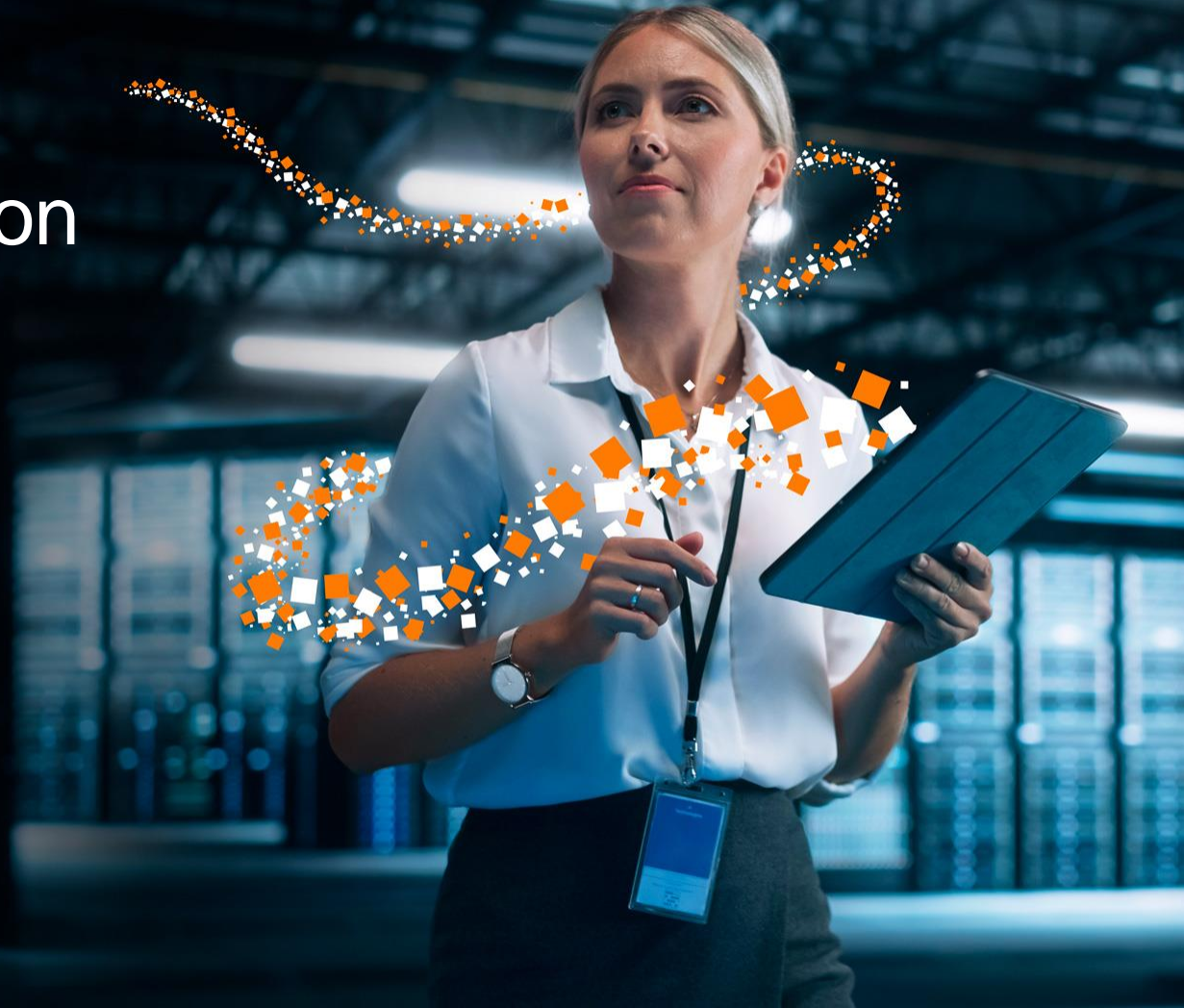# Digital Services

Data Interpretation

Attila Popping

24-11-2023

What is Data Interpretation?

Data Interpretation

Data Interpretation is the process of making sense of and assigning meaning to data.

It involves analyzing, summarizing, and drawing conclusions from data to facilitate decision-making.

Data interpretation is crucial in various fields, including science, business, healthcare, and social sciences.

Why am I giving this course

- Attila Popping

- Joined B&D / Orange Business in Feb 2022

- Faction Lead Data Intelligence (NL)

- Background in Academia (astrophysics)

- Astronomer turned Data Scientist

Is an astronomer a Data Scientist?

Most astronomers that change field become Data Scientist

WHY …

Astronomers are interested in physical problems, however the work requires a lot of data handling, programming, analysis and solving (unkown) problems
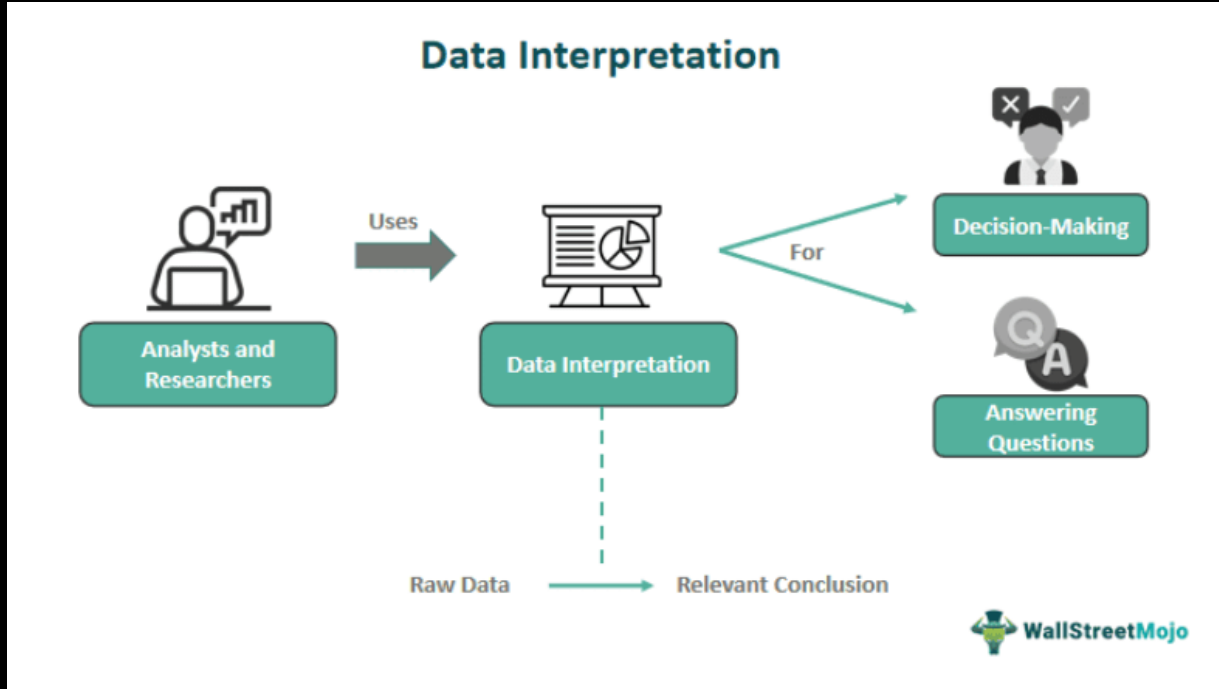
Working with Data

In any field of science where you use measurements, experiments or observations, you generate data.

Usually you won't get the answer to your problem directly from the data, it requires interpretation.

This process typically includes identifying patterns, trends, relationships, and insights within the data.

Data Interpretation

Importance of Data Interpretation

Informed Decision-Making: Interpreting data allows individuals and organizations to make informed decisions based on evidence rather than intuition or guesswork.

Problem-Solving: It helps in understanding and solving complex problems by extracting meaningful information from data.

Performance Evaluation: Businesses and organizations use data interpretation to evaluate performance, identify areas of improvement, and optimize processes.

Predictive Analysis: By interpreting historical data, trends and patterns can be identified, enabling predictions about future outcomes.

Research and Discovery: In scientific research, data interpretation is essential for drawing conclusions and making discoveries based on experimental results.

Statistics vs Data Interpretation

Statistics is a tool within the larger framework of data interpretation.

Statistics is a branch of mathematics that deals with the collection, analysis, interpretation, presentation, and organization of data.

Statistics is a key component of data interpretation, the latter also includes other aspects, such as visual representation of data (through charts, graphs, etc.), identifying patterns, and contextualizing data within a specific domain or problem.

Data interpretation is a broader concept that involves making sense of data by analyzing and extracting meaningful information from it.

It involves various challenges, including subjectivity, collecting high-quality data, expertise in the respective field, statistics, and interpretation techniques

Types of Data Interpretation: Quantitative and Qualitative

Quantitative Data Interpretation

Quantitative data analysis relies on numeric values and mathematical and statistical tools to uncover insights and make data-driven decisions, distinct from qualitative data analysis.

When numerical data is analysed, more often than not, it involves the use of statistical modeling such as **standard deviation, mean and median**
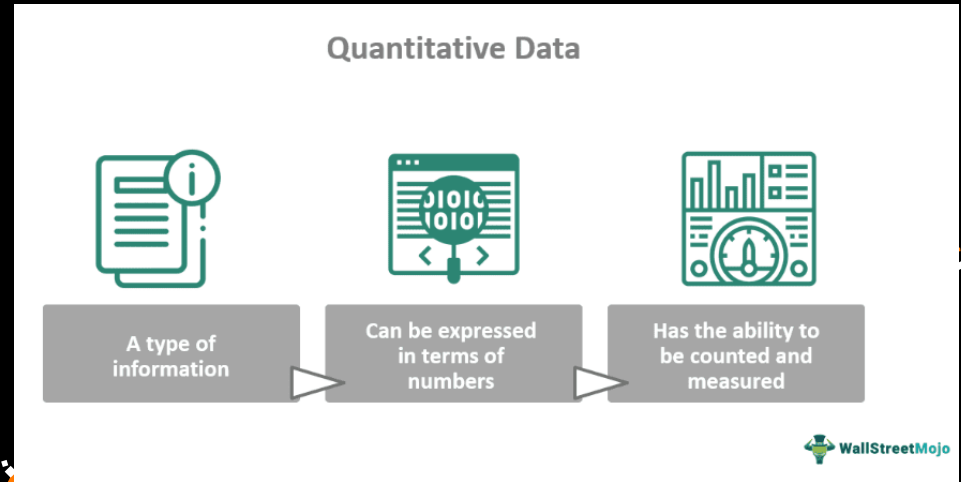
Quantitative Data Interpretation: Statistical Modeling

Mean: The **<u>mean</u>** represents the average value within a dataset, determined by summing all data points and dividing by the total number of values. It facilitates estimating population characteristics based on sampled data.

Standard Deviation: This metric measures the extent to which data points deviate from the mean, indicating the degree of consistency or variation within the dataset. A higher value implies more significant **<u>variability</u>**.

Frequency Distribution: It examines how data points are distributed and the frequency with which specific values occur. It assists in understanding the overlap or divergence of data points.

Quantitative Analysis:

Typically, quantitative data is measured by visually presenting **correlation tests between two or more variables of significance**. Different processes can be used together or separately, and comparisons can be made to ultimately arrive at a conclusion. Other signature interpretation processes of quantitative data are shown in next slides
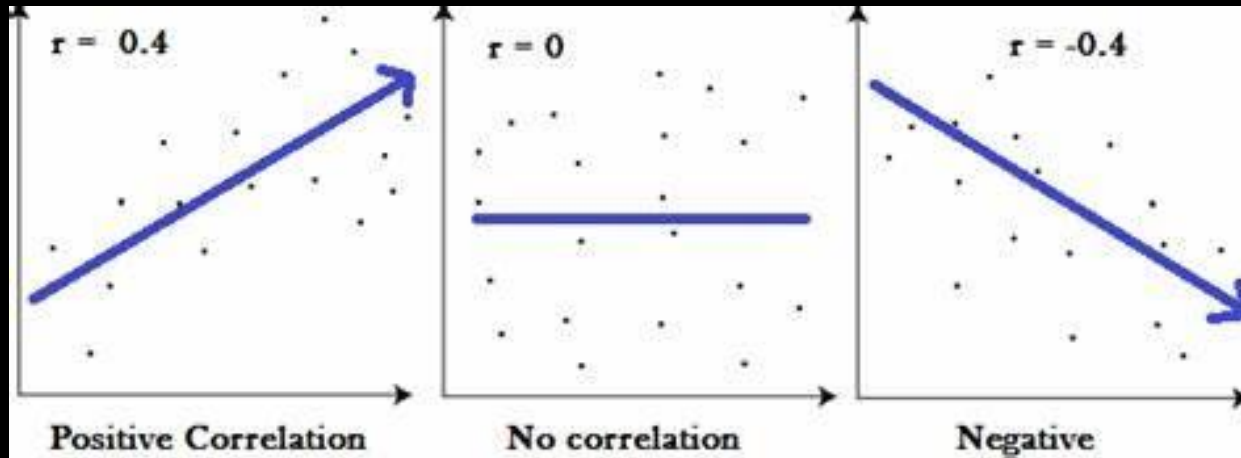
Regression Analysis

Regression analysis: Essentially, it uses historical data to understand the relationship between a dependent variable and one or more independent variables. Knowing which variables are related and how they developed in the past allows you to anticipate possible outcomes and make better decisions going forward. For example, if you want to predict your sales for next month you can use regression to understand what factors will affect them such as products on sale, and the launch of a new campaign, among many others.

actual and fitted plots
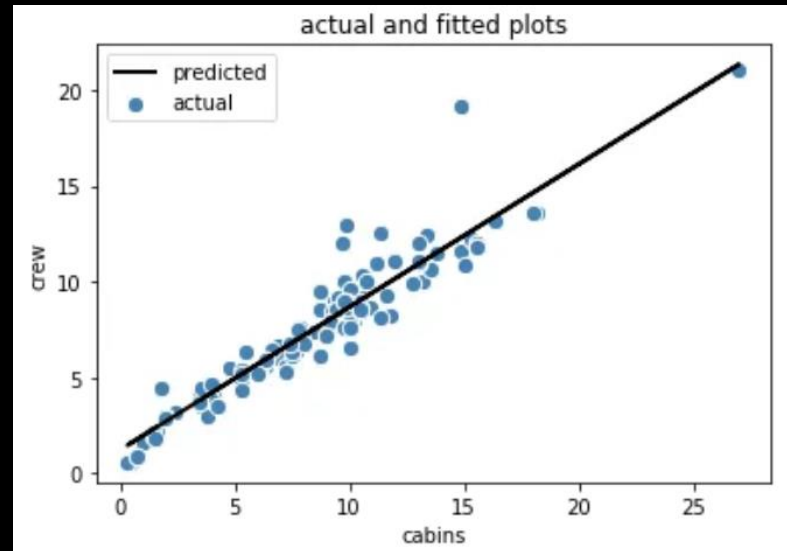
Quantitative Analysis: Cohort Analysis

Cohort analysis: This method identifies groups of users who share common characteristics during a particular time period. In a business scenario, cohort analysis is commonly used to understand customer behaviors. For example, a cohort could be all users who have signed up for a free trial on a given day. An analysis would be carried out to see how these users behave, what actions they carry out, and how their behavior differs from other user groups.

Subscription Retention

Active Subscriptions ▼   Relative | Absolute

Subscriptions per month

Month	Total	0	1	2	3	4	5	6	7	8	9	10	11
March 2017	45	96%	90%	82%	75%?	73%	65%	58%	52%	48%	35%	28%	9%
April 2017	57	98%	95%	85%	78%?	75%	45%	35%	25%	15%	13%	8%	
May 2017	49	96%	94%	92%	90%	55%	45%	35%	25%	15%	9%		
June 2017	50	96%	91%	81%	65%?	55%	45%	35%	15%	9%			
July 2017	47	98%	95%	82%	65%?	35%	25%	12%	7%				
August 2017	34	97%	85%	75%	65%?	55%	45%	35%					
September 2017	26	100%	85%	75%	65%?	55%	45%						
October 2017	24	100%	85%	75%	65%?	55%							
November 2017	27	100%	85%	75%	65%?								
December 2017	28	93%	85%	75%									
January 2018	35	97%	85%										
February 2018	25	96%											

Months since subscription creation

# Quantitative Analysis: Predictive Analysis

Predictive analysis: As its name suggests, the predictive method aims to predict future developments by analyzing historical and current data. Powered by technologies such as artificial intelligence and machine learning, predictive analytics practices enable businesses to identify patterns or potential issues and plan informed strategies in advance.
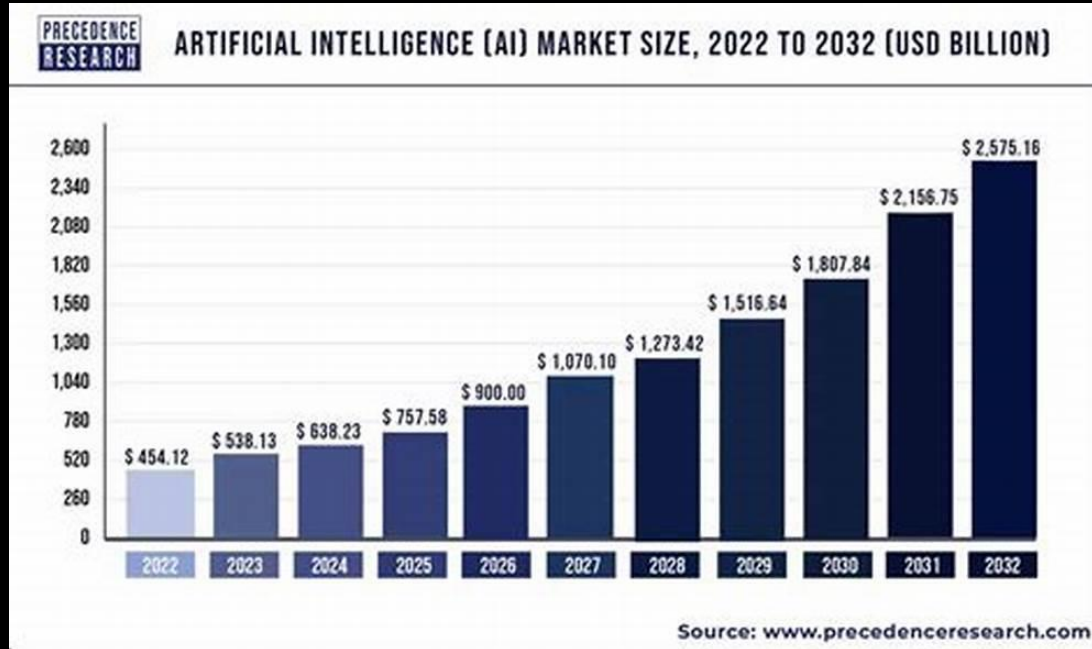
Prescriptive analysis

Prescriptive analysis: Also powered by predictions, the prescriptive method uses techniques such as graph analysis, complex event processing, and neural networks, among others, to try to unravel the effect that future decisions will have in order to adjust them before they are actually made. This helps businesses to develop responsive, practical business strategies.
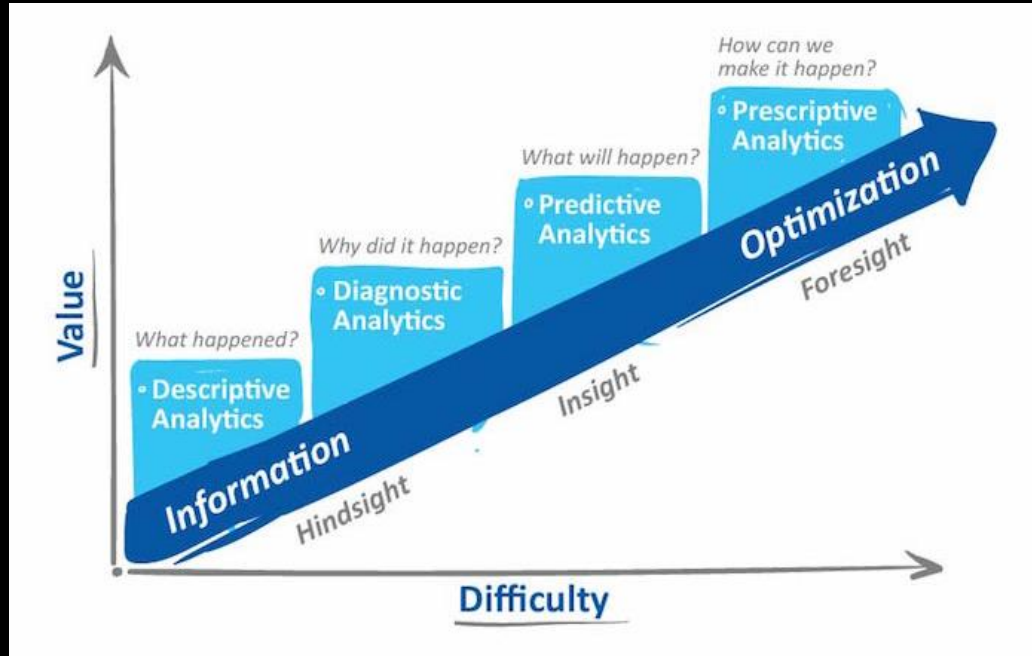
Conjoint analysis

Conjoint analysis: Typically applied to survey analysis, the conjoint approach is used to analyze how individuals value different attributes of a product or service. This helps researchers and businesses to define pricing, product features, packaging, and many other attributes. A common use is menu-based conjoint analysis in which individuals are given a "menu" of options from which they can build their ideal concept or product. Through this analysts can understand which attributes they would pick above others and drive conclusions.

Single choice conjoint example

Which of the following SUV packages you would be most likely to purchase?

|			
Size	Compact	Mid-size	Full-size
Fuel source	Hybrid	Hybrid	Fully electric
Platform	2WD	4WD	4WD
Towing package	Not included	Not included	Not included
Price	$45,000	$55,000	$65,000

Cluster analysis

Cluster analysis: Last but not least, cluster is a method used to group objects into categories. Since there is no target variable when using cluster analysis, it is a useful method to find hidden trends and patterns in the data. In a business context clustering is used for audience segmentation to create targeted experiences, and in market research, it is often used to identify age groups, geographical information, and earnings, among others.
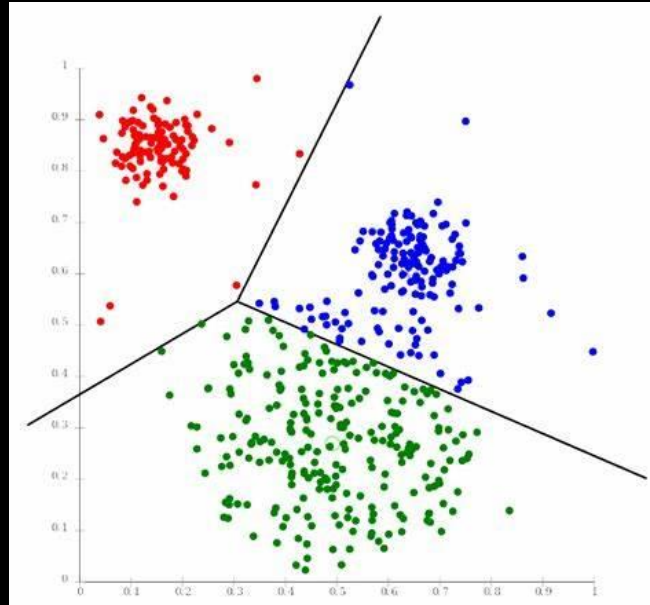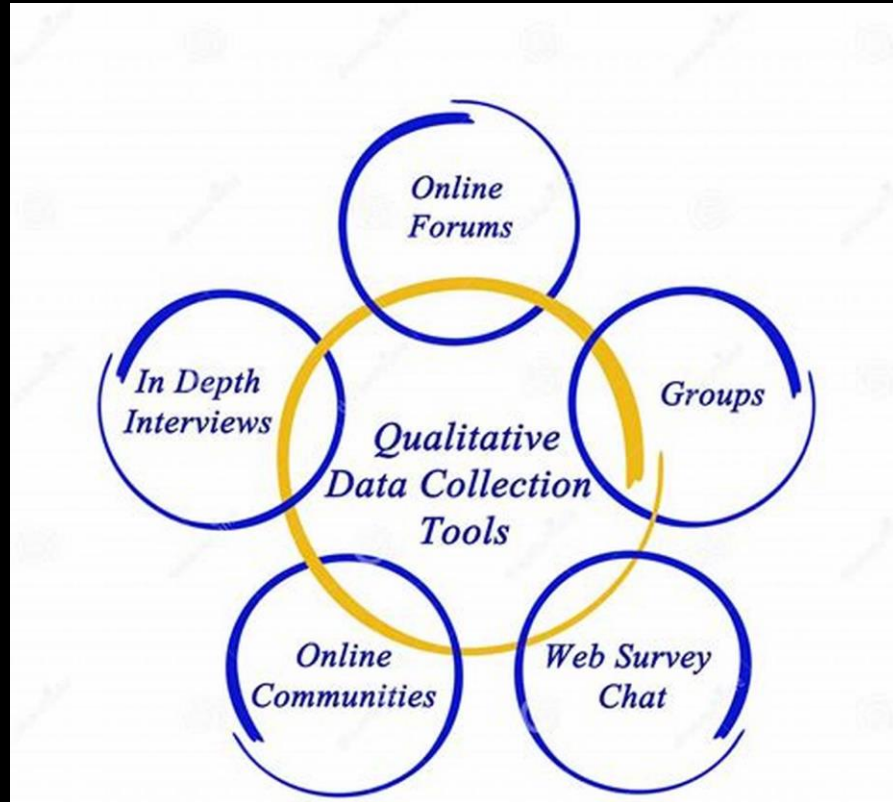
Qualitative Data Interpretation

Qualitative data interpretation refers to the process of analyzing non-numerical data, such as text, images, and audio. This data type is often used to gain a deeper understanding of customer attitudes and opinions and to identify patterns and trends.

Qualitative Data Interpretation

Digital Services
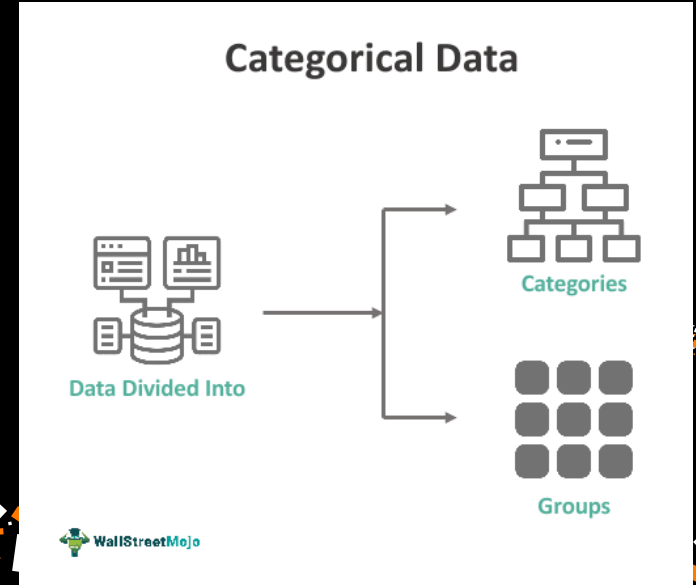
Data Interpretation Process

Data collection: The first step in data interpretation is to collect data from various sources, such as surveys, databases, and websites.

Data preparation: Once data is collected, it needs to be prepared for analysis. This may involve cleaning the data to remove errors, missing values, or outliers

Data analysis: The next step is to analyze the data using various techniques, such as statistical analysis, visualization, and modeling.

Data interpretation: Once the data has been analyzed, it needs to be interpreted to determine what the results mean. This may involve identifying key insights, drawing conclusions, and making recommendations.

Data communication: The final step in the data interpretation process is to communicate the results and insights to others. This may involve creating visualizations, reports, or presentations to share the results with stakeholders.

Data Interpretation Use Cases

Data interpretation can be applied in a variety of settings and industries. Here are a few examples of how data interpretation can be used:

Marketing: Marketers use data interpretation to analyze customer behavior, preferences, and trends to inform marketing strategies and campaigns.

Healthcare: Healthcare professionals use data interpretation to analyze patient data, including medical histories and test results, to diagnose and treat illnesses.

Financial Services: Financial services companies use data interpretation to analyze financial data, such as investment performance, to inform investment decisions and strategies.

Retail: Retail companies use data interpretation to analyze sales data, customer behavior, and market trends to inform merchandising and pricing strategies.

Manufacturing: Manufacturers use data interpretation to analyze production data, such as machine performance and inventory levels, to inform production and inventory management decisions.

These are just a few examples of how data interpretation can be applied in various settings. The possibilities are endless, and data interpretation can provide valuable insights in any industry where data is collected and analyzed.
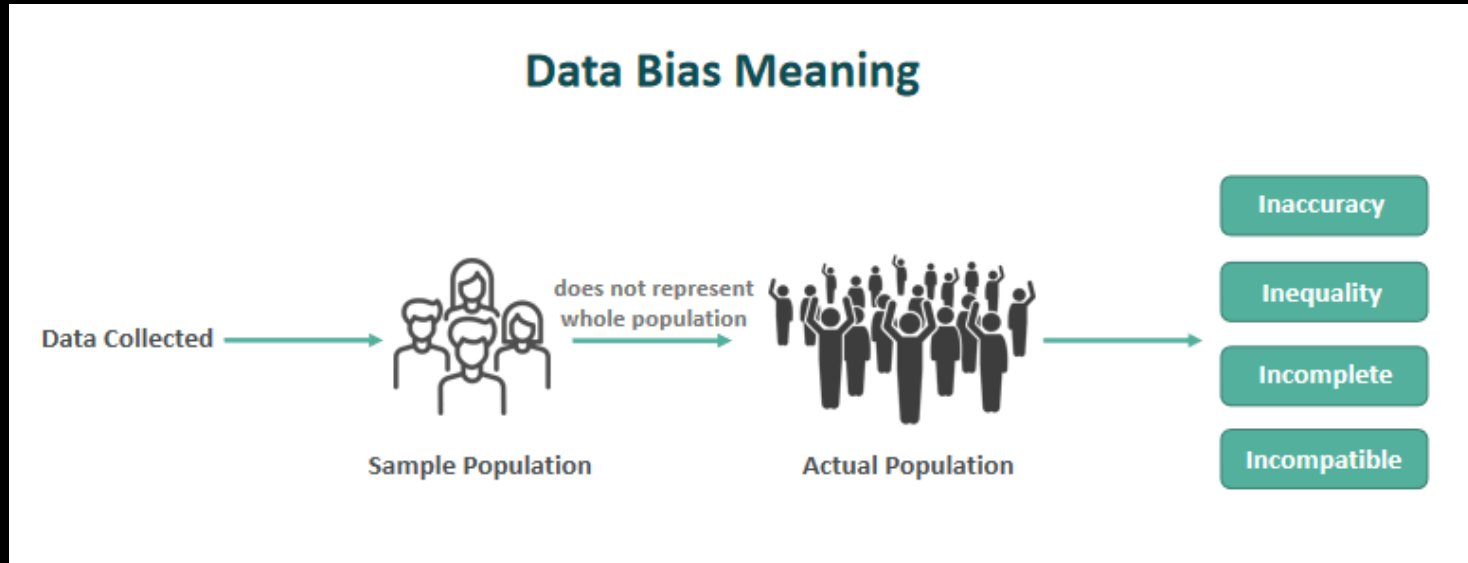
Data Interpretation Challenges


Big Data
Comes with
Big Challenges

Overcoming Bias in Data

Data interpretation can often be **biased** based on the data sources and the people who interpret it. It is important to eliminate these biases to get a clear and accurate understanding of the data. This can be achieved by diversifying the data sources, involving multiple stakeholders in the data interpretation process, and regularly reviewing the data interpretation methodology.

Dealing with missing data

Missing data can often result in inaccuracies in the data interpretation process. To overcome this challenge, data scientists can use interpolation methods to fill in missing data or use statistical models that can account for missing data.
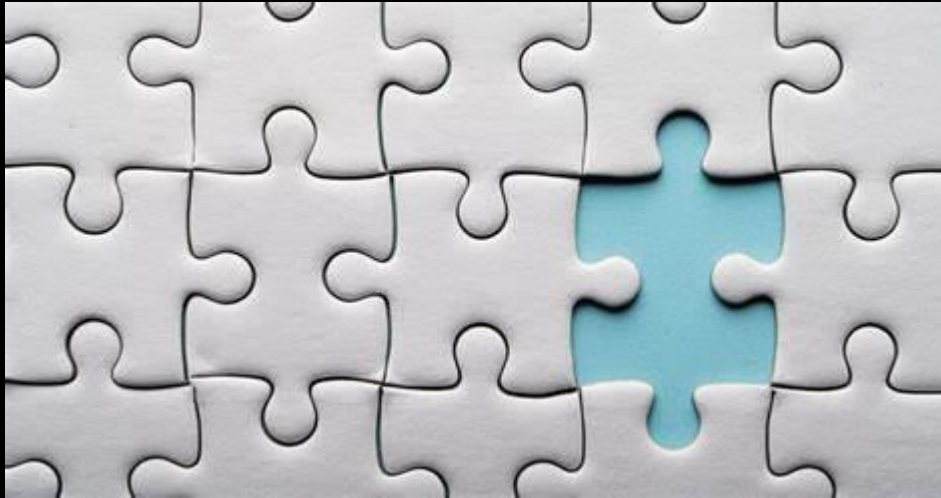
Addressing Data Privacy Concerns

Data privacy is a crucial concern in today's data-driven world. To address this, organizations should ensure that their data interpretation processes align with data privacy regulations and that the data being analyzed is adequately secured.

Data Interpretation Best Practices

Maintaining Data Quality

Data quality is critical to the accuracy of data interpretation. To maintain data quality, organizations should regularly review and validate their data, eliminate data biases, and address missing data.

Choosing the right tools

Top 5 Tools Required To Become Data Analyst in 2020

Choosing the right data interpretation tools is crucial to the success of the data interpretation process. Organizations should consider factors such as cost, compatibility with existing tools and processes, and the complexity of the data to be analyzed when choosing the right data interpretation tool.

Use appropriate statistical techniques: The choice of statistical methods used for data interpretation should be suitable for the type of data being analyzed. For example, regression analysis is often used for analyzing trends in large data sets, while chi-square tests are used for categorical data.

Effective Communication of Results

Data interpretation results need to be communicated effectively to stakeholders in a way they can understand.

Graph and visualize data: Graphical representations of data can help to quickly identify patterns and trends. Visualization tools like histograms, scatter plots, and bar graphs can make the data more understandable and easier to interpret.

Ongoing Learning and Development

The world of data interpretation is constantly evolving, and organizations must stay up to date with the latest developments and best practices. Ongoing learning and development initiatives, such as attending workshops and conferences, can help organizations stay ahead of the curve.

Thanks

Attila Popping

24 November 2023

Business