DATA ANALYTICS AND ITS METHODS OF DEVELOPMENT

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Abstract
The article discusses characteristics of data analysis and what role does different types of data analysis play in collecting informations? Data analysis is a technique used by academics to turn data into a narrative and then interpret it to draw conclusions. Different techniques such as modeling to reach trends, relationships, and therefore conclusions to address the decision-making process are employed in this process.

Keywords: Data analysis, descriptive, exploratory, inferential, predictive, explanatory or causal, mechanistic, data analysis process, data collection, data decision, data cleaning, data analysis, data interpretation, data visualization.

Introduction

The process of methodically using statistical and/or logical tools to explain and depict, summarize and analyze, and assess data is known as data analysis. Data analytics includes the procedures, equipment, and methods for gathering, organizing, and storing data as well as conducting data analysis and management. Applying technologies and statistical analysis to data in order to identify patterns and address issues is the main goal of data analytics. In the corporate world, data analytics has grown in significance as a tool for decision-making and process analysis, process shaping, and enhanced company outcomes.

Data analytics performs analysis on data to explain, forecast, and enhance performance. It draws from a variety of fields, including computer programming, mathematics, and statistics. Data analytics teams use a variety of data management approaches, such as data mining, data cleansing, data transformation, data modeling, and more, to enable effective analysis.

Data transformation, data coding, data entry, and missing values are the processes in the data preparation process. Here is a brief description of these steps:

Coding of Data: During the data coding process, data is converted to numerical values. It makes use of a codebook, which is a document that contains various details like a description of the variables, their measures, and their format, as well as the response and, at the end, their coding. Response in this process refers to figuring out the several kinds of scales, such as whether to choose a nominal, ratio, ordinal, or interval scale; or a five-, seven-, or other-point scale.

Data entry: In this process, the coded data from the previous step is entered into text files or spreadsheets. It also can be directly added to the statistical program.

Missing data: As some respondents may not answer all the questions because of different reasons, a method should be used to face these missed values. For example, you need to add the value -1 or 999 in some programs, some of them automatically address the missed values, and others use a listwise deletion technique facing the missing values which drop all the answers even with a single missed value.

Data transformation: Transforming data is needed before interpreting them in some cases. Reverse coded items can be considered as an example that should be transformed before comparing or combining with not reversed ones. This concept is used where the meaning of the item is opposite to their underlying construct (Bhattacherjee, 2012).

Actually, there are some types of data analysis and can be categorized into the following six main methods:

1. Descriptive
2. Exploratory
3. Inferential
4. Predictive
5. Explanatory or Causal
6. Mechanistic

- Descriptive statistics summarizes or describes the characteristics of a data set. Descriptive statistics consists of three basic categories of measures: measures of central tendency, measures of variability (or spread), and frequency distribution. Measures of central tendency describe the center of the data set (mean, median, mode). Measures of variability describe the dispersion of the data set (variance, standard deviation). Measures of frequency distribution describe the occurrence of data within the data set (count). (Investopedia)

- Exploratory Data Analysis (EDA) is an analysis approach that identifies general patterns in the data. These patterns include outliers and features of the data that might be unexpected. EDA is an important first step in any data analysis.

- Inferential analyzing method uses a small sample to conclude a bigger population. It means, data from a subject sample of the world is used to test a general theory about its nature. The types of data sets that can be used in this method are observational, retrospective data set, and crosssectional time study (Bhattacherjee, 2012).

- Predictive analysis utilizes historical and current facts to reach future predictions. It can also use data from a subject to predict the values of another subject. There are different predictive models; however, a simple model with more data can work better in general. Therefore, the prediction data set and also the determination of the measuring variables are important aspects to consider (MacGregor, 2013).

- Explanatory: This analyzing method is used to determine the consequences happening to one variable when changing another one using randomized trial data sets (Bhattacherjee, 2012).

Mechanistic: This method needs the most effort to determine the exact changes in the variables which can lead to changes in other ones using randomized trial data sets. It can be also concluded that mechanistic analysis is hardly inferable. Thus, when you need high precision in your result and you should minimize your errors, for example in the engineering and physical sciences, it can be a choice.

The actual analysis is just one step in a much bigger process of using data to move your business forward. Here you can look at all the steps you need to take to make sure you're making informed decisions.
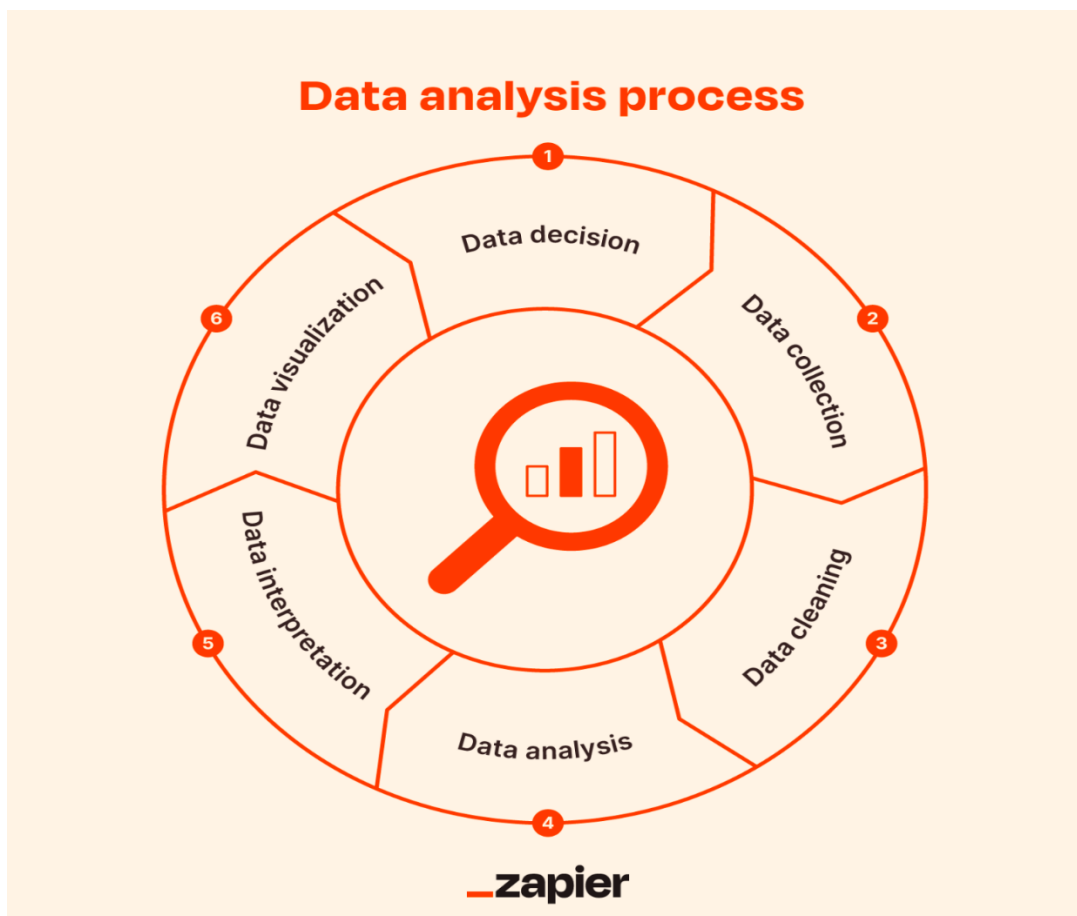
So from the picture we can see that data analysis process starts from data decision and ends with data visualization. Data analysis is a critical process that businesses and organizations use to extract valuable insights from data to make informed decisions, optimize strategies, and drive growth. The data analysis process typically involves several key steps: data decision, data collection, data cleaning, data analysis, data interpretation, and data visualization.

Data decision is the first step in the data analysis process. It involves defining the problem or question that needs to be addressed through data analysis. This step is crucial as it sets the foundation for the entire analysis process and ensures that the analysis is focused and aligned with the business objectives.

Data collection is the next step in the data analysis process. It involves gathering relevant data from various sources such as databases, surveys, sensors, or other data repositories. The quality and quantity of data collected play a significant role in the success of the analysis. It is essential to ensure that the data collected is accurate, complete, and representative of the problem being analyzed.

Data cleaning is a critical step in the data analysis process. It involves processing and preparing the raw data to remove errors, inconsistencies, and missing values that could affect the accuracy of the analysis. Data cleaning helps ensure that the dataset is reliable and ready for analysis.

Data analysis is the heart of the data analysis process. It involves applying statistical and computational techniques to extract meaningful patterns, trends, and relationships within the

dataset. Techniques such as regression analysis, hypothesis testing, and clustering can be used to uncover insights and make informed decisions based on the data.

Data interpretation is another crucial step in the data analysis process. It involves making sense of the results obtained from the analysis and deriving actionable insights. Data interpretation helps businesses understand the implications of the analysis findings and how they can be applied to improve decision-making and drive growth.

Data visualization is the final step in the data analysis process. It involves presenting the analysis results in a visual format such as charts, graphs, or dashboards. Data visualization helps communicate complex information in a clear and concise manner, making it easier for stakeholders to understand and act upon the insights derived from the analysis.

Conclusion

This article provided a summary of the most common data analysis techniques. It first describes data preparation methods which are an essential process in analyzing data. Then, common methods are reviewed, and the tools for the most important techniques are discussed. Data analysis is a powerful tool that can help businesses make informed decisions and drive growth. By analyzing data effectively, organizations can uncover valuable insights that can lead to improved performance and increased profitability. As technology continues to advance, the importance of data analysis will only continue to grow, making it essential for businesses to invest in data analytics capabilities. The data analysis process is a systematic approach that businesses and organizations use to extract valuable insights from data to drive growth and make informed decisions. By following a structured process that includes data decision, collection, cleaning, analysis, interpretation, and visualization, organizations can unlock hidden opportunities, optimize strategies, and achieve sustainable growth in today's data-driven world.

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