

Data Analysis and Visualization

CentraleDigitalLab@Nice

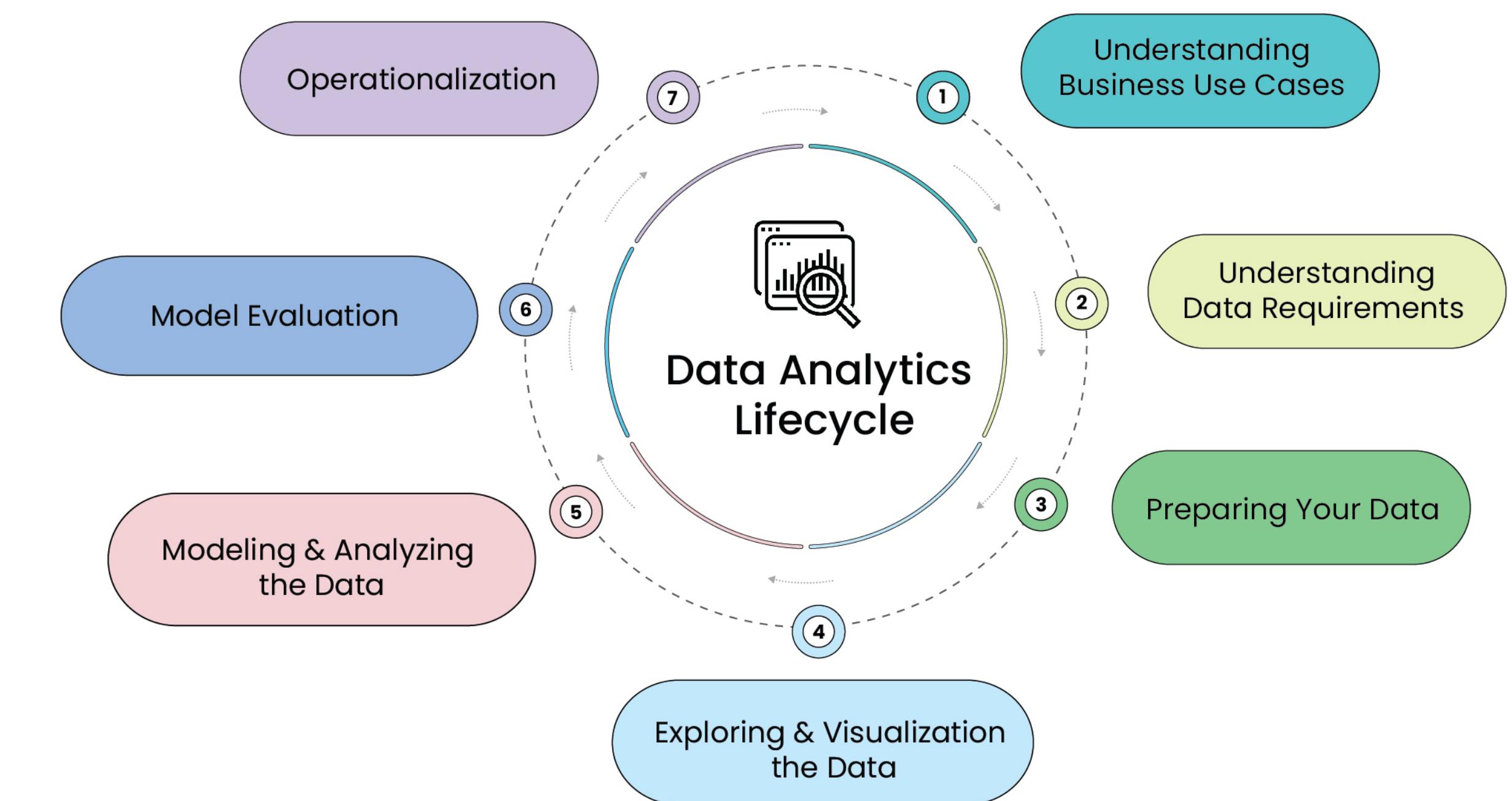
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MARIANNE, Université Côte d'Azur, CNRS, INRIA, I3S

Introduction to Data Analysis

Understanding Data Analysis

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



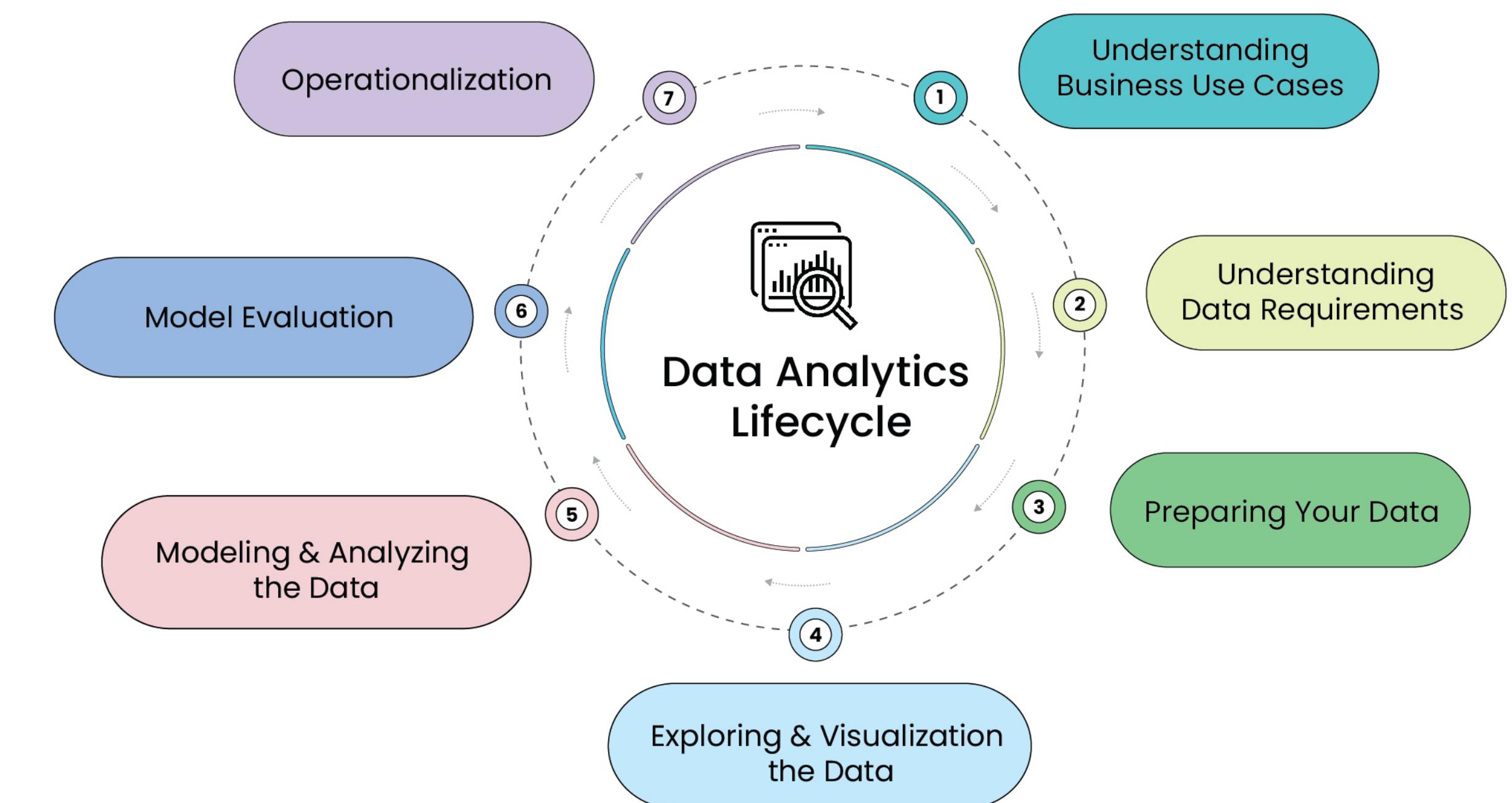
Introduction to Data Analysis

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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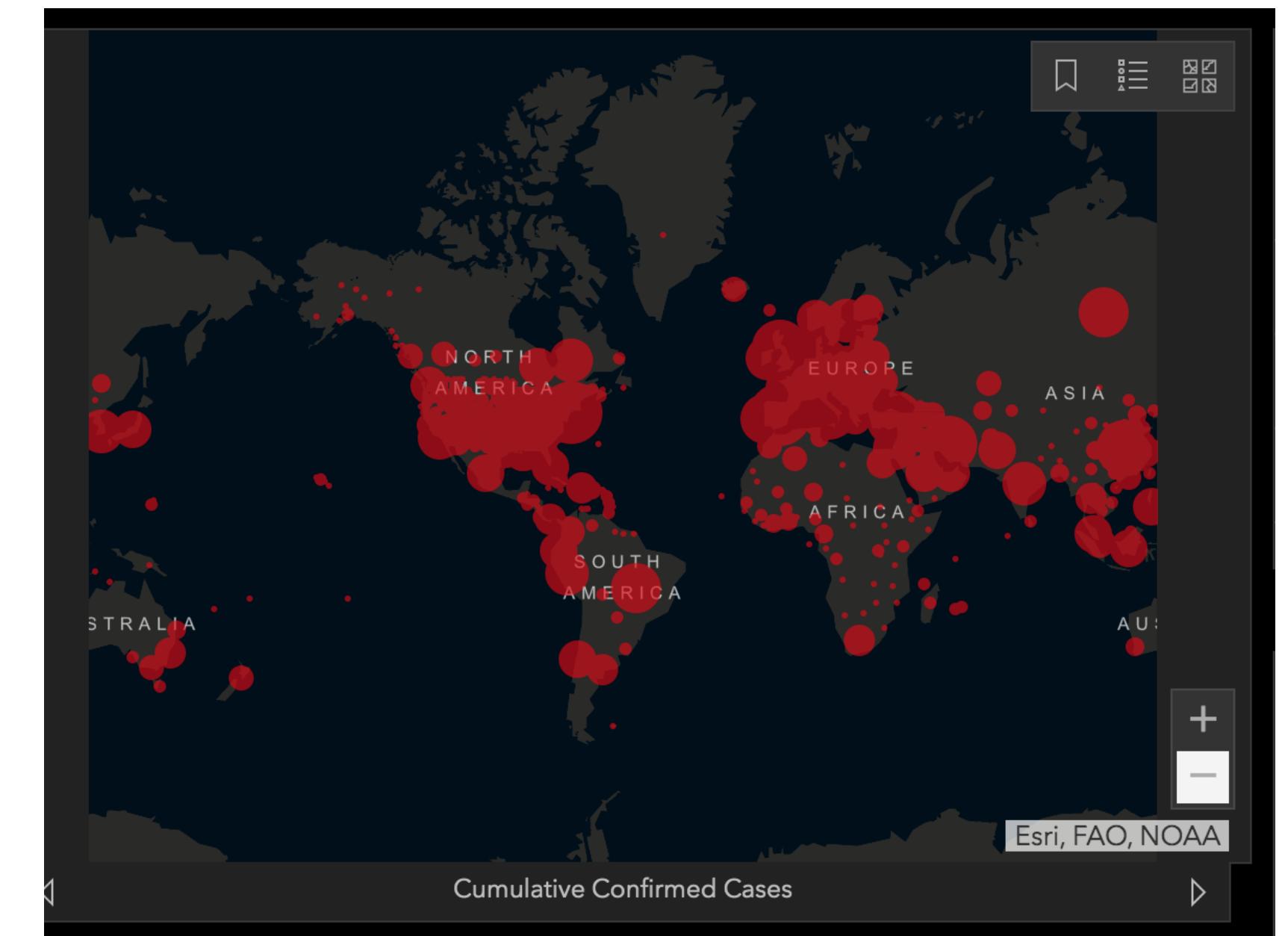
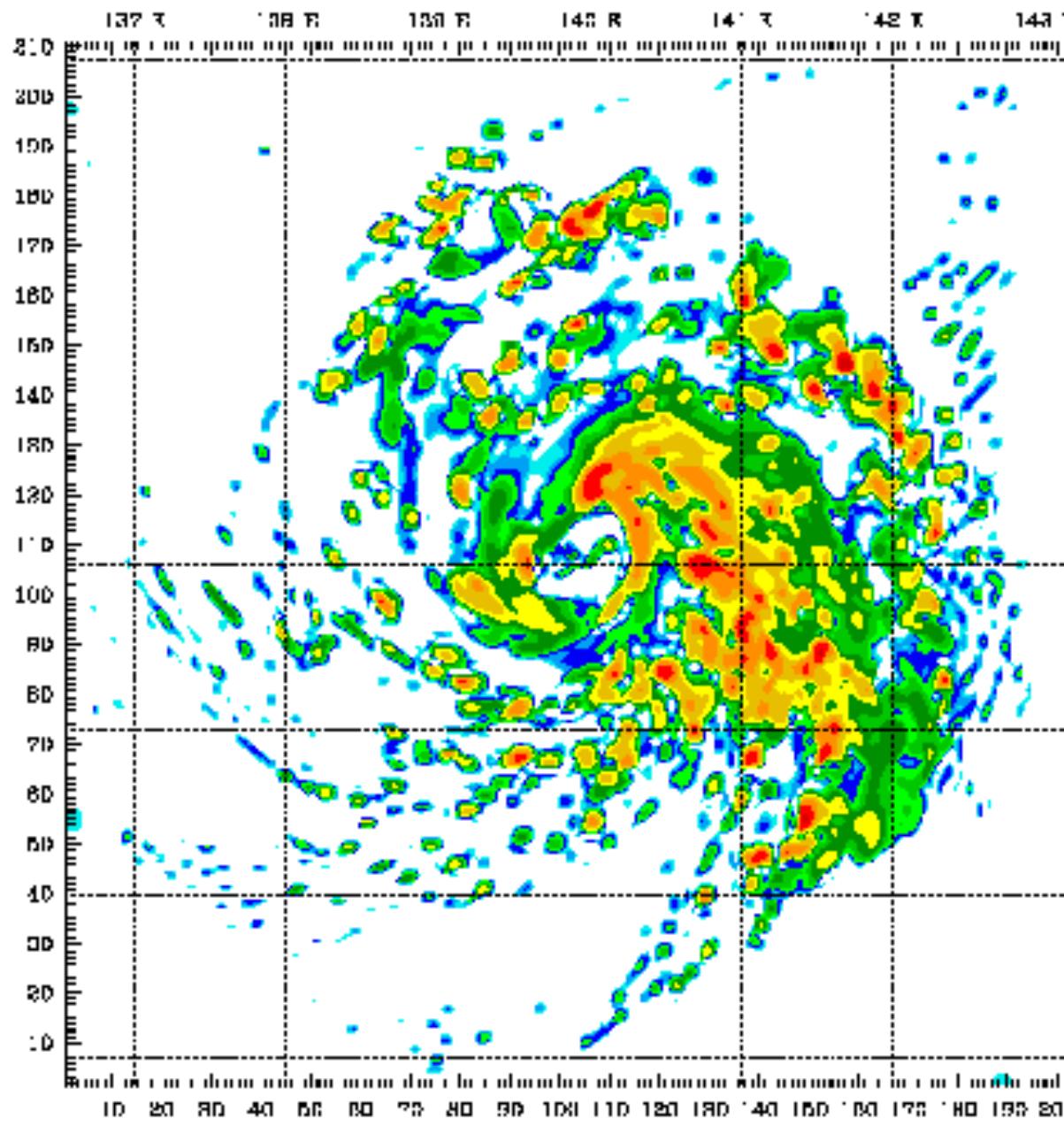
The Role of Data Analysis

- 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?

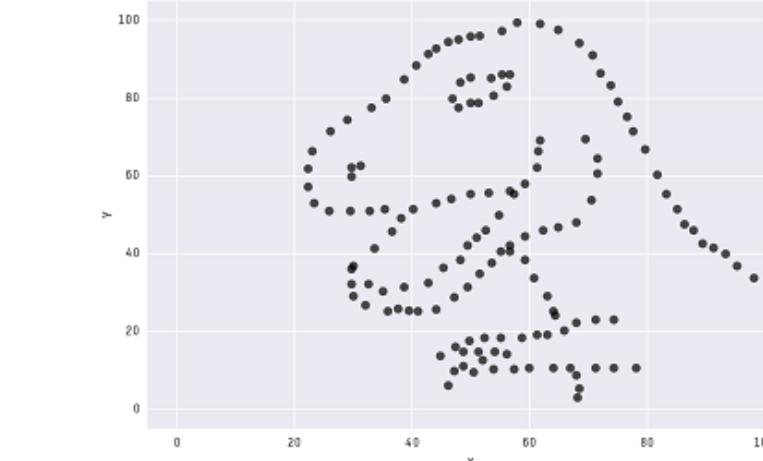
Data visualization helps to:

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

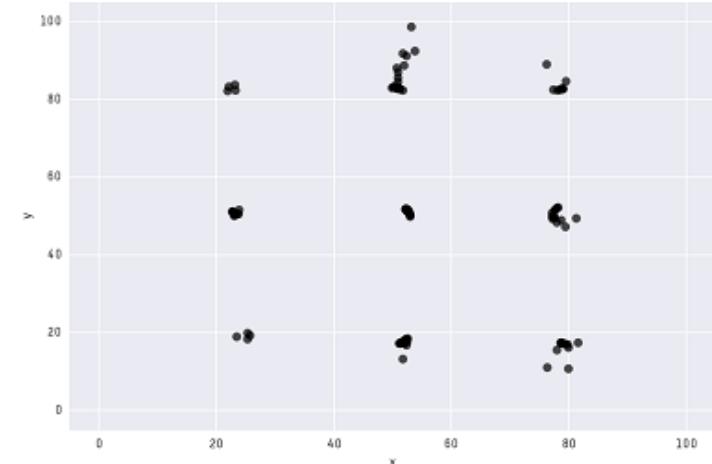
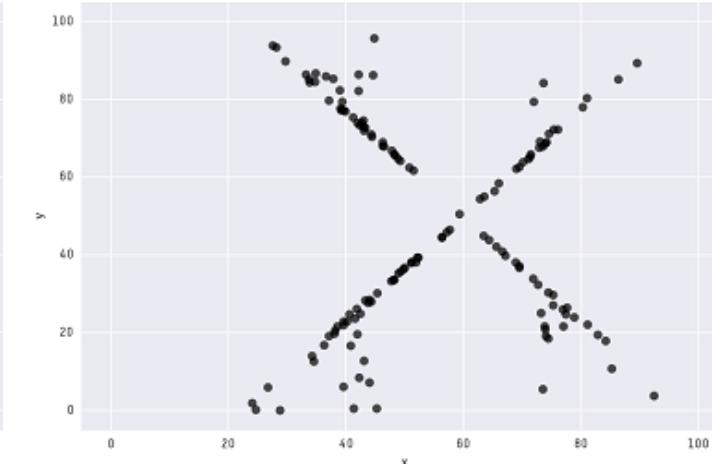
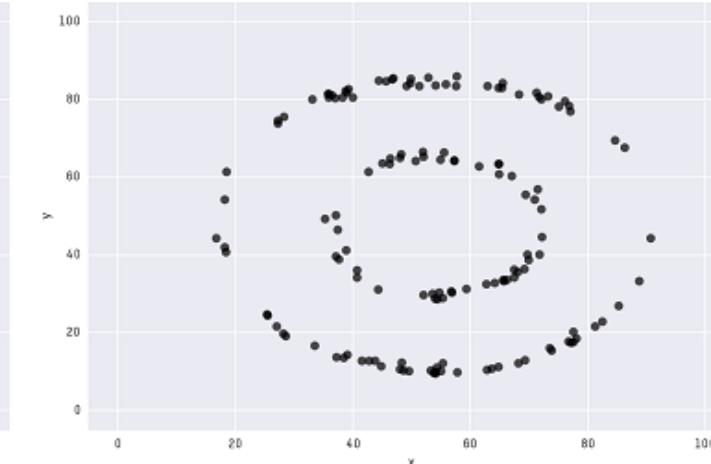
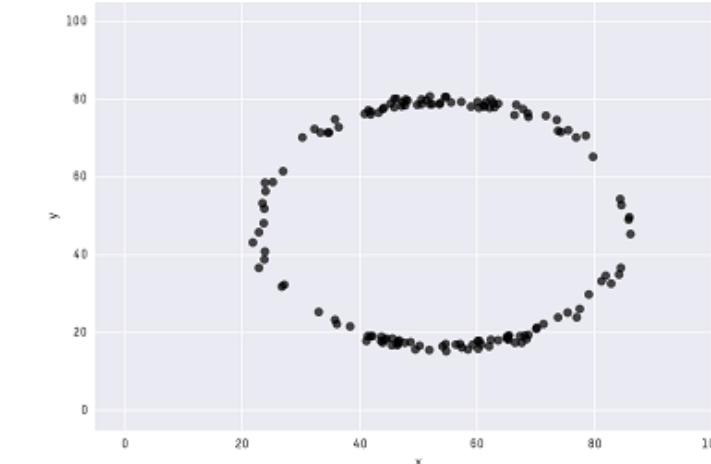
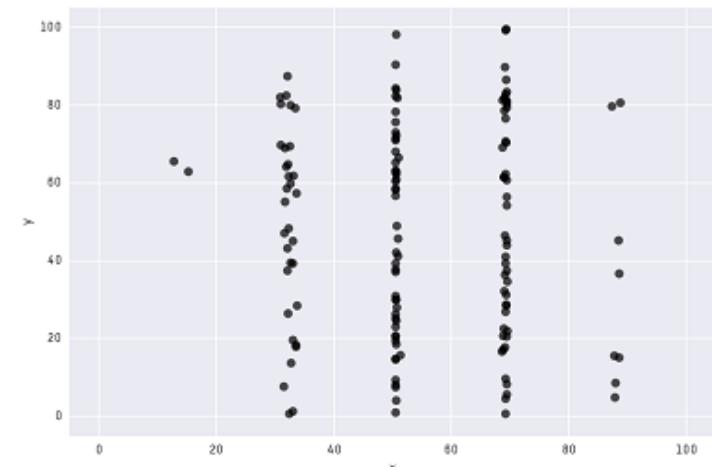
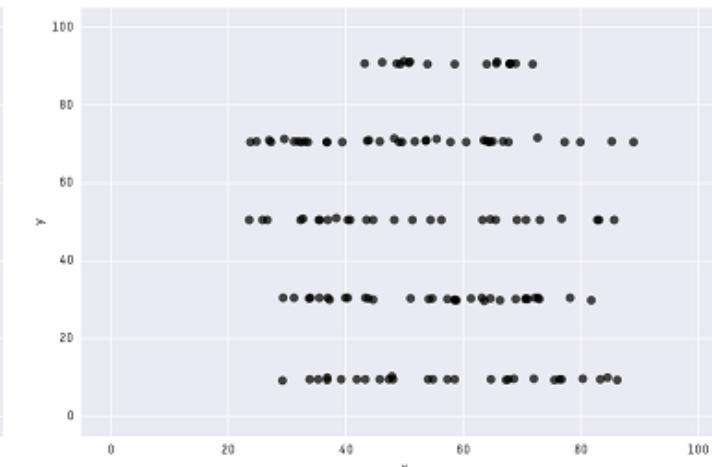
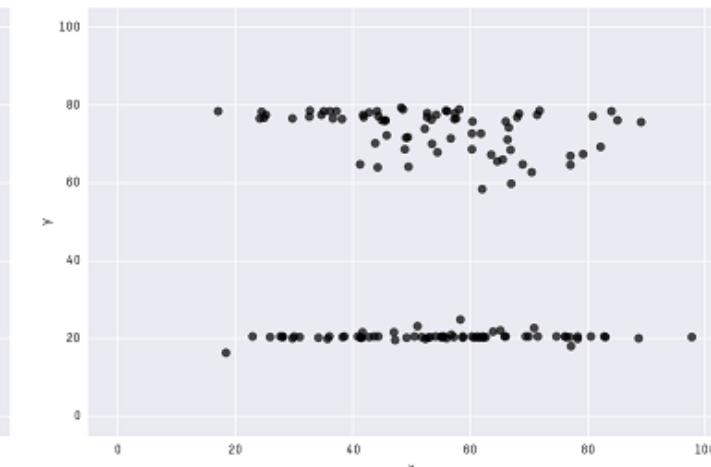
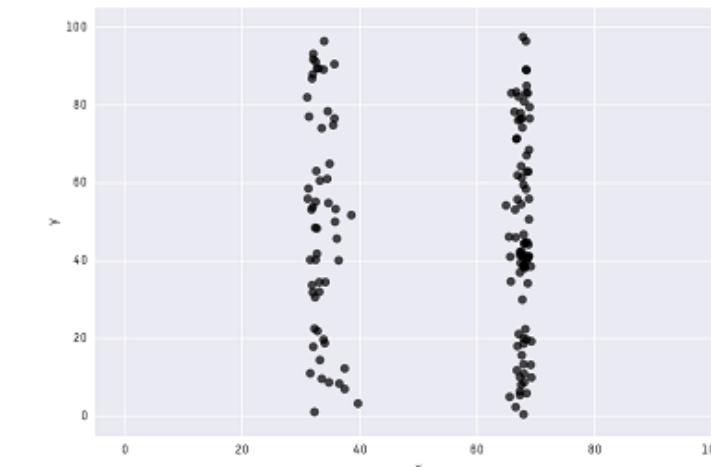
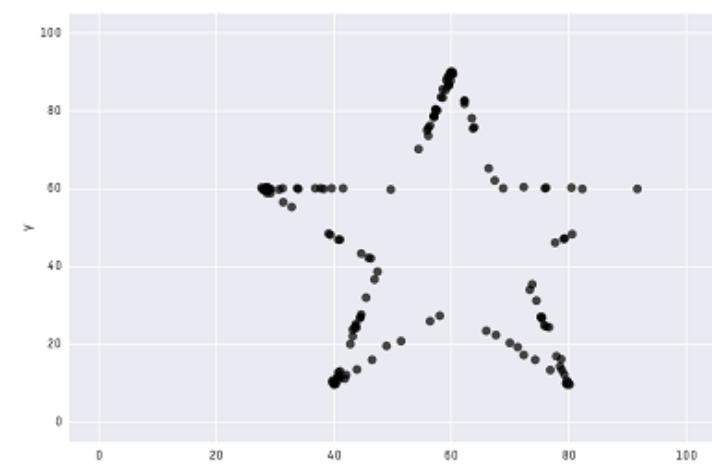
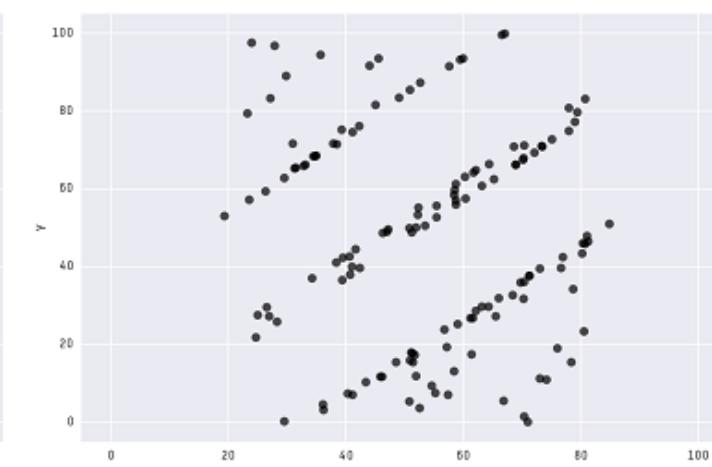
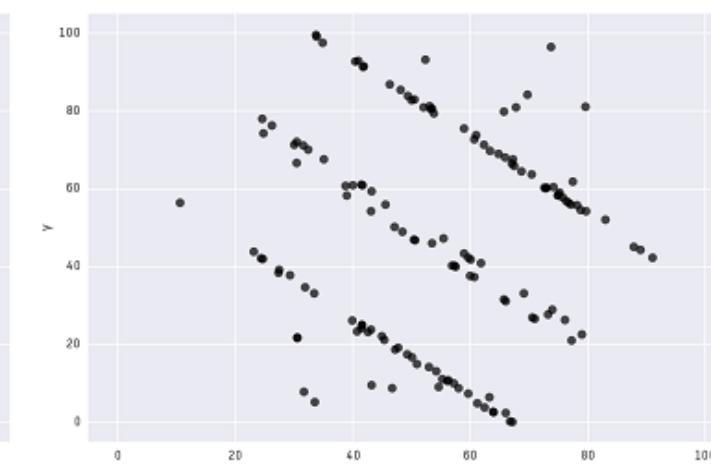
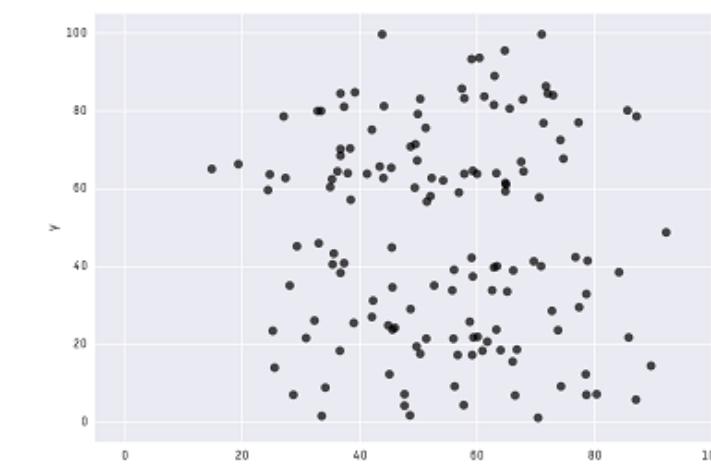
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Why data visualization is important?

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



X Mean: 54.26
Y Mean: 47.83
X SD : 16.76
Y SD : 26.93
Corr. : -0.06



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Why visualization work

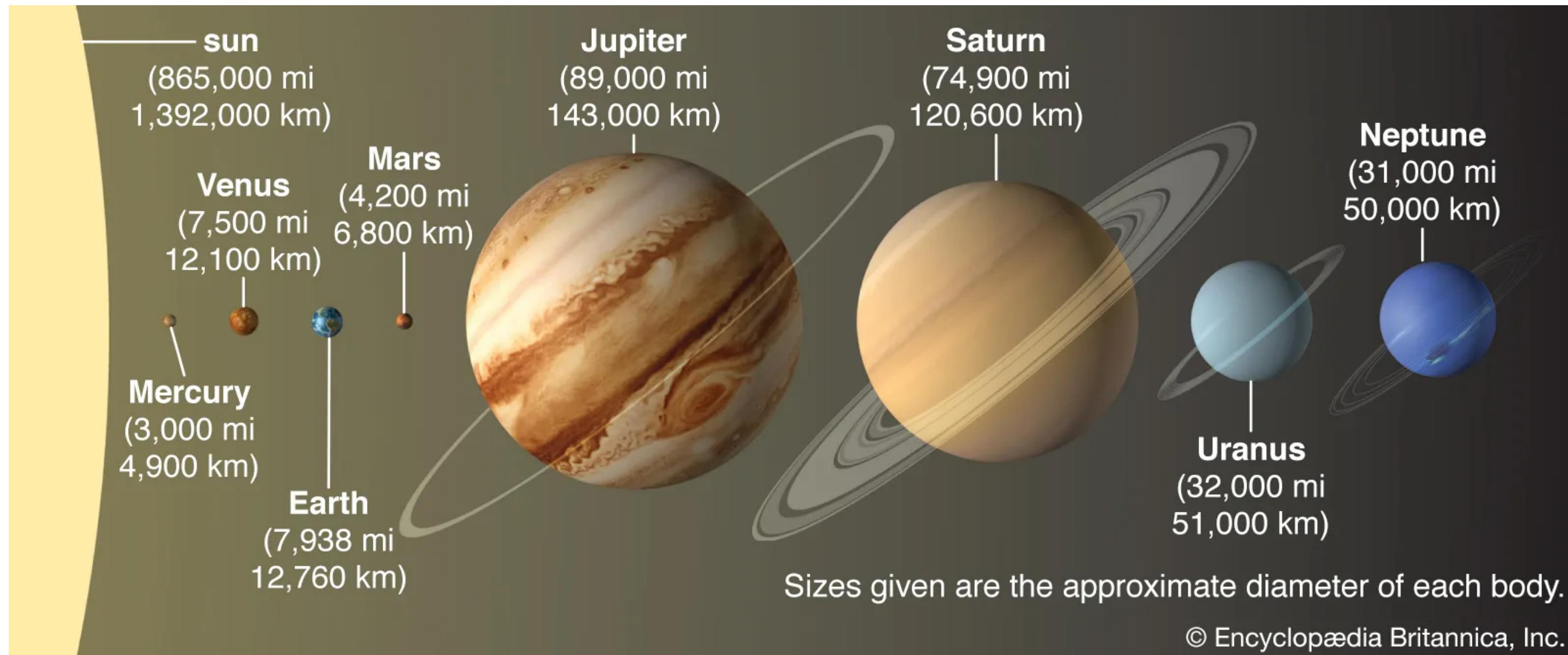
- Humans process visuals 60,000 times faster than text



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Why visualization work

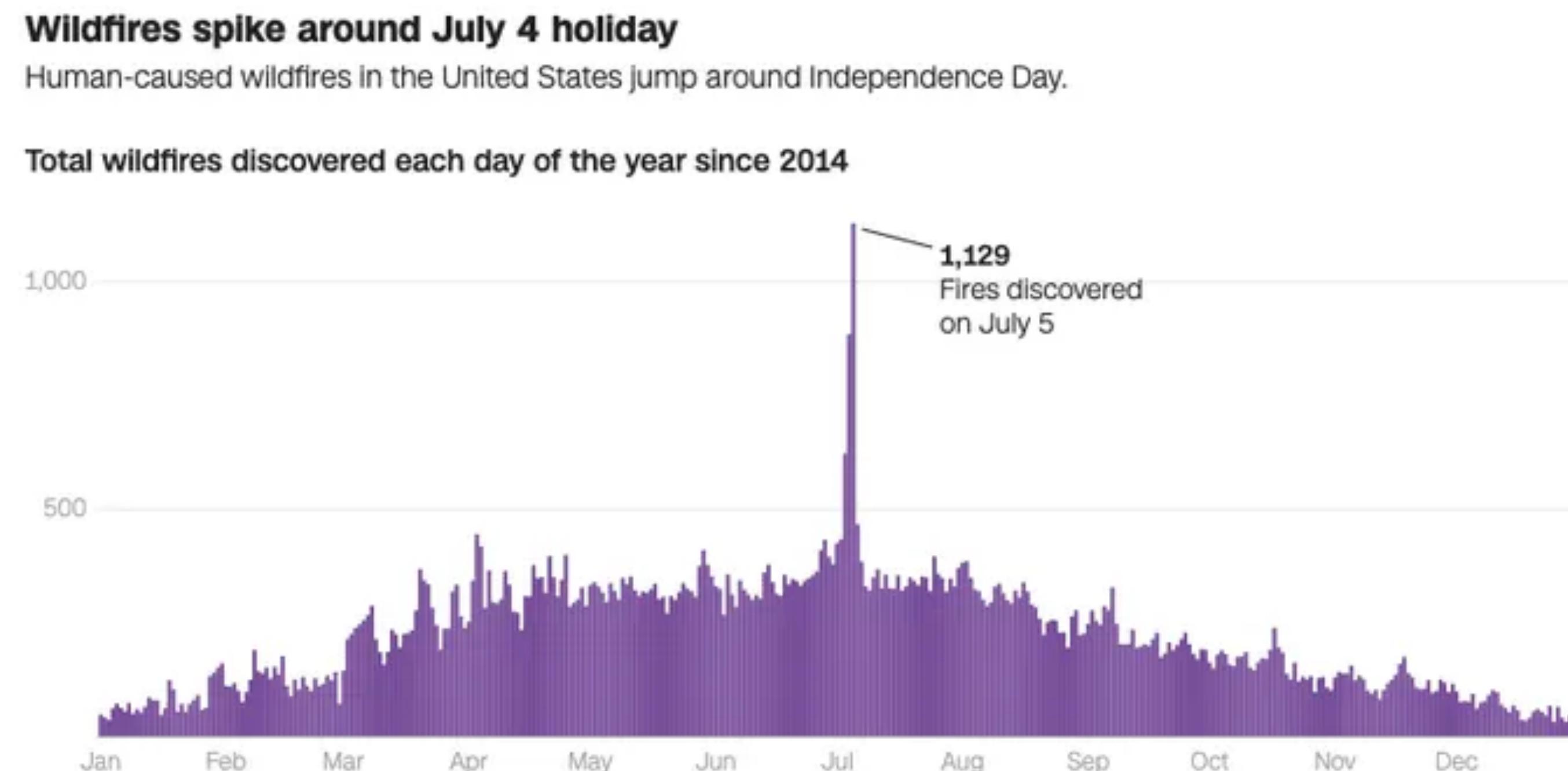
- We remember 80% of what we see but only 20% of what we read



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Why visualization work

- Patterns and outliers are easier to spot visually



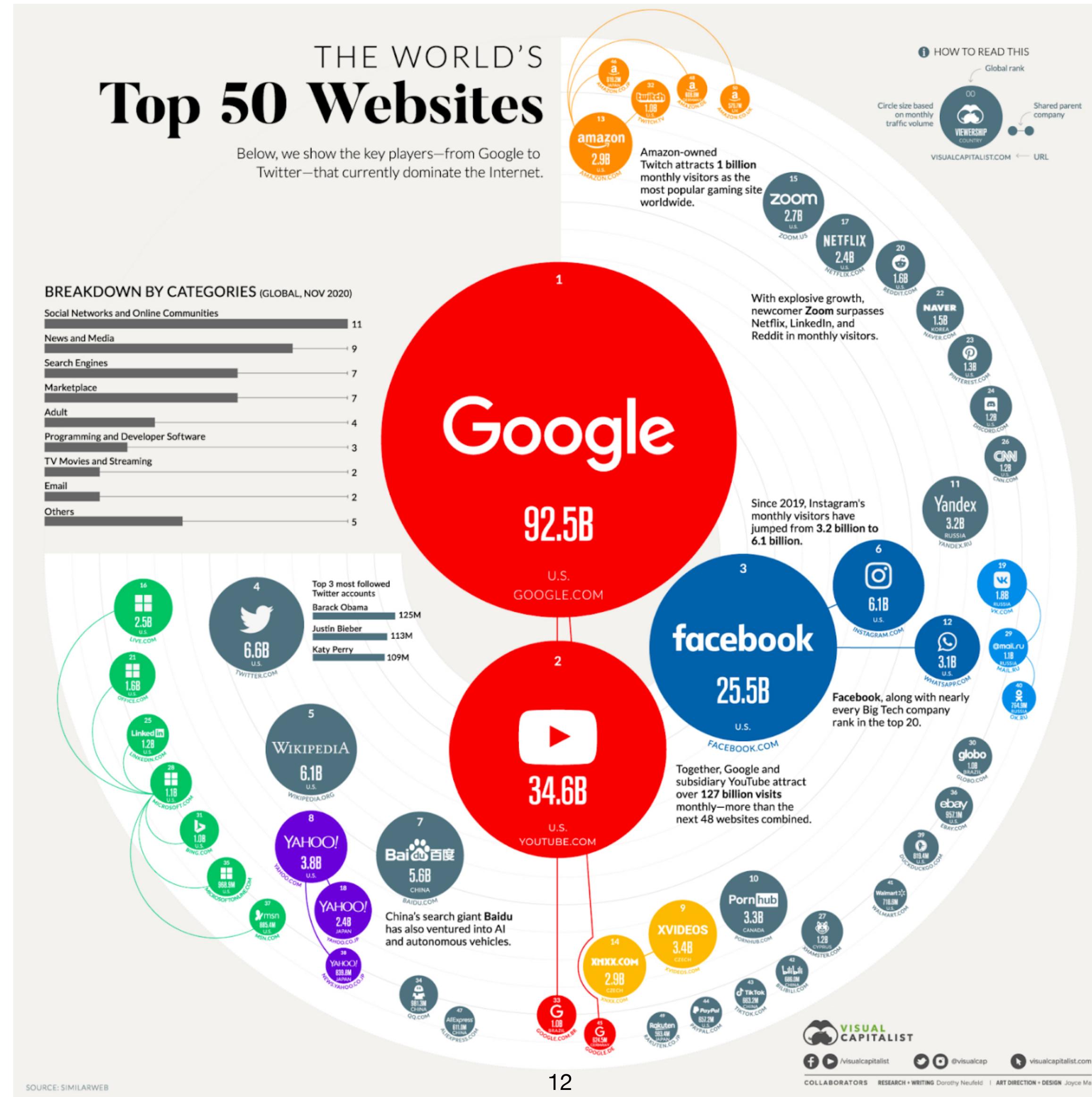
Human-caused fires, excluding prescribed fires. 2022 fires included through June 30. All incident times Eastern.

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/>

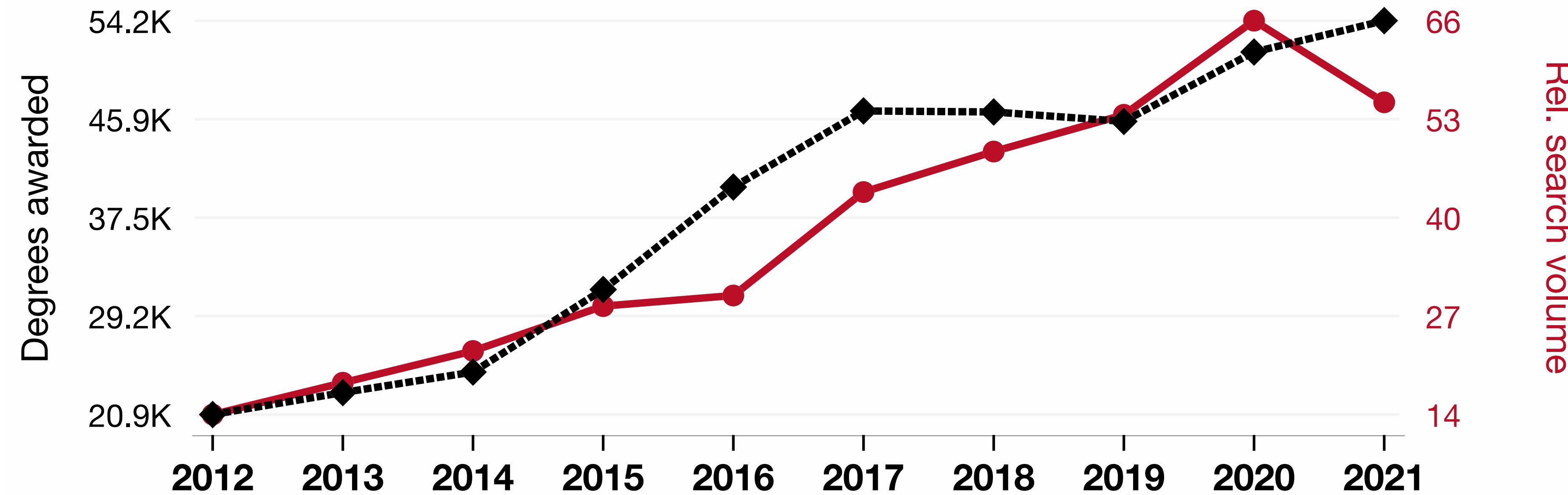
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Example

**Master's degrees awarded
in information sciences**

correlates with

Google searches for 'how to learn python'



https://www.tylervigen.com/spurious/correlation/920/_masters-degrees-awarded-in-information-sciences_correlates-with_google-searches-for-how-to-learn-python

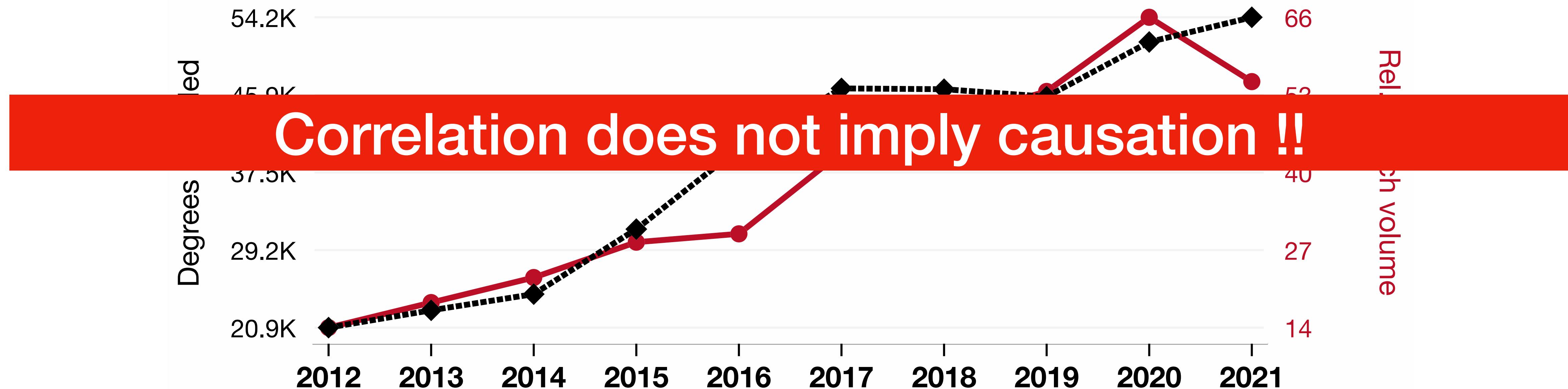
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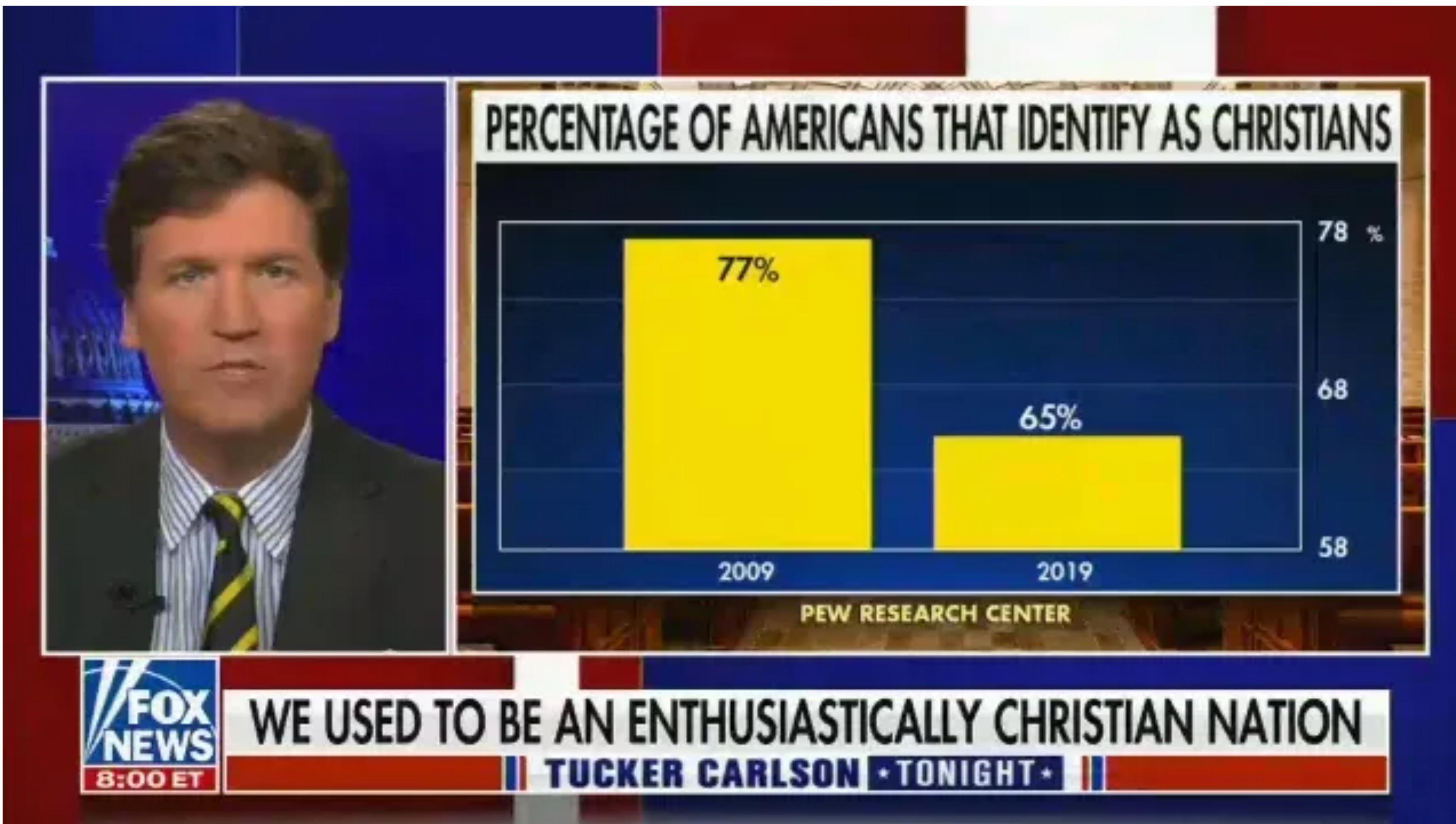
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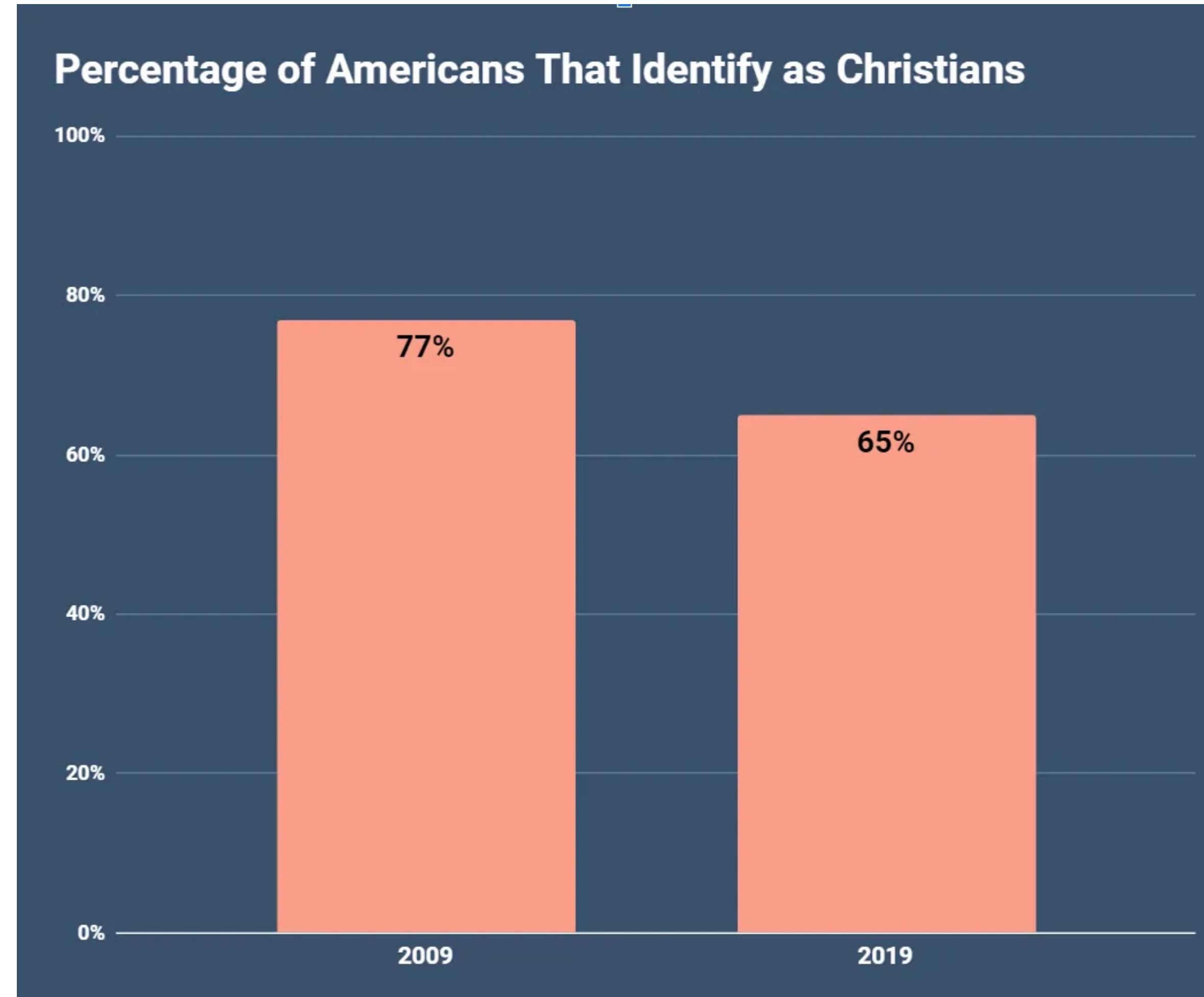
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Tricky Visualisation



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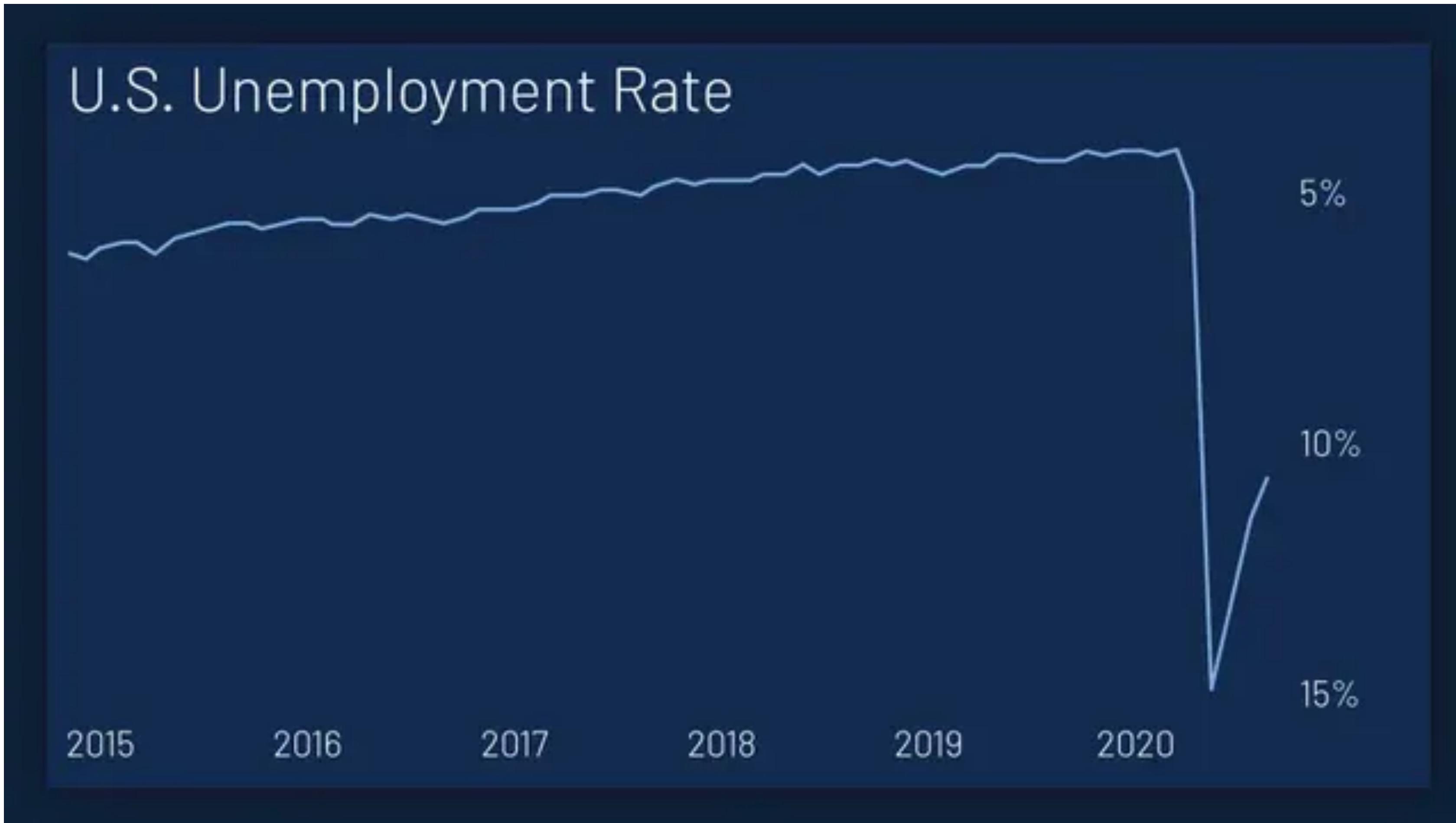
Tricky Visualisation



<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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Introduction to Data Analysis

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?