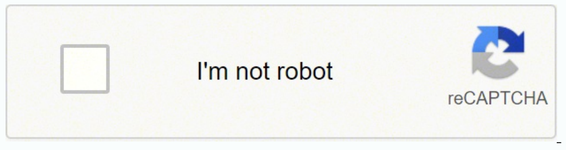

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What do you mean by data analysis in research

In order to continue enjoying our site, we ask that you confirm your identity as a human. Thank you very much for your cooperation. 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 your 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 all 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 great 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. Interprete: 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 meaningful way. Although it is relevant to mention that this analysis on its own will not allow you to predict future outcomes or tell you the answer to questions like why something happened, it will leave your data organized and ready to conduct 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, e.g. c) 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 issues 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 with 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 bottom image, you see an example of how you visualize a cohort in this tool. The segments (devices traffic) are divided into date cohorts (usage of devices) and then analyzed week by week to extract insights into performance. Regression uses historical data to understand how a dependent variable's value is affected when one (linear regression) 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 if 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, 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 insights. 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 clean data, you will also help BI tools to interact better with your information and create better reports for your organization. 6. Set your KPIs Once you've set your sources, cleaned your data, and established clear-cut questions you want your insights to answer, you need to set a host of key performance indicators (KPIs) that will help you track, measure, and shape your progress in a number of key areas. KPIs are critical to both qualitative and quantitative analysis research. This is one of the primary methods of data analysis you certainly shouldn't overlook. To help you set the best possible KPIs for your initiatives and activities, here is an example of a relevant logistics KPI: transportation-related costs. If you want to see more go explore our collection of key performance indicator examples. Having bestowed your data analysis techniques and methods with true purpose and defined your mission, you should explore the raw data you've collected from all sources and use your KPIs as a reference for chopping out any information you deem to be useless. Trimming the informational fat is one of the most crucial methods of analysis as it will allow you to focus your analytical efforts and squeeze every drop of value from the remaining 'lean' information. Any stats, facts, figures, or metrics that don't align with your business goals or fit with your KPI management strategies should be eliminated from the equation. 8. Build a data management roadmap While, at this point, this particular step is optional (you will have already gained a wealth of insight and formed a fairly sound strategy by now), creating a data governance roadmap will help your data analysis methods and techniques become successful on a more sustainable basis. These roadmaps, if developed properly, are also built so they can be tweaked and scaled over time. Invest ample time in developing a roadmap that will help you store, manage, and handle your data internally, and you will make your analysis techniques all the more fluid and functional – one of the most powerful types of data analysis methods available today. 9. Integrate technology There are many ways to analyze data, but one of the most vital aspects of analytical success in a business context is integrating the right decision support software and technology. Robust analysis platforms will not only allow you to pull critical data from your most valuable sources while working with dynamic KPIs that will offer you actionable insights; it will also present them in a digestible, visual, interactive format from one central, live dashboard. A data methodology you can count on. By integrating the right technology within your data analysis methodology, you'll avoid fragmenting your insights, saving you time and effort while allowing you to enjoy the maximum value from your business's most valuable insights. For a look at the power of software for the purpose of analysis and to enhance your methods of analyzing, glance over our selection of dashboard examples. 10. Answer your questions By considering each of the above efforts, working with the right technology, and fostering a cohesive internal culture where everyone buys into the different ways to analyze data as well as the power of digital intelligence, you will swiftly start to answer your most burning business questions. Arguably, the best way to make your data concepts accessible across the organization is through data visualization. 11. Visualize your data Online data visualization is a powerful tool as it lets you tell a story with your metrics, allowing users across the organization to extract meaningful insights that aid business evolution – and it covers all the different ways to analyze data. The purpose of analyzing is to make your entire organization more informed and intelligent, and with the right platform or dashboard, this is simpler than you think, as demonstrated by our marketing dashboard. **click to enlarge** Primary KPIs: This visual, dynamic, and interactive online dashboard is designed to give Chief Marketing Officers (CMO) an overview of relevant metrics to help them understand if they achieved their monthly goals. In detail, this example generated with a modern dashboard creator displays interactive charts for monthly revenues, costs, net income, and net income per customer; all of them are compared with the previous month so that you can understand how the data fluctuated. In addition, it shows a detailed summary of the number of users, customers, SQLs, and MQLs per month to visualize the whole picture and extract relevant insights or trends for your marketing reports. The CMO dashboard is perfect for c-level management as it can help them monitor the strategic outcome of their marketing efforts and make data-driven decisions that can benefit the company exponentially. 12. Be careful with interpretation We already dedicated an entire post to data interpretation as it is a fundamental part of the process of data analysis. It gives meaning to the analytical information and aims to drive a concise conclusion from the analysis results. Since most of the time companies are dealing with data from many different sources, the interpretation stage needs to be done carefully and properly in order to avoid misinterpretations. To help you through the process, here we list three common practices that you need to avoid at all costs when looking at your data: Correlation vs. causation: The human brain is formatted to find patterns. This behavior leads to one of the most common mistakes when performing interpretation: confusing correlation with causation. Although these two aspects can exist simultaneously, it is not correct to assume that because two things happened together, one provoked the other. A piece of advice to avoid falling into this mistake is never to trust just intuition, trust the data. If there is no objective evidence of causation, then always stick to correlation. Confirmation bias: This phenomenon describes the tendency to select and interpret only the data necessary to prove one hypothesis, often ignoring the elements that might disprove it. Even if it's not done on purpose, confirmation bias can represent a real problem, as excluding relevant information can lead to false conclusions and, therefore, bad business decisions. To avoid it, always try to disprove your hypothesis instead of proving it, share your analysis with other team members, and avoid drawing any conclusions before the entire analytical project is finalized.Statistical significance: To put it in short words, statistical significance helps analysts understand if a result is actually accurate or if it happened because of a sampling error or pure chance. The level of statistical significance needed might depend on the sample size and the industry being analyzed. In any case, ignoring the significance of a result when it might influence decision-making can be a huge mistake. 13. Build a narrative Now, we're going to look at how you can bring all of these elements together in a way that will benefit your business - starting with a little something called data storytelling. The human brain responds incredibly well to strong stories or narratives. Once you've cleansed, shaped, and visualized your most invaluable data using various BI dashboard tools, you should strive to tell a story - one with a clear-cut beginning, middle, and end. By doing so, you will make your analytical efforts more accessible, digestible, and universal, empowering more people within your organization to use your discoveries to their actionable advantage. 14. Consider autonomous technology Autonomous technologies, such as artificial intelligence (AI) and machine learning (ML), play a significant role in the advancement of understanding how to analyze data more effectively. Gartner predicts that by the end of this year, 80% of emerging technologies will be developed with AI foundations. This is a testament to the ever-growing power and value of autonomous technologies. At the moment, these technologies are revolutionizing the analysis industry. Some examples that we mentioned earlier are neural networks, intelligent alarms, and sentiment analysis. 15. Share the load If you work with the right tools and dashboards, you will be able to present your metrics in a digestible, value-driven format, allowing almost everyone in the organization to connect with and use relevant data to their advantage. Modern dashboards consolidate data from various sources, providing access to a wealth of insights in one centralized location, no matter if you need to monitor recruitment metrics or generate reports that need to be sent across numerous departments. Moreover, these cutting-edge tools offer access to dashboards from a multitude of devices, meaning that everyone within the business can connect with practical insights remotely - and share the load. Once everyone is able to work with a data-driven mindset, you will catalyze the success of your business in ways you never thought possible. And when it comes to knowing how to analyze data, this kind of collaborative approach is essential. 16. Data analysis tools In order to perform high-quality analysis of data, it is fundamental to use tools and software that will ensure the best results. Here we leave you a small summary of four fundamental categories of data analysis tools for your organization. Business Intelligence: BI tools allow you to process significant amounts of data from several sources in any format. Like this, you can not only analyze and monitor your data to extract relevant insights but also create interactive reports and dashboards to visualize your KPIs and use them for your company's good. datapine is an amazing online BI software that is focused on delivering powerful online analysis features that are accessible for beginner and advanced users. Like this, it offers a full-service solution that includes cutting-edge analysis of data, KPIs visualization, live dashboards, and reporting, as well as artificial intelligence technologies to predict trends and minimize risk.Statistical analysis: These tools are usually designed for scientists, statisticians, market researchers, and mathematicians, as they allow them to perform complex statistical analyses with methods like regression analysis, predictive analysis, and statistical modeling. A good tool to perform this type of analysis is R-Studio as it offers a powerful data modeling and hypothesis testing feature that can cover both academic and general data analysis. This tool is one of the favorite ones in the industry, due to its capability for data cleaning, data reduction, and performing advanced analysis with several statistical methods. Another relevant tool to mention is SPSS from IBM. The software offers advanced statistical analysis for users of all skill levels. Thanks to a vast library of machine learning algorithms, text analysis, and a hypothesis testing approach it can help your company find relevant insights to drive better decisions. SPSS also works as a cloud service that enables you to run it anywhere.SQL Consoles: SQL is a programming language often used to handle structured data in relational databases. Tools like these ones are popular among data scientists as they are extremely effective to unlock the value of these databases. Without a doubt, one of the most used SQL software's in the market is MySQL Workbench This tool offers several features such as a visual tool for database modeling and monitoring, complete SQL optimization, along with administration tools, and visual performance dashboards to keep track of KPIs.Data Visualization: These tools are used to represent your data through charts, graphs, and maps that allow you to find patterns and trends in the data. datapine's already mentioned BI platform also offers a wealth of powerful online data visualization tools with several benefits. Some of them include: delivering compelling data-driven presentations to share with your entire company, the ability to see your data online with any device wherever you are, an interactive dashboard design feature that enables you to showcase your results in an interactive and understandable way, and to perform online self-service reports that can be used simultaneously with several other people to enhance team productivity. 17. Refine your process constantly Last is a step that might seem obvious to some people, but it can be easily ignored if you think your are done. Once you have extracted the needed results, you should always take a retrospective look at your project and think about what you can improve. As you saw throughout this long list of techniques, data analysis is a complex process that requires constant refinement. For this reason, you should always go one step further and keep improving. Quality Criteria For Data Analysis So far we've covered a list of methods and techniques that should help you perform efficient data analysis. But how do you measure the quality and validity of your results? This is done with the help of some science quality criteria. Here we will go into a more theoretical area that is critical to understanding the fundamentals of statistical analysis in science. However, you should also be aware of these steps in a business context, as they will allow you to assess the quality of your results in a correct way. Let's dig in. Internal validity: The results of a survey are internally valid if they measure what they are supposed to measure and thus provide credible results. In other words, internal validity measures the trustworthiness of the results and how they can be affected by factors such as the research design, operational definitions, how the variables are measured, and more. For instance, imagine you are doing an interview to ask people if they brush their teeth two times a day. While most of them will answer yes, you can still notice that their answers correspond to what is socially acceptable, which is to brush your teeth at least twice a day. In this case, you can't be 100% sure if respondents actually brush their teeth twice a day or they just say that they do, therefore, the internal validity of this interview is very low. External validity: Essentially, external validity refers to the extent to which the results of your research can be applied to a broader context. It basically aims to prove that the findings of a study can be applied in the real world. If the research can be applied to other settings, individuals, and times, then the external validity is high. Reliability: If your research is reliable, it means that it can be reproduced. If your measurement were repeated under the same conditions, it would produce similar results. This means that your measuring instrument consistently produces reliable results. For example, imagine a doctor builds a symptoms questionnaire to detect a specific disease on a patient. Then, various other doctors use this questionnaire but end up diagnosing the same patient with a different condition. This means the questionnaire is not reliable to detect the initial disease. Another important note here is that in order for your research to be reliable, it also needs to be objective. If the results of a study are the same, independent of who assesses them or interprets them, the study can be considered reliable. Let's see the objectivity criteria more in detail now. Objectivity: In data science, objectivity means that the researcher needs to stay fully objective when it comes to its analysis. The results of a study need to be affected by objective criteria and not by the beliefs, personality, or values of the researcher. Objectivity needs to be ensured when you are gathering the data, for example, when interviewing individuals, the questions need to be asked in a way that doesn't influence the results. Paired to this, objectivity also needs to be thought of when interpreting the data. If different researchers reach the same conclusions, then the study is objective. For this last point, you can set predefined criteria to interpret the results to ensure all researchers follow the same steps. The discussed quality criteria cover mostly potential influences in a quantitative context. Analysis in qualitative research have by default additional subjective influences that must be controlled in a different way. Therefore, there are other quality criteria for this kind of research such as credibility, transferability, dependability, and confirmability. You can see each of them more in detail on this resource. Data Analysis Limitations & Barriers Analyzing data is not an easy task. As you've seen throughout this post, there are many steps and techniques that you need to apply in order to extract useful information from your research. While a well-performed analysis can bring various benefits to your organization it doesn't come without limitations. In this section, we will discuss some of the main barriers you might encounter when conducting an analysis. Let's see them more in detail. Objectivity: Arguably one of the biggest barriers when it comes to data analysis in research is to stay objective. When trying to prove a hypothesis, researchers might find themselves, intentionally or unintentionally, directing the results towards an outcome that they want. To avoid this, always question your assumptions and avoid confusing facts with opinions. You can also show your findings to a research partner or external person to confirm that your results are objective. Flawed correlation: Misleading statistics can significantly damage your research. We've already pointed out a few interpretation issues previously on the post, but it is an important barrier that we can't avoid addressing here as well. Flawed correlations occur when two variables appear related to each other but they are not. Confusing correlations with causation can lead to a wrong interpretation of results which can lead to building wrong strategies and loss of resources, therefore, it is very important to identify the different interpretation mistakes and avoid them. Privacy concerns: In some cases, data collection can be subjected to privacy regulations. Businesses gather all kinds of information from their customers from purchasing behaviors to addresses and phone numbers. If this falls into the wrong hands due to a breach, it can affect the security and confidentiality of your clients. To avoid this issue, you need to collect only the data that is needed for your research and, if you are using sensitive facts, make it anonymous so customers are protected. The misuse of customer data can severely damage a business's reputation, so it is important to keep an eye on privacy. Lack of communication between teams: When it comes to performing data analysis on a business level, it is very likely that each department and team will have different goals and strategies. However, they are all working for the same common goal of helping the business run smoothly and keep growing. When teams are not connected and communicating with each other, it can directly affect the way general strategies are built. To avoid these issues, tools such as data dashboards enable teams to stay connected through data in a visually appealing way. Innumeracy: Businesses are working with data more and more every day. While there are many BI tools available to perform effective analysis, data literacy is still a constant barrier. Not all employees know how to apply analysis techniques or extract insights from them. To prevent this from happening, you can implement different training opportunities that will prepare every relevant user to deal with data. Data Analysis In The Big Data Environment Big data is invaluable to today's businesses, and by using different methods for data analysis, it's possible to view your data in a way that can help you turn insight into positive action. To inspire your efforts and put the importance of big data into context, here are some insights that you should know: By 2023 the industry of big data is expected to be worth approximately $77 billion.94% of enterprises say that analyzing data is important for their growth and digital transformation. Companies that exploit the full potential of their data can increase their operating margins by 60%.We already told you the benefits of Artificial Intelligence through this article. This industry's financial impact is expected to grow up to $40 billion by 2025. Data analysis concepts may come in many forms, but fundamentally, any solid methodology will help to make your business more streamlined, cohesive, insightful, and successful than ever before. Key Takeaways From Data Analysis As we reach the end of our data analysis journey, we leave a small summary of the main methods and techniques to perform excellent analysis and grow your business. 10 Essential Types of Data Analysis Methods: Cluster analysisCohort analysisRegression analysisFactor analysisNeural NetworksData MiningText analysisTime series analysisDecision treesConjoint analysis Top 17 Data Analysis Techniques: Collaborate your needsEstablish your questionsData democratizationThink of data governance Clean your dataSet your KPIsOmit useless dataBuild a data management roadmapIntegrate technologyAnswer your questionsVisualize your dataInterpretation of dataConsider autonomous technologyBuild a narrativeShare the loadData Analysis toolsRefine your process constantly We've pondered the data analysis definition and drilled down into the practical applications of data-centric analytics, and one thing is clear: by taking measures to arrange your data and making your metrics work for you, it's possible to transform raw information into action - the kind of that will push your business to the next level. Yes, good data analytics techniques result in enhanced business intelligence (BI). To help you understand this notion in more detail, read our exploration of business intelligence reporting. And, if you're ready to perform your own analysis, drill down into your facts and figures while interacting with your data on astonishing visuals, you can try our software for a free, 14-day trial.

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