Assignment - Data Analysis

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The process of data analysis uses analytical and logical reasoning to gain information from the data. The main purpose of data analysis is to find meaning in data so that the derived knowledge can be used to make informed decisions. Essentially, data analysis takes raw untapped data and converts it into viable useful information also known as business intelligence. Data analytics is a broad term that encompasses many diverse types of data analysis. Many types of information can be subjected to data analytics techniques to get insight that can be used to act, gain insight, and improve things.

**Type of Information Obtain with Data Analysis:**

Data analytics is used in business to help organizations make better business decisions that result in higher margins, smarter business choices, and the bottom line. Whether it is market research, product research, positioning, customer reviews, sentiment analysis, semantic analysis, customer retention, or any other issue for which data exists, analyzing data will provide insights that organizations need to make the right choices.

Data analytics is important for businesses today, data-driven choices are the most adequate way to be truly confident in business decisions. Successful business choices are data-based and data-driven. Data analytics is vitally important because it helps businesses optimize their overall performances *(Integrity, 2020).*

Data analytics reveals business intelligence which at its base level is knowledge. Data analytics Knowledge is facts, information, and skills acquired through the data analysis. An example of data is like the statement “Columbus discovered America in 1492”. These statements are already known to us as common knowledge, but do we have any concrete use for them at the moment. Knowledge, consists of data converted into information that would produce statements like, “More customers shop on Saturday” or “Every day at 7:30 AM a flight with destination Tampa Bay departs" This is descriptive information that answers a question and gives us insight into the action we need to take. In this instance, we gain knowledge of customers spending more money on a given day or what time a flight is leaving so we do not miss it. Knowledge is the information gained that is provided by data analysis that allows us to take certain actions.

Data analysis is implemented through a process of cleaning, transforming, and modeling data to discover useful information for business decision-making. These are the required phases facilitated in the Data Analysis Process are implemented to effectively convert raw data into useful business information *(Pine, 2020).*

**Data Analysis Process:**

Data analysis is implemented through a process of cleaning, transforming, and modeling data to discover useful information for business decision-making. These are the required phases facilitated in the process of data analysis effectively converting raw data into useful business information .

* **Data Requirement Gathering** - deciding which type of data analysis is needed outlining the purpose and goals of the analysis. Determining which indicators need to be measured. Identifying pertinent business questions that need answered.
* **Data collection** - collecting the data based on the requirements.
* **Data analysis** - requires collecting the data to meet the requirements, cleaning the data and transforming or processing the data using data analytics tools to extract, understand, calculate, and derive conclusions based on the set of requirements. Also, set KPI’s (Key performance Indicators) to track and measure data performance.
* **Data interpretation** - interpreting the results in determining how to express or communicate the data analysis. This is where data is interpreted to answer the business questions and reveal business information (knowledge).
* **Data visualization** - using the interpretation of the data to form charts graphs and graphical depictions that are easy to understand and process. Data visualization are used to discover unknown facts and trends by observing relationships and comparing data sets define meaningful information in business intelligence.

**Data Types:**

At its base level data analysis is conducted analyzing one of two types of data and using the in combination to answer the business questions resulting in business intelligence.

* **Qualitative** — data can be categorized based on traits and characteristics such as categorical and textual data.
* **Quantitative** — data can be counted, measured, and expressed using numbers to provide calculations.

**Types of information:**

Implementing data analysis through these data types we can derive business intelligence. The types of information that we can derive from data analysis can be broken down into 2 main categories *(Vidhya, 2020).*

* **Hypothesis Generation** — An educated guess of various factors impacting a business problem. While deeply analyzing data, combining skillsets and knowledge, to generate hypotheses to explain why the data behaves the way it does.
* **Hypothesis Confirmation** — Using a precise quantitative and qualitative mathematical model to generate falsifiable predictions with statistical confidence, to confirm the hypotheses.

**Types of Data Analysis used to Find Information:**

To understand what types of information can be obtained with data analytics. An understanding of the several different types of data analysis is needed. Data analysis are based on mathematic and statistical significance while facilitating support capabilities that can be segmented into multiple categories as follows. Data Analysis includes collection, Analysis, interpretation, presentation, and modeling of data through these methods *(Guru99, 2020)*.

* **Descriptive Analysis** —The goal of describing and summarizing data. Analyses made from complete data Descriptive Analysis use a sample of summarized quantitative numerical data. It shows mean and standard deviations for continuous numerical and shows the percentage and frequency analysis for categorical data.
* **Inferential Analysis** — The goal of using a small sample of data to infer about a larger population. Analyses made from a sample (P-hat) from complete data. This type of Analysis, that discovers conclusions from the same data by selecting different samples using statistical significance and goodness of fit.
* **Exploratory / Diagnostic Analysis** —The goal is to find out why something happened. This analysis is used to examine or explore data and find relationships between variables that were previously unknown This Analysis shows "Why did it happen?" by finding the cause from the insight found in Statistical Analysis. This Analysis is useful to identify behavior patterns of data.
* **Predictive Analysis** —The goal is to use historical or current data to find patterns to make predictions about the future This analysis shows or predicts what is likely to happen based on the accuracy of input variables, types of models, and causal relationships in data.
* **Prescriptive Analysis** — The goal is to determine what action to take about some event or issue. This analysis uses the insight from all previous analyses to determine which action to take in a current problem or decision. Most data-driven companies are utilizing Prescriptive Analysis to improve data performance. This analysis uses optimization algorithms to attain possible outcomes on what has to be done to attain better output in the future.
* **Causal Analysis** — The goal Is to find relationships between variables focused on finding the cause and effect correlations of data and inferred analysis data. Also, it is the field of experimental design and statistics pertaining to establishing cause and effect (Science, 2020).
* **Mechanistic Analysis** — the goal is to understand the exact changes in variables that lead to changes in other variables for individual objects. Mechanistic models are based on the fundamental laws of natural sciences. Both Physical and biochemical principles constitute the complex models and equations used to perform this analysis. assumes that a complex system can be understood by examining the workings of its individual parts and the manner in which they are coupled *(Science, 2020).*

Data analysis models and inference can be implemented to providing information. Information is objective facts provided or learned about something or someone. Decision capabilities are learned through these inferences to build the derivate models needed to provide these types of information. This information is effectively used to answer business or scientific questions about someone or something concerning the hypothesis and requirements being asked.

The information(facts about something or someone) derived can be simply associated with these types of questions per the analyses model.

* **Planning analytics**: What is our plan?
* **Descriptive analytics**: What happened?
* **Diagnostic analytics**: Why did it happen?
* **Predictive analytics**: What will happen next?
* **Prescriptive analytics**: What should be done about it?
* **Causal analytics**: What caused it and what effect does it have?
* **Mechanistic Analysis**: What change is in a complex system of multiple analysis?

It should be recognized that Data Analytics is the science of analyzing raw data to make conclusions about that information. The techniques and processes of data analytics have been automated into mechanical processes and algorithms that work over raw data for human consumption. Types of information obtained from data analytics are used to help answer business questions, provide business intelligence, and optimize business performance.

# References

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