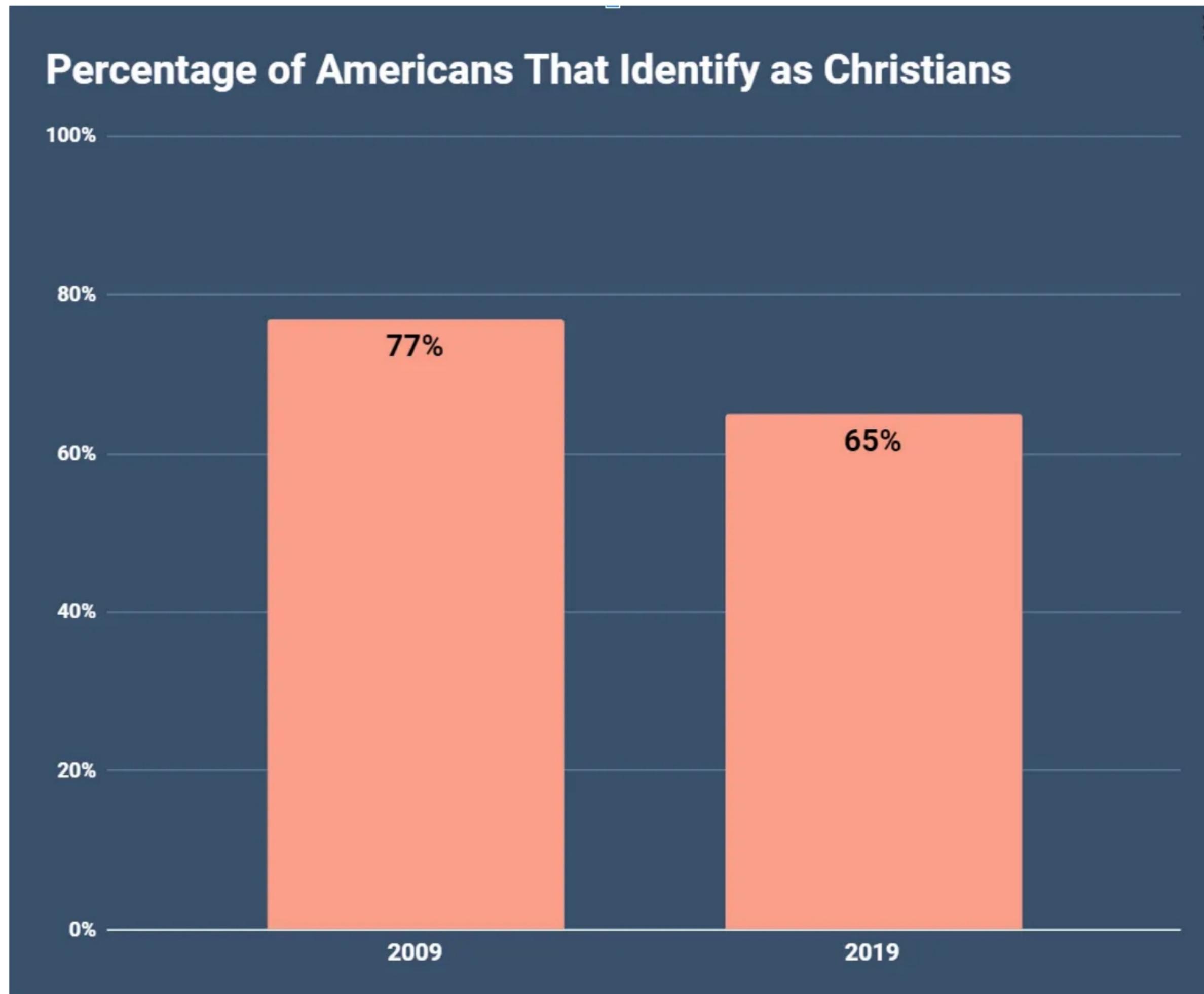
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Tricky Visualisation



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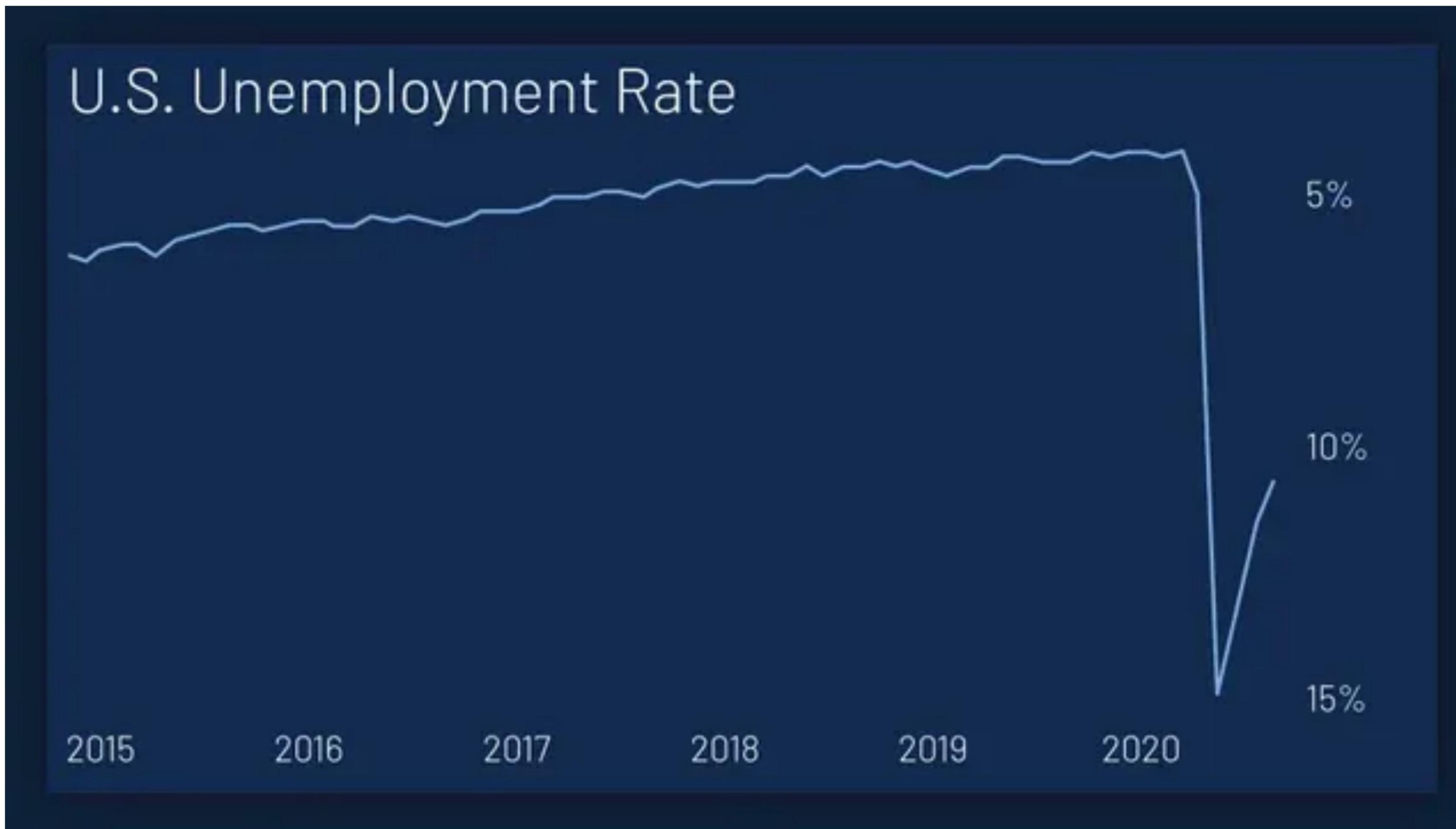
Tricky Visualisation



<https://medium.com/@thomas.ellyatt/bad-data-visualisation-real-life-examples-out-there-in-the-wild-eb5032329aeb>

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Tricky Visualisation



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Example: Retail Sales Analysis

- Analyzing sales data to identify best-selling products
- Understanding seasonal trends
- Informing restocking and marketing strategies

Example: Healthcare Data

- Identifying **risk factors** for disease
- Tracking patient **outcomes over time**
- Improving treatment **effectiveness**

Example: Social Media Analytics

- Measuring engagement (likes, shares, comments)
- Understanding audience demographics
- Optimizing content strategy

Interactive question 1

“What are some goals of data analysis?”

- A. Make data pretty
- B. Extract meaningful insights
- C. Confuse the audience
- D. Hide data errors

👉 Discuss your choice with a neighbor!

Interactive question 2

“Which of these is NOT a benefit of data visualization?”

- A. Spotting patterns
- B. Faster data processing
- C. Misleading interpretations
- D. Better communication

👉 Can you think of a bad visualization you've seen?

Interactive question 3

“What does the phrase 'correlation does not imply causation' mean?”

👉 Try to come up with a funny example!

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Summary

Data Analysis :

Examines and interprets raw data to extract insights

Uses techniques like statistical analysis and modeling

Data Visualization :

Transforms data into graphical representations

Highlights trends, patterns and relationships for better understanding

Any questions?