

# Data Analysis and Visualization

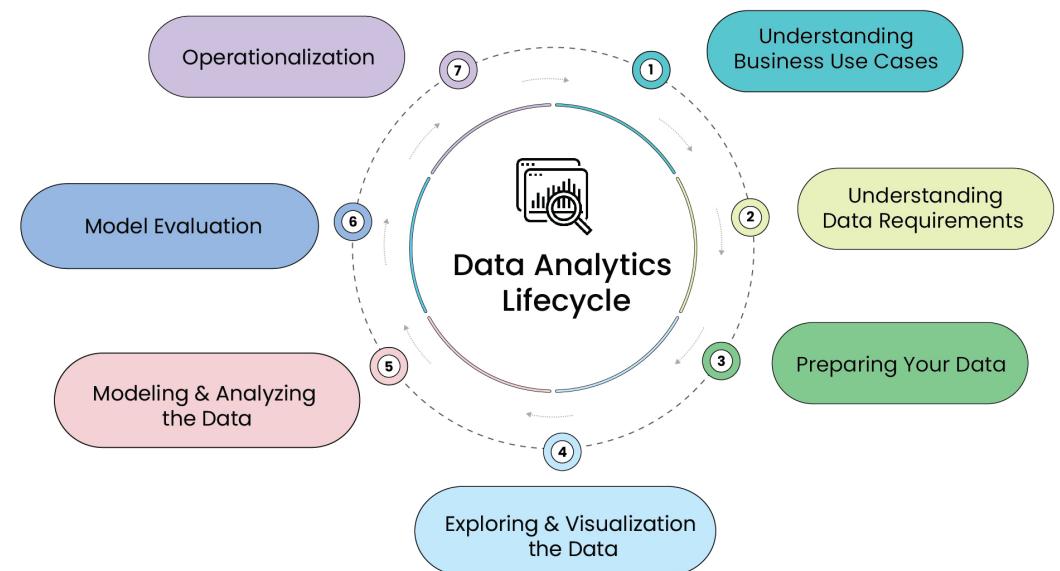
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# Lesson 1: Introduction to Data Analysis

## Understanding Data Analysis

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



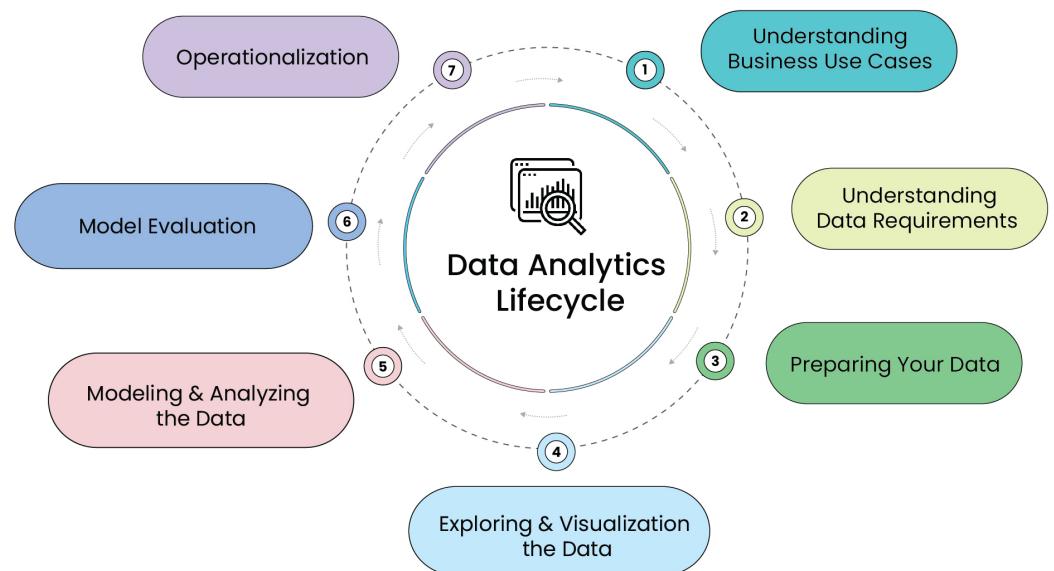
<https://www.scribbledata.io/blog/advanced-data-analytics-lifecycle/>

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### Key goals:



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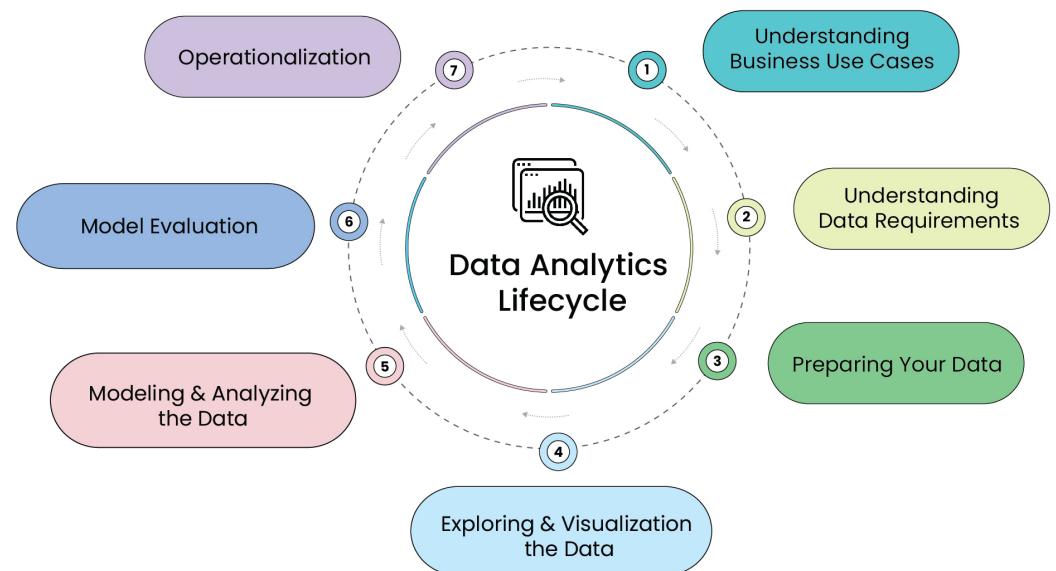
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1. Identify patterns and trends



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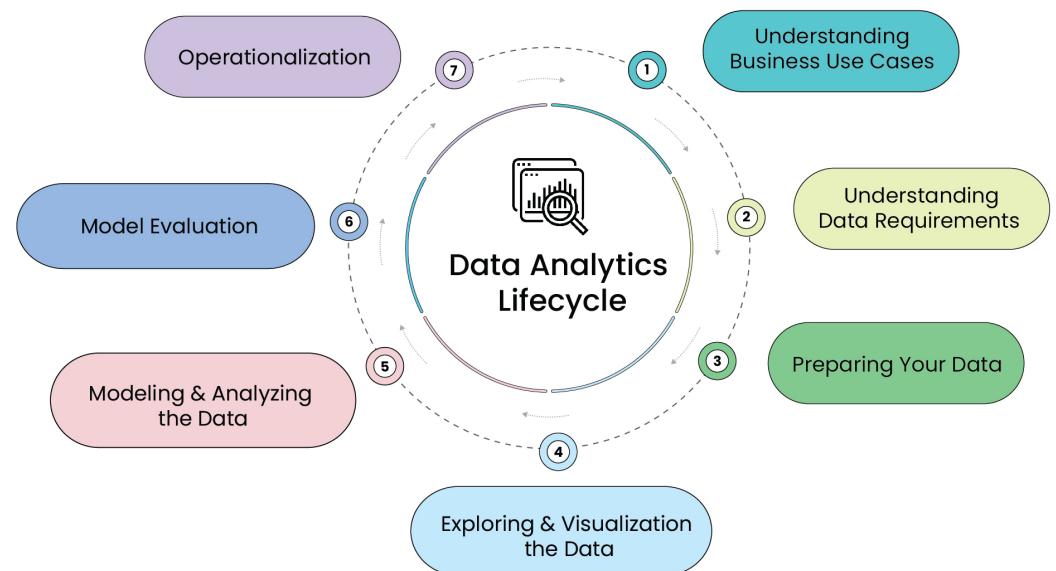
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2. Support the *decision-making process*



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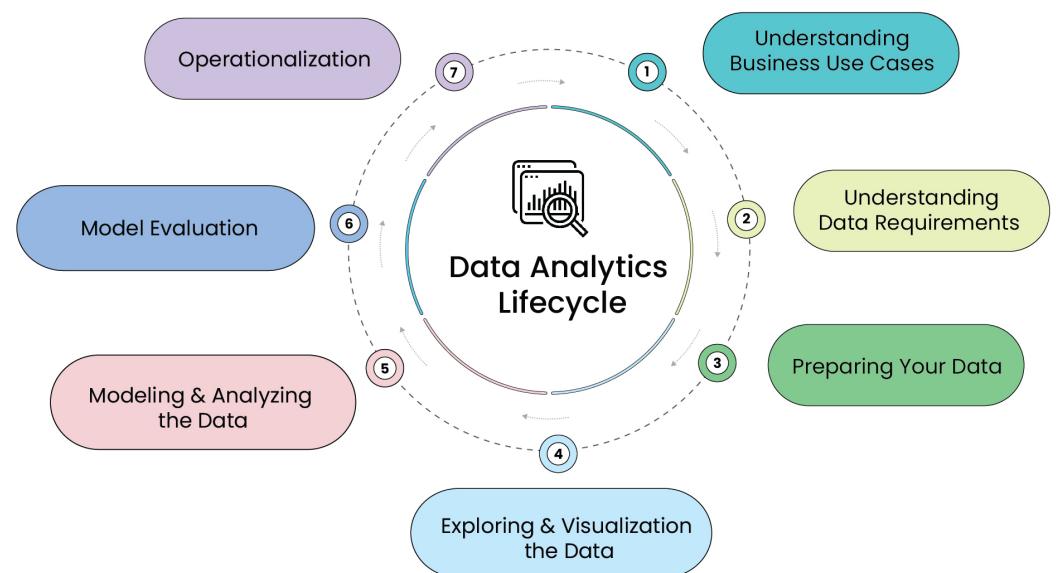
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### Key goals:

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



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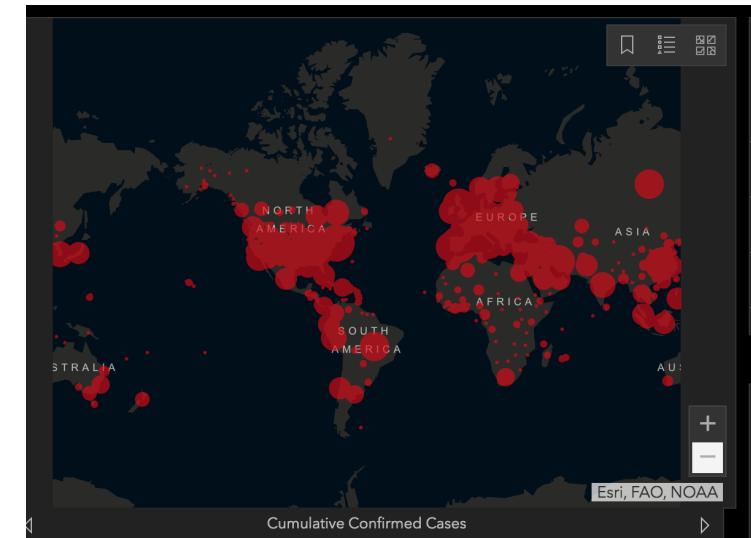
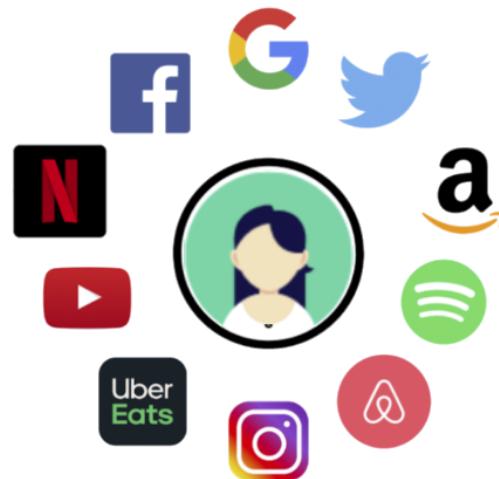
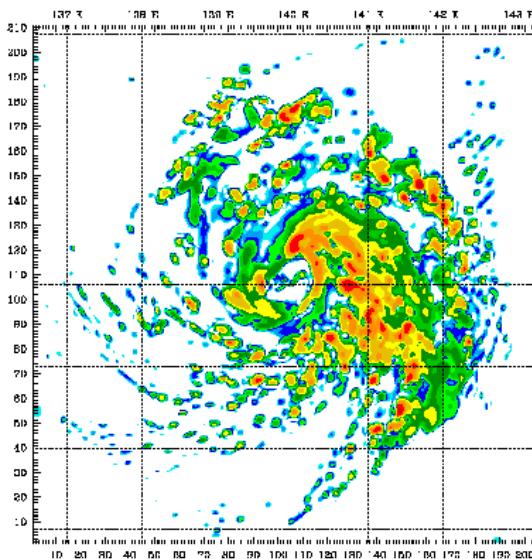
## **The Role of Data Analysis**

- 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



[https://en.wikipedia.org/wiki/Weather\\_Research\\_and\\_Forecasting\\_Model](https://en.wikipedia.org/wiki/Weather_Research_and_Forecasting_Model), <https://mlarchive.com/machine-learning/recommendation-systems-an-overview/>, <https://www.npr.org/2020/04/13/833073670/mapping-covid-19-millions-rely-on-online-tracker-of-cases-worldwide>

# Lesson 1: Introduction to Data Analysis

## What is data visualization?

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

# **Lesson 1: Introduction to Data Analysis**

## **Why data visualization is important?**

Data visualization helps to:

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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  
visualize them



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## Why visualization work

- Humans process visuals 60,000 times faster than text

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

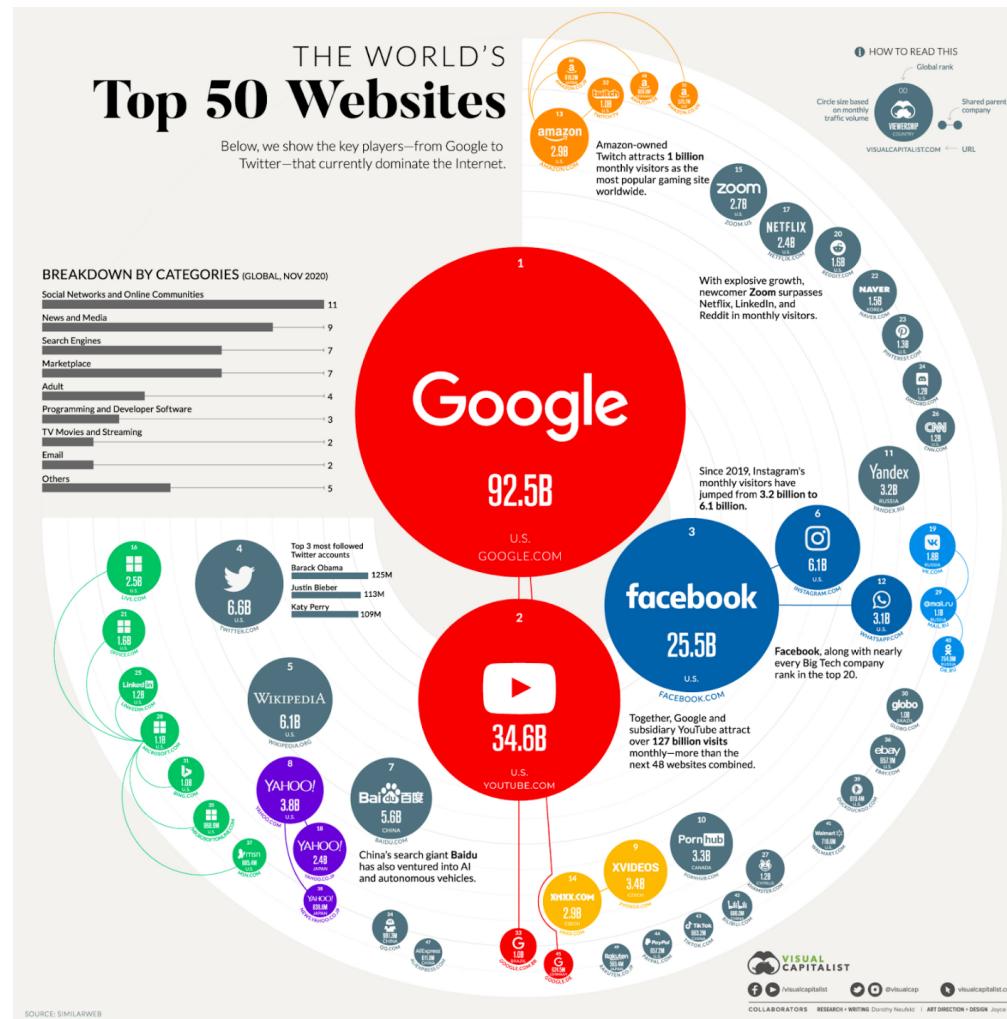
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## Why visualization work

- Humans process visuals 60,000 times faster than text
- We remember 80% of what we see but only 20% of what we read
- Patterns and outliers are easier to spot visually

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## Example



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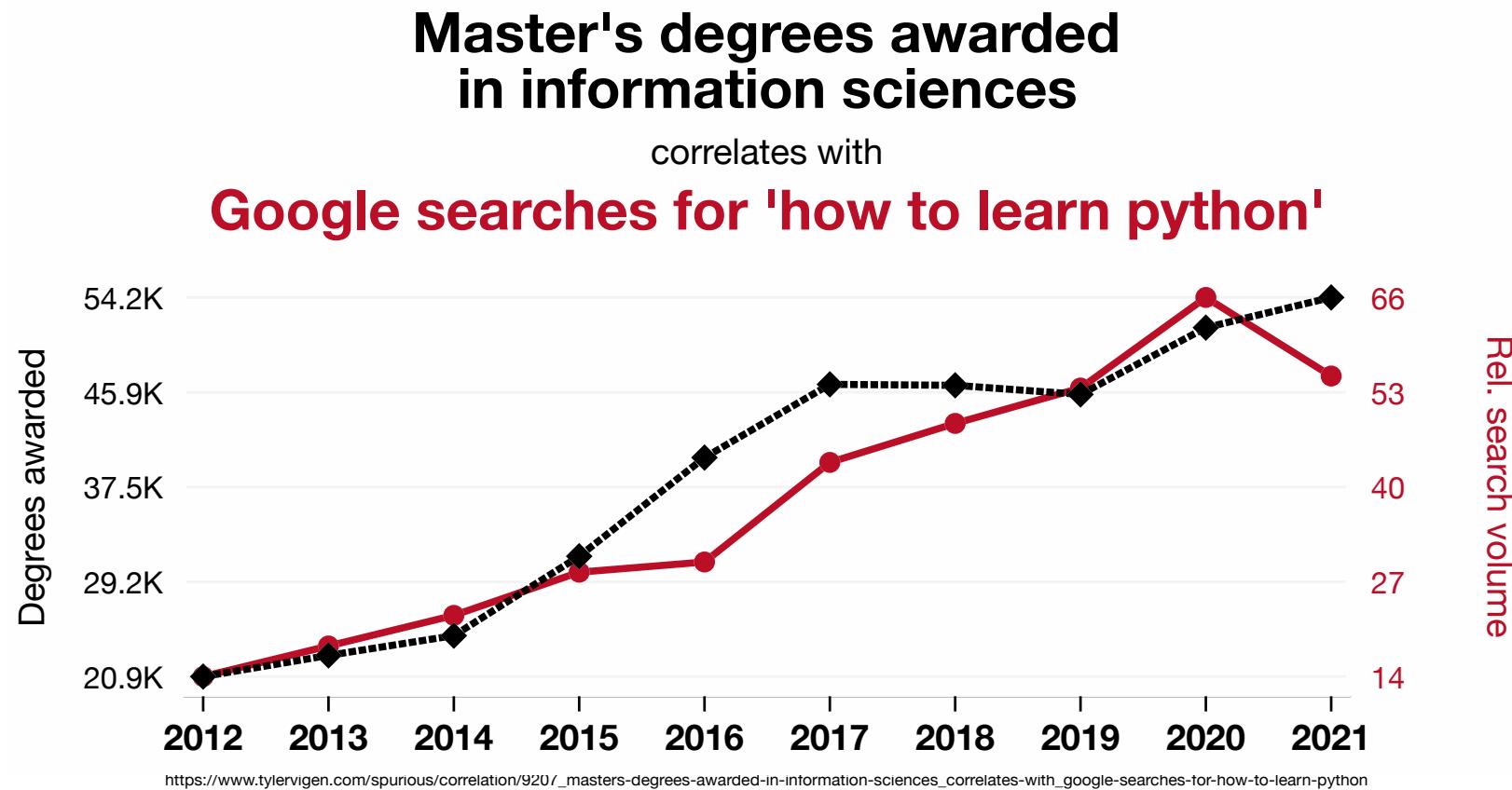
## Example



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

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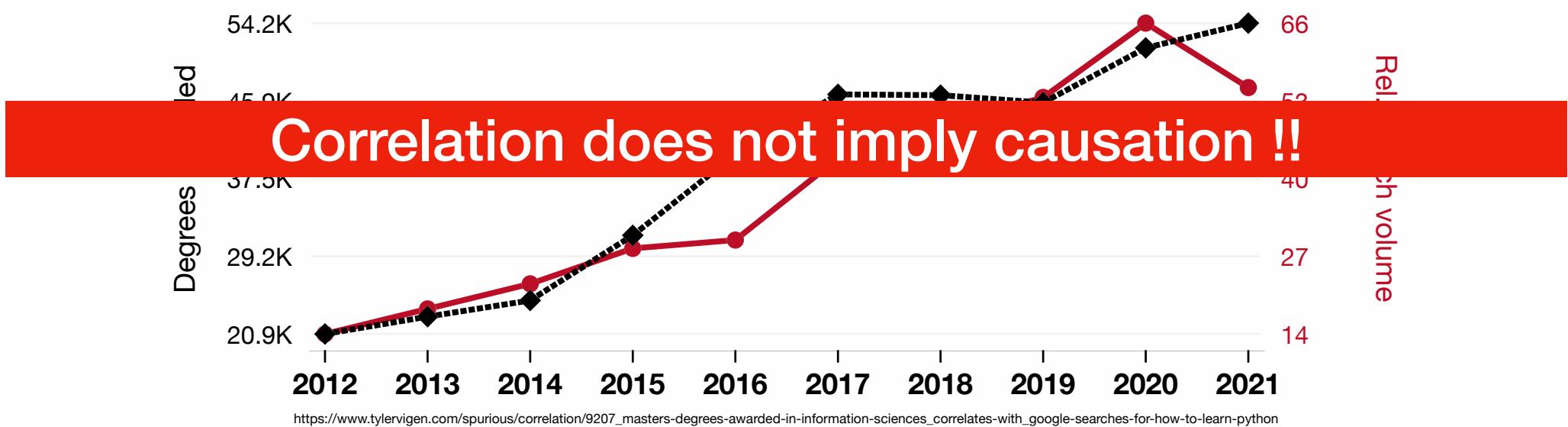
## Example



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## Example

Master's degrees awarded  
in information sciences  
correlates with  
**Google searches for 'how to learn python'**



# **Lesson 1: 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