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Next

Data analysis methods sample

In our data-rich age, understanding how to analyze and extract true meaning from our business's digital insights is one of the primary drivers of success. Despite the colossal volume of data we create every day, a mere 0.5% is actually analyzed and used for data discovery, improvement, and intelligence. While that may not seem like much, considering the amount of digital information we have at our fingertips, half a percent still accounts for a vast amount of data. With so much data and so little time, knowing how to collect, curate, organize, and make sense of all of this potentially business-boosting information can be a minefield – but online data analysis is the solution. In science, data analysis uses a more complex approach with advanced techniques to explore and experiment with data. On the other hand, in a business context, data is used to make data-driven decisions that will enable the company to improve its overall performance. In this post, we will cover the analysis of data from a business point of view while still going through the scientific and statistical foundations that are fundamental to understanding the basics of data analysis. To put all of that into perspective, we will answer a host of important analytical questions, explore analytical methods and techniques, while demonstrating how to perform analysis in the real world with a 17-step blueprint for success. What Is Data Analysis? Data analysis is the process of collecting, modeling, and analyzing data to extract insights that support decision-making. There are several methods and techniques to perform analysis depending on the industry and the aim of the investigation. All these various methods are largely based on two core areas: quantitative and qualitative research. To explain the key differences between qualitative and quantitative research, here's a video for your viewing pleasure: Gaining a better understanding of different techniques and methods in quantitative research as well as qualitative insights will give you analyzing efforts a more clearly defined direction, so it's worth taking the time to allow this particular knowledge to sink in. Additionally, you will be able to create a comprehensive analytical report that will skyrocket your analysis. Why Is Data Analysis Important? Before we go into detail about the categories of analysis along with its methods and techniques, you must understand the potential that analyzing data can bring to your organization. Informed decision-making: From a management perspective, you can benefit from analyzing your data as it helps you make decisions based on facts and not simple intuition. For instance, you can understand where to invest your capital, detect growth opportunities, predict your incomes, or tackle uncommon situations before they become problems. Like this, you can extract relevant insights from areas in your organization, and with the help of dashboard software, present the information in a professional and interactive way to different stakeholders.Reduce costs: Another key benefit is to reduce costs. With the help of advanced technologies such as predictive analytics, businesses can spot improvement opportunities, trends, and patterns in their data and plan their strategies accordingly. In time, this will help you save money and resources on implementing the wrong strategies. And not just that, by predicting different scenarios such as sales and demand you can also anticipate production and supply. Target customers better: Customers are arguably the most crucial element in any business. By using analytics to get a 360° vision of all aspects related to your customers, you can understand which channels they use to communicate with you, their demographics, interests, habits, purchasing behaviors, and more. In the long run, it will drive success to your marketing strategies, allow you to identify new potential customers, and avoid wasting resources on targeting the wrong people or sending the wrong message. You can also track customer satisfaction by analyzing your client's reviews or your customer service department's performance. What Is The Data Analysis Process? When we talk about analyzing data there is an order to follow in order to extract the needed conclusions. The analysis process consists of 5 key stages. We will cover each of them more in detail later in the post, but to start providing the needed context to understand what is coming next, here is a rundown of the 5 essential steps of data analysis. Identify: Before you get your hands dirty with data, you first need to identify why do you need it in the first place. The identification is the stage in which you establish the questions you will need to answer. For example, what is the customer's perception of our brand? Or what type of packaging is more engaging to our potential customers? Once the questions are outlined you are ready for the next step. Collect: As its name suggests, this is the stage where you start collecting the needed data. Here, you define which sources of information you will use and how you will use them. The collection of data can come in different forms such as internal or external sources, surveys, interviews, questionnaires, focus groups, among others. An important note here is that the way you collect the information will be different in a quantitative and qualitative scenario. Clean: Once you have the necessary data it is time to clean it and leave it ready for analysis. Not all the data you collect will be useful. When collecting big amounts of information in different formats it is very likely that you will find yourself with duplicate or badly formatted data. To avoid this, before you start working with your data you need to make sure to erase any white spaces, duplicate records, or formatting errors. This way you avoid hurting your analysis with incorrect data. Analyze: With the help of various techniques such as statistical analysis, regressions, neural networks, text analysis, and more, you can start analyzing and manipulating your data to extract relevant conclusions. At this stage, you find trends, correlations, variations, and patterns that can help you answer the questions you first thought of in the identify stage. Various technologies in the market assists researchers and average business users with the management of their data. Some of them include business intelligence and visualization software, predictive analytics, data mining, among others. Interpret: Last but not least you have one of the most important steps: it is time to interpret your results. This stage is where the researcher comes up with courses of action based on the findings. For example, here you would understand if your clients prefer packaging that is red or green, plastic or paper, etc. Additionally, at this stage, you can also find some limitations and work on them. Now that you have a basic understanding of these steps, let's look at the top 10 essential methods. 10 Essential Types Of Data Analysis Methods Before diving into the seven essential types of methods, it is important that we go over really fast through the main analysis categories. Starting with the category of descriptive up to prescriptive analysis, the complexity and effort of data evaluation increases, but also the added value for the company. a) Descriptive analysis - What happened. The descriptive analysis method is the starting point to any analytic reflection, and it aims to answer the question of what happened? It does this by ordering, manipulating, and interpreting raw data from various sources to turn it into valuable insights for your organization. Performing descriptive analysis is essential, as it allows us to present our insights in a clear and concise way. Although it is important to mention that this analysis does not allow you to predict future outcomes or tell you the answer to what you want to know, it will leave you data organized and ready for further investigations. b) Exploratory analysis - How to explore data relationships. As its name suggests, the main aim of the exploratory analysis is to explore. Prior to it, there was still no notion of the relationship between the data and the variables. Once the data is investigated, the exploratory analysis enables you to find connections and generate hypotheses and solutions for specific problems. A typical area of application for it is data mining. c) Diagnostic analysis - Why it happened. Diagnostic data analytics empowers analysts and executives by helping them gain a firm contextual understanding of why something happened. If you know why something happened as well as how it happened, you will be able to pinpoint the exact ways of tackling the issue or challenge. Designed to provide direct and actionable answers to specific questions, this is one of the world's most important methods in research, among its other key organizational functions such as retail analytics, etc. f) Predictive analysis - What will happen. The predictive method allows you to look into the future to answer the question: what will happen? In order to do this, it uses the results of the previously mentioned descriptive, exploratory, and diagnostic analysis, in addition to machine learning (ML) and artificial intelligence (AI). Like this, you can uncover future trends, potential problems or inefficiencies, connections, and casualties in your data. With predictive analysis, you can unfold and develop initiatives that will not only enhance your various operational processes but also help you gain an all-important edge on the competition. If you understand why a trend, pattern, or event happened through data, you will be able to develop an informed projection of how things may unfold in particular areas of the business. e) Prescriptive analysis - How will it happen. Another of the most effective types of analysis methods in research. Prescriptive data techniques cross over from predictive analysis in the way that it revolves around using patterns or trends to develop responsive, practical business strategies. By drilling down into prescriptive analysis, you will play an active role in the data consumption process by taking well-arranged sets of visual data and using it as a powerful fix to emerging variability in a number of key areas, including marketing, sales, customer experience, HR fulfillment, finance, logistics analytics, and others. Without further ado, here are the 10 essential types of data analysis methods among which some use cases in the business world. 1. Cluster analysis The action of grouping a set of data elements in a way that said elements are more similar (in a particular sense) to each other than to those in other groups – hence the term "cluster". Since there is no target variable when clustering, the method is often used to find hidden patterns in the data. The approach is also used to provide additional context to a trend or dataset. Let's look at it from a business perspective. In a perfect world, marketers would be able to analyze each customer separately and give them the best-personalized service, but let's face it, with a large customer base, it is timely impossible to do that. That's where clustering comes in. By grouping customers into clusters based on demographics, purchasing behaviors, monetary value, or any other factor that might be relevant for your company, you will be able to immediately optimize your efforts and give your customers the best experience based on their needs. 2. Cohort analysis This type of data analysis method uses historical data to examine and compare a determined segment of users' behavior, which can then be grouped with others with similar characteristics. By using this methodology, it's possible to gain a wealth of insight into consumer needs or a firm understanding of a broader target group. Cohort analysis can be really useful to perform analysis in marketing as it will allow you to understand the impact of your campaigns on specific groups of customers. To exemplify, imagine you send an email campaign encouraging customers to sign up to your site. For this, you create two versions of the campaign with different designs, CTAs, and ad content. Later on, you can use cohort analysis to track the performance of the campaign for a longer period of time and understand which type of content is driving your customers to sign up, repurchase, or engage in other ways. A useful tool to start performing cohort analysis method is Google Analytics. You can learn more about the benefits and limitations of using cohorts in GA in this useful guide. In the end, you will be able to identify the most effective content and use it to drive more conversions. 3. Regression analysis Regression analysis is a statistical method used to determine the relationship between one or more independent variables (multiple regression) change or stay the same. By understanding each variable's relationship and how they developed in the past, you can anticipate possible outcomes and make better decisions in the future. Let's bring it down with an example. Imagine you did a regression analysis of your sales in 2019 and discovered that variables like product quality, store design, customer service, marketing campaigns, and sales channels affected the overall result. Now you want to use regression to analyze which of these variables changed or if any new ones appeared during 2020. For example, you couldn't sell as much in your physical store due to COVID lockdowns. Therefore, your sales could've either dropped in general or increased in your online channels. Like this, you can understand which independent variables affected the overall performance of your dependent variable, annual sales. If you want to go deeper into this type of analysis, check out this article and learn more about how you can benefit from regression. 4. Neural networks The neural network forms the basis for the intelligent algorithms of machine learning. It is a form of analytics that attempts, with minimal intervention, to understand how the human brain would generate insights and predict values. Neural networks learn from each and every data transaction, meaning that they evolve and advance over time. A typical area of application for neural networks is predictive analytics. There are BI reporting tools that have this feature implemented within them, such as the Predictive Analytics Tool from datapine. This tool enables users to quickly and easily generate all kinds of predictions. All you have to do is select the data to be processed based on your KPIs, and the software automatically calculates forecasts based on historical and current data. Thanks to its user-friendly interface, anyone in your organization can manage it; there's no need to be an advanced scientist. Here is an example of how you can use the predictive analysis tool from datapine: **click to enlarge** 5. Factor analysis The factor analysis also called "dimension reduction" is a type of data analysis used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. The aim here is to uncover independent latent variables, an ideal method for streamlining specific segments. A good way to understand this data analysis method is a customer evaluation of a product. The initial assessment is based on different variables like color, shape, wearability, current trends, materials, comfort, place where they bought the product, frequency of usage. Like this, the list can be endless, depending on what you want to track. In this case, factor analysis comes to the picture by summarizing all of these variables into homogenous groups, for example, by grouping the variables color, materials, quality, and trends into a brother latent variable of design. If you want to start analyzing data using factor analysis we recommend you to take a look at this practical guide from UCLA. 6. Data mining A method of data analysis that is the umbrella term for engineering metrics and insights for additional value, direction, and context. By using exploratory statistical evaluation, data mining aims to identify dependencies, relations, patterns, and trends to generate advanced knowledge. When considering how to analyze data, adopting a data mining mindset is essential to success - as such, it's an area that is worth exploring in greater detail. An excellent use case of data mining is datapine intelligent data alerts. With the help of artificial intelligence and machine learning, they provide automated signals based on particular commands or occurrences within a dataset. For example, if you're monitoring supply chain KPIs, you could set an intelligent alarm to trigger when invalid or low-quality data appears. By doing so, you will be able to drill down deep into the issue and fix it swiftly and effectively. In the following picture, you can see how the intelligent alarms from datapine work. By setting up ranges on daily orders, sessions, and revenues, the alarms will notify you if the goal was not completed or if it exceeded the expectations. **click to enlarge** 7. Text analysis Text analysis, also known in the industry as text mining, works by taking large sets of textual data and arranging it in a way that makes it easier to manage. By working through this cleansing process in stringent detail, you will be able to extract the data that is truly relevant to your organization and use it to develop actionable insights that will propel you forward. Modern tools accelerate the application of text analytics. Thanks to the combination of machine learning and intelligent algorithms, you can perform advanced analytical processes such as sentiment analysis. This technique allows you to understand the intentions and emotions of a text, for example, if it's positive, negative, or neutral, and then give it a score depending on certain factors and categories that are relevant for your brand. Sentiment analysis is often used to monitor brand and product reputation and to understand how successful your customer experience is. To learn more about the topic check out this insightful article. By analyzing data from various word-based sources, including product reviews, articles, social media communications, and survey responses, you will gain invaluable insights into your audience, as well as their needs, preferences, and pain points. This will allow you to create campaigns, services, and communications that meet your prospects' needs on a personal level, growing your audience while boosting customer retention. 8. Time series analysis As its name suggests, the time series analysis is used to analyze a set of data points collected over a specified period of time. Although analysts use this method to monitor the data points in a specific interval of time rather than just monitoring them intermittently, the time series analysis is not uniquely used with the purpose of collecting data over time. Instead, it allows researchers to understand if variables changed during the duration of the study, how the different variables are dependent, and how did it reach the end result. In a business context, this method is used to understand the causes of different trends and patterns to extract valuable insights. Another way of using this method is with the help of time series forecasting. Powered by predictive technologies, businesses can analyze various data sets over a period of time and forecast different future events. A great use case to put time series analysis into perspective is seasonality effects on sales. By using time series forecasting to analyze sales data of a specific product over time, you can understand sales rise on a specific period of time (e.g. swimwear during summertime, or candy during Halloween). These insights allow you to predict demand and prepare production accordingly. 9. Decision Trees The decision tree analysis aims to act as a support tool to make smart and strategic decisions. By visually displaying potential outcomes, consequences, and costs in a tree-like model, researchers and business users can easily evaluate all factors involved and choose the best course of action. Decision trees are helpful to analyze quantitative data and they allow for an improved decision-making process by helping you spot improvement opportunities, reduce costs, enhance operational efficiency and production. But how does a decision tree actually works? This method works like a flowchart that starts with the main decision that you need to make and branches out based on the different outcomes and consequences of each decision. Each outcome will outline its own consequences, costs, and gains and, at the end of the analysis, you can compare each of them and make the smartest decision. Businesses can use them to understand which project is more cost-effective and will bring more earnings in the long run. For example, imagine you need to decide if you want to update your software app or build a new app entirely. Here you would compare the total costs, the time needed to be invested, potential revenue, and any other factor that might affect your decision. In the end, you would be able to see which of these two options is more realistic and attainable for your company or research. 10. Conjoint analysis Last but not least, we have the conjoint analysis. This approach is usually used in surveys to understand how individuals value different attributes of a product or service and it is one of the most effective methods to extract consumer preferences. When it comes to purchasing, some clients might be more price-focused, others more features-focused, others might have a sustainable focus, whatever your customer's preferences are, you can find them with conjoint analysis. Like this, the companies can define pricing strategies, packaging options, subscription packages, and more. A great example of conjoint analysis is with marketing and sales. For instance, a cupcake brand might use conjoint analysis and find that its clients prefer gluten-free options and cupcakes with healthier toppings over super sugary ones. Like this, the cupcake brand can turn these insights into advertisements and promotions to increase sales on this particular type of product. And not just that, conjoint analysis can also help businesses segment their customers based on their interests. This allows them to send different messaging that will bring value to each of the segments. How To Analyze Data? Top 17 Data Analysis Techniques To Apply Now that we've answered the questions "what is data analysis", "why is it important, and covered the different data analysis types, it's time to dig deeper into how to perform your analysis by working through these 17 essential techniques. 1. Collaborate your needs Before you begin analyzing or drilling down into any techniques, it's crucial to sit down collaboratively with all key stakeholders within your organization, decide on your primary campaign or strategic goals, and gain a fundamental understanding of the types of insights that will best benefit your progress or provide you with the level of vision you need to evolve your organization. 2. Establish your questions Once you've outlined your core objectives, you should consider which questions will need answering to help you achieve your mission. This is one of the most important techniques as it will shape the very foundations of your success. To help you ask the right things and ensure your data works for you, you have to ask the right data analysis questions. 3. Data democratization After giving your data analytics methodology some real direction, and knowing which questions need answering to extract optimum value from the information available to your organization, you should continue with democratization. Data democratization is an action that aims to connect data from various sources efficiently and quickly so that anyone in your organization can access it at any given moment. You can extract data in text, images, videos, numbers, or any other format. And then perform cross-database analysis to achieve more advanced insights to share with the rest of the company interactively. Once you have decided on your most valuable sources, you need to take all of this into a structured format to start collecting your data. For this purpose, datapine offers an easy all-in-one data connectors feature to integrate all your internal and external sources and manage them at your will. Additionally, datapine's end-to-end solution automatically updates your data, allowing you to save time and focus on performing the right analysis to grow your company. When collecting data in a business or research context you always need to think about security and privacy. With data breaches becoming a topic of concern for businesses, the need to protect your client's or subject's sensitive information becomes critical. To ensure that all this is taken care of, you need to think of a data governance strategy. According to Gartner, this concept refers to "the specification of decision rights and an accountability framework to ensure the appropriate behavior in the valuation, creation, consumption, and control of data and analytics." In simpler words, data governance is a collection of processes, roles, and policies, that ensure the efficient use of data while still achieving the main company goals. It ensures that clear roles are in place for who can access the information and how they can access it. In time, this not only ensures that sensitive information is protected but also allows for an efficient analysis as a whole. 5. Clean your data After harvesting from so many sources you will be left with a vast amount of information that can be overwhelming to deal with. At the same time, you can be faced with incorrect data that can be misleading to your analysis. The smartest thing you can do to avoid dealing with this in the future is to clean the data. This is fundamental before visualizing it, as it will ensure that the insights you extract from it are correct. There are many things that you need to look for in the cleaning process. The most important one is to eliminate any duplicate observations; this usually appears when using multiple internal and external sources of information. You can also add any missing codes, fix empty fields, and eliminate incorrectly formatted data. Another usual form of cleaning is done with text data. As we mentioned earlier, most companies today analyze customer reviews, social media comments, questionnaires, and several other text inputs. In order for algorithms to detect patterns, text data needs to be revised to avoid invalid characters or any syntax or spelling errors. Most importantly, the aim of cleaning is to prevent you from arriving at false conclusions that can damage your business in the long run. By using text cleaning tools, you can clean up your data and ensure that the insights you extract from it are accurate. 6. Visualize your data Visualizing your data is a crucial step in the data analysis process. It allows you to see patterns, trends, and outliers in a way that is easy to understand. There are many ways to visualize your data, from simple bar charts to complex dashboards. The key is to choose the right visualization method for your data and your audience. 7. Segment your data Segmenting your data allows you to break down your data into smaller, more manageable groups. This helps you to understand the different needs and behaviors of different groups of customers. 8. Analyze your data Once you have cleaned and visualized your data, it's time to analyze it. This involves using various statistical techniques to identify patterns and trends in your data. 9. Interpret your results After analyzing your data, you need to interpret the results. This involves understanding what the data tells you about your business and how you can use this information to make better decisions. 10. Report your findings Finally, you need to report your findings to your stakeholders. This involves creating a clear and concise report that summarizes your key findings and recommendations. 11. Monitor your progress Once you have implemented your findings, you need to monitor your progress. This involves regularly checking your key performance indicators (KPIs) to see if you are on track to achieve your goals. 12. Iterate your process Data analysis is an iterative process. This means that you may need to repeat some steps of the process as you learn more about your data and your business. 13. Collaborate with your team Data analysis is a team effort. This means that you should involve all relevant stakeholders in the process. 14. Stay up to date Data analysis is a constantly evolving field. This means that you should stay up to date with the latest trends and technologies in the industry. 15. Invest in the right tools Data analysis requires the right tools. This means that you should invest in the right software and hardware to support your analysis. 16. Focus on the results Data analysis is not just about the process, it's about the results. This means that you should focus on the insights that you gain from your analysis and how you can use them to improve your business. 17. Share your insights Data analysis is a valuable tool for sharing insights. This means that you should share your findings with your team and other stakeholders in your organization. 1. Collaborate your needs Before you begin analyzing or drilling down into any techniques, it's crucial to sit down collaboratively with all key stakeholders within your organization, decide on your primary campaign or strategic goals, and gain a fundamental understanding of the types of insights that will best benefit your progress or provide you with the level of vision you need to evolve your organization. 2. Establish your questions Once you've outlined your core objectives, you should consider which questions will need answering to help you achieve your mission. This is one of the most important techniques as it will shape the very foundations of your success. To help you ask the right things and ensure your data works for you, you have to ask the right data analysis questions. 3. Data democratization After giving your data analytics methodology some real direction, and knowing which questions need answering to extract optimum value from the information available to your organization, you should continue with democratization. Data democratization is an action that aims to connect data from various sources efficiently and quickly so that anyone in your organization can access it at any given moment. You can extract data in text, images, videos, numbers, or any other format. And then perform cross-database analysis to achieve more advanced insights to share with the rest of the company interactively. Once you have decided on your most valuable sources, you need to take all of this into a structured format to start collecting your data. For this purpose, datapine offers an easy all-in-one data connectors feature to integrate all your internal and external sources and manage them at your will. Additionally, datapine's end-to-end solution automatically updates your data, allowing you to save time and focus on performing the right analysis to grow your company. When collecting data in a business or research context you always need to think about security and privacy. With data breaches becoming a topic of concern for businesses, the need to protect your client's or subject's sensitive information becomes critical. To ensure that all this is taken care of, you need to think of a data governance strategy. According to Gartner, this concept refers to "the specification of decision rights and an accountability framework to ensure the appropriate behavior in the valuation, creation, consumption, and control of data and analytics." 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It allows you to see patterns, trends, and outliers in a way that is easy to understand. There are many ways to visualize your data, from simple bar charts to complex dashboards. The key is to choose the right visualization method for your data and your audience. 7. Segment your data Segmenting your data allows you to break down your data into smaller, more manageable groups. This helps you to understand the different needs and behaviors of different groups of customers. 8. Analyze your data Once you have cleaned and visualized your data, it's time to analyze it. This involves using various statistical techniques to identify patterns and trends in your data. 9. Interpret your results After analyzing your data, you need to interpret the results. This involves understanding what the data tells you about your business and how you can use this information to make better decisions. 10. Report your findings Finally, you need to report your findings to your stakeholders. 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This is one of the most important techniques as it will shape the very foundations of your success. To help you ask the right things and ensure your data works for you, you have to ask the right data analysis questions. 3. Data democratization After giving your data analytics methodology some real direction, and knowing which questions need answering to extract optimum value from the information available to your organization, you should continue with democratization. Data democratization is an action that aims to connect data from various sources efficiently and quickly so that anyone in your organization can access it at any given moment. You can extract data in text, images, videos, numbers, or any other format. And then perform cross-database analysis to achieve more advanced insights to share with the rest of the company interactively. Once you have decided on your most valuable sources, you need to take all of this into a structured format to start collecting your data. For this purpose, datapine offers an easy all-in-one data connectors feature to integrate all your internal and external sources and manage them at your will. Additionally, datapine's end-to-end solution automatically updates your data, allowing you to save time and focus on performing the right analysis to grow your company. When collecting data in a business or research context you always need to think about security and privacy. With data breaches becoming a topic of concern for businesses, the need to protect your client's or subject's sensitive information becomes critical. To ensure that all this is taken care of, you need to think of a data governance strategy. According to Gartner, this concept refers to "the specification of decision rights and an accountability framework to ensure the appropriate behavior in the valuation, creation, consumption, and control of data and analytics." 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