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New Techniques and Methods of Data Collection

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Abstract

Data is simply the information required to examine a research issue after a well-designed study. Data collection is essential because without the precise information obtained, research cannot be carried out. Review the many researchers' studies on data gathering strategies and procedures in this page. It concluded that the selection of appropriate data collection methods is crucial for enhancing research quality and efficiency. Different techniques have their strengths and limitations depending on factors such as participant demographics and research objectives. The rise of online platforms has further expanded data collection possibilities, necessitating adherence to ethical guidelines. Utilizing advanced tools and software optimizes data management and analysis, leading to insightful outcomes. Combining various analytical techniques ensures comprehensive interpretation and evidence-based decision-making. The practical application of a minimum dataset aids in systematic data planning, while pre-collected routine data remains valuable for ongoing research efforts.

Keywords: Data collection and gathering, Data collection techniques, Data collection methods, Techniques and methods, Tools and software, Data management and analysis, Decision-making, etc.

1 Introduction

Following the definition of the research problem and the development of the research design/plan, the duty for data collection is assigned. Information regarding circumstances, particular problems, or any other phenomenon is to be collected using two primary methods. On occasion, the essential information is already accessible and only requires extraction [1]. The researcher will be required to determine the type of data that will be utilised in their research and, as a result, will need to choose one of the available data acquisition methods. Data collection is defined as the process of acquiring, assessing, and analysing

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exact perceptions for research using conventional authenticated methods [2]. The hypothesis can be evaluated by a researcher using the data that has been collected. Data acquisition is the most critical phase of research in nearly all instances, irrespective of the field of study [3]. The information that is essential in the various disciplines of study determines the data collection method. Data collection's main objective is to safeguard the reliable, information-rich data that is gathered for statistical analysis, which then helps researchers make data-driven choices [4].

A. Data collection

The act of data collection or data gathering involves the accumulation and measurement of information on specific variables within a predetermined system. This process allows for the evaluation of outcomes and the resolution of pertinent enquiries. Data collecting is a component of research in all fields of study, including business, the humanities, and the physical and social sciences [5]. The emphasis on the accumulation of accurate and honest data remains consistent, despite the fact that the methodologies used within each discipline may differ. Finding evidence that allows data analysis to support the creation of reliable answers to the questions addressed is the aim of all data collecting [6]. In order to preserve the integrity of research, it is imperative to acquire precise data, regardless of the field or preference for data definition (qualitative or numeric). The choice of appropriate data gathering tools (pre-existing, modified, or newly built) and the supply of explicit guidelines for their appropriate usage reduce errors [7].

B. Methods and techniques of data collection

In the workplace, there are numerous methods of data collection that may be implemented, such as:

Observation: The primary objective of observational techniques is to examine items and collect data about them. One way to do this would be to observe certain animals or people in their natural habitat. Avoiding direct interaction among researchers and the subjects of their studies may provide more trustworthy results [8].

Survey: The main focus of survey methods is gathering written or multiple-choice answers from respondents on a variety of subjects. People usually interact with these questions online, and there is often little to no interaction between survey distributors and respondents. Companies might utilise them to quickly get internal or external feedback.

Focus group: Focus group strategies aim to directly obtain information from participants. Instead than concentrating on numbers, this approach often emphasises sentiments, views, or emotions. Focus groups may be used by businesses to learn more about their customers.

Interview: Techniques for conducting interviews may be more personal when participants and the researcher speak face-to-face. Researchers may provide participants the questions before the interview so they have time to decide whether or not they feel comfortable participating. This strategy can include obtaining consent documents for video or audio recordings [9].

Design thinking: In order to produce original ideas or solutions, design thinking techniques may emphasise brainstorming among participants. Businesses may use this if they want to solve the challenges that consumers have while using their goods. Digital or in-person sessions may be used, depending on the participants' and researchers' locations.

User testing: Businesses often test their products or services either during or after they are created. In the event that customers choose to utilise the product during development, it might be used to pinpoint regions that they find challenging to use. Even after launching a product or service, people could use it to make improvements if they're interested [10].

Web Scrapping: Web scraping is a method of gathering data that involves mechanically extracting information from dynamic websites. You may get up-to-date data on rivals and market trends using tools like BeautifulSoup or Scrapy. You must be aware of data privacy regulations and terms of service infractions, however.

Log Files: Detailed records created by servers, apps, or devices are called log files. They record a chronology of interactions, transactions, and events that take place inside a system. Log files may be analysed and visualised using Splunk or ELK Stack to provide information on system performance, web traffic, and security events.

API Integration: By enabling information interchange between two software programs or systems, application programming interfaces, or APIs, automate data collecting. It offers a unified picture of the data and is scalable. This method is used, for instance, to extract datasets from cloud services or social media networks [11].

Transactional Tracking: Data collection about your customers' purchases is part of transactional tracking. Transactions done via websites, third-party services, or in-store point-of-sale systems may be monitored to get data on product combinations ordered, delivery locations, and other details. By analysing this information, you may target the best client categories and improve your marketing tactics.

Mobile Data Collection: Through applications, polls, and GPS monitoring, real-time data is directly gathered from users via mobile devices. Mobiles and tablets are widely used, which makes them perfect for collecting data while on the move.

Social Media Monitoring: Numerous social media sites provide data analytics tools that let you monitor engagement numbers, demographic data, and other information about your target audience. Information on consumer mood and new trends may be found using tools like Hootsuite or Brandwatch.

C. Common challenges in data collection

Some of the challenges that are often faced while collecting data include the following:

Data quality issues: Inaccuracies, inconsistencies, and other issues are common with raw data. Data gathering methods should ideally be created to prevent or lessen these issues. But generally speaking,

that isn't infallible. Consequently, gathered data often has to undergo data cleaning to address problems and data profiling to find them.

Finding relevant data: Because they must navigate a range of systems, gathering data for analysis may be a difficult task for data scientists and other users within an organisation. Data curation techniques may help make data easier to find and access. For instance, such may include developing searchable indexes and a data catalogue.

Deciding which data to collect: These are fundamental issues that pertain to both the initial raw information collection and the data collection by consumers for analytics applications. Time and expense are increased as a result of the process being complicated by an excessive amount of data acquisition. On the other hand, the exclusion of valuable data may have an impact on the results of analytics and diminish the economic value of a data set.

Dealing with big data: Large amounts of semistructured, unstructured, and structured data are often found in big data contexts. As a result, the earliest phases of data collecting and processing become increasingly intricate. In addition, data scientists frequently must filter collections of unprocessed data stored in a data lake for specific analytics applications.

Low response and other research issues: The validity of the data gathered in research projects is called into doubt when there are no consenting participants or answers. To ensure the accuracy of the data, it is necessary to devise appropriate quality assurance methods and train personnel to collect it. These are additional research obstacles.

2 Literature Review

(IYANUOLUWA Blessing et al., 2024)[12] Gives a summary of the key methods for collecting and analysing data. Qualitative, descriptive, inferential, and predictive analyses are the different categories of analysis approaches. The efficiency and quality of data management are improved by a variety of tools and software, including statistical programs and platforms for data visualisation. Ensuring appropriate data management requires careful consideration of ethical factors, such as informed permission, data privacy, and integrity. New techniques and instruments are always being developed as technology advances, influencing how data collecting and analysis will develop in the future. This abstract emphasises the significance of using the right methods to extract trustworthy and useful insights from data.

(Cheong et al., 2023) [13] Lays forth a novel, methodical approach to secondary qualitative investigation using publicly accessible, online interview data. By using a procedural approach, the research community may extend its datasets, boost rigour, and actively address and minimise possible hazards. To address the predetermined research questions, the data analysis approach consists of theme discourse analysis and content analysis for dataset classification. The technique also discusses the legal and ethical issues surrounding the use of secondary web data and the publication of research conclusions derived

from it. We illustrate how the technique gives secondary qualitative research structure by using the topic of forced migration as an example.

(Kwok et al., 2022) [14] The importance of data analytics in guiding healthcare choices has generated a lot of interest in the field. The purpose of this article is to introduce the idea of a minimal dataset for any variable. The value of a variable represents the most fundamental level of data collecting. The way a variable's values changed over time is described by its time course. To prevent erroneous results, it's also critical to consider the validity or correctness of a variable's values. To sum up, the minimal dataset is a paradigm that may be used to research design and evaluation. The minimal dataset framework for each variable does not need to be fully taken into account for every data, but if more in-depth findings are sought, the framework could be crucial.

(Qiu et al., 2022) [15] Concentrate on researching ways to collect data for assessing socially assistive systems (SAS). The findings showed that the most common targets of the SASs that were in place were youngsters with autism, elderly folks, and those who had visual impairments. Most often, observation data, questionnaires, and interviews were used to evaluate SASs. The interview studies consisted of target users in approximately half of the cases, while the other half contained "stakeholders or secondary users". Surveys were primarily utilised to gauge the social interaction, emotional state, and system use of older folks and those with visual impairments. Most observational studies included users in certain age groups, including elderly individuals and autistic children. As a result, we provide a summary of the approaches used to collect data from distinct SAS target users. In order to guide future research and development, pertinent insights are retrieved.

(Newman et al., 2021) [11] Researchers are using online tools like Amazon Mechanical Turk (MTurk) more and more to gather survey and experimental data. However, these platforms can represent a turbulent environment for reviewers and researchers alike. In order to ensure data quality, ethically encourage participant involvement, preserve openness, and collect representative samples from online participant cohorts, researchers must manage many challenges. The challenges of assessing how well such data gathering and execution initiatives address significant research concerns, however, must be handled by reviewers. This article offers a number of suggestions for researchers and reviewers on how to properly conduct and assess data gathering using online platforms in order to shed light on these problems.

(Syeda Ayeman Mazhar et al., 2021) [10] In essence, data is the information required to investigate a research topic that has been properly designed. The significance of data collection stems from the fact that research cannot be carried out without the precise information being obtained. It might be original or secondary data. Primary data collection methods in the behavioural sciences often use questionnaires, interviews, database access, and observational methods. Secondary data sources include "unpublished biographies and autobiographies, books, magazines, journals", and other earlier editions. Consequently, data collecting is the primary research instrument as it is necessary to complete the research process. The several approaches and strategies of obtaining data for doing research are thoroughly reviewed in this text.

(Flanagan et al., 2015) [16] The usefulness of the data gathering techniques used while doing research with children, teens, and young adults is summarised. There is a discussion of the advantages and disadvantages of the variety of data gathering techniques that are used, including whether certain techniques are suitable for certain age groups or which approach is best to use when examining a particularly delicate subject. Numerous data gathering techniques are used while doing research with children, adolescents, and young adults. The evidence that is currently available is included in this review, together with an outline of the advantages and disadvantages of the data gathering techniques used.

3 Conclusion

The advancement of data collection techniques has significantly enhanced research methodologies across various disciplines. The selection of appropriate methods depends on factors such as participant demographics, research objectives, and ethical considerations. Arts-based methods may be more suitable for younger participants, while focus groups and digital technologies are often preferred for adolescents. The rise of online platforms has provided researchers with efficient ways to gather data, though ethical guidelines must be strictly followed. Primary data collection methods, including observations, interviews, and questionnaires, remain fundamental in behavioral sciences, while secondary data sources such as books, journals, and biographies offer valuable supplementary insights. The integration of advanced tools and software has streamlined data collection and analysis, improving research efficiency and collaboration. Employing a combination of descriptive, inferential, predictive, and qualitative techniques allows for a deeper understanding of data, enabling evidence-based decision-making. The concept of a minimum dataset plays a crucial role in defining data collection strategies, particularly in routine data scenarios where information is pre-existing. By leveraging modern data collection techniques, researchers can enhance the reliability, accuracy, and impact of their findings, ultimately contributing to knowledge advancement and informed decision-making across diverse fields.

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