Journal of Business Data Science Research

The Application of Grounded Theory in Data Science Research

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ABSTRACT

Grounded theory is a research methodology that is used in data science to uncover patterns or relationships among the data. It is a flexible and iterative approach that is suitable for discovering new insights in very large and complex data sets. The efficient use of grounded theory in research makes the exploration of instances in data science easier to enable the effective analysis of large and complex data sets for effective decision-making and efficient problem-solving. This article will provide an in-depth analysis of the grounded theory process and its application in data science.

KEWWORDS: Grounded theory, Data Science, Research, theory making, Data Science Research.

EDITORIAL ARTICLE

Received 1 March 2023
Accepted 20 March 2023

CITATION

Rasti Borazjani Faghat, E. (2023). The Application of Grounded Theory in Data Science Research. Journal of Business Data Science Research, 2(01). 1-4.

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1. Introduction

With access With access to more and more data sets, data scientists are presented with the challenge of analyzing large-scale and complex data to derive insights and make recommendations (Alqazlan et al., 2022). Grounded theory methodology, which focuses on developing theoretical explanations grounded in empirical data, can help in this area (Arifin et al., 2022). This article explores the role of grounded theory in data science research, focusing on how it can be used to derive explanations and insights from data.

The core principle of grounded theory is that the researcher should develop a theory based on the data collected, rather than starting with a preconceived hypothesis (Allen, 2023). This principle implies that the researcher must immerse themselves in the data and analyze it systematically to generate themes, categories, and concepts that lead to the development of a theory.

Grounded theory methodology is often used to identify and explain patterns or relationships in the data. It is also used to understand the meaning that people give to their experiences, behaviors, and surroundings (Aras, 2022). So, Grounded theory is a valuable approach in data science because it helps in discovering previously unknown patterns and associations among the data.

2. The basics of Grounded theory

Grounded theory is a methodology for developing theories based on empirical research that focuses on systematically observing data and deriving concepts from them (Ghori et al., 2022). This methodology is based on the idea that data can be used to inform the development of theory and, unlike traditional research approaches, in which the research

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hypothesis guides the research design and influences the analysis of data, Grounded theory is an iterative process that continually analyses data and generates new hypotheses to be tested (Malakouti and Talebi, 2018).

The methodology was first proposed by Barney Glaser and Anselm Strauss in their book "The Discovery of Grounded theory" (Glaser et al., 1968). Since then, the approach has been widely adopted in social sciences, business research, health sciences, and numerous other areas (Glaser, 1992; Strauss and Corbin, 1994; Charmaz, 2014).

3. Applications of Grounded theory in Data Science

Grounded theory methodology has many applications in data science. As said before, this methodology helps discover unknown trends within data. It is a valuable tool for data science when the data is large, complex, or heterogeneous (Diehl et al., 2022; Clary and Van Slyke, 2023).

Grounded theory methodology is often used in data science to identify emergent patterns in large data sets. These patterns are then interpreted and used to create a theory that explains the pattern. When examining data science, grounded theory allows researchers to identify unclear trends within data and to develop new theories. Grounded theory methodology can also help data scientists to gain a deep understanding of their data (Aras, 2022).

Data scientists can use grounded theory methodology to analyze all kinds of data, including structured and unstructured data (Clary and Van Slyke, 2023). The methodology is particularly valuable for analyzing textual data, such as customer feedback, social media posts, or transcripts of interviews. The use of grounded theory means that data can be interpreted meaningfully to provide insights into its various attributes.

4. The role of Grounded theory in data science research

Grounded theory has numerous applications in data science and analytics. By applying a grounded approach to data science, researchers and managers can derive insights from the data that inform decision-making across different business areas.

4.1. Understanding the Data

Grounded theory can help data scientists to identify important patterns in the data that are not immediately obvious. This is useful in cases where the data is messy and not structured, or where it is complex, as it helps data scientists to find the underlying patterns that are not immediately obvious. Through deep analysis of data, Grounded theory helps to uncover new perspectives, leading to the development of new theories (Rasti Borazjani Faghat et al., 2020; Karimi-Ghartemani et al., 2022).

4.2. Identifying Hypotheses

Grounded theory can be an effective tool for identifying hypotheses that would not emerge through other research methods (Mohajan and Mohajan, 2023). It can help data scientists identify relationships between variables and identify patterns that might be missed by other data modeling techniques. By using Grounded theory, data scientists can come up with a set of initial hypotheses that can inform future data analysis, ultimately helping to guide future research processes.

4.3. Developing Theoretical Explanations

One of the critical aspects of Grounded theory is that it helps organizations develop theories that explain why specific patterns exist within the data. Theory development is essential within data science research and is often the goal of research (Rasti Borazjani Faghat et al., 2021), as it can inform future decisions and actions. By using grounded theory to develop theoretical explanations, data scientists can illustrate how a particular dataset fits into the broader context of an organization's operations.

4.4. Generating Insights

Finally, Grounded theory can help generate insights into why new data patterns have emerged. This is essential when organizations are working with large datasets that require intensive exploration to identify what's happening in the data (Metersky et al., 2022). By analyzing the data from a grounded perspective, data scientists can identify trends that may not have otherwise emerged. With the identification of these patterns, organizations can adjust their operations or strategy accordingly.

5. Challenges of Grounded theory in Data Science

Grounded theory methodology can sometimes be labor-intensive and time-consuming, making it difficult to apply to large data sets that can frequently arise in the data science process (Miller, 2022). This can lead to lengthy analysis and encoding of data, which can increase the research timeline.

Another problem that can be witnessed is anchoring the data in the wrong parameters, leading to an inaccurate analysis and interpretation process. This issue can make it difficult to generalize the findings to other data or research settings. grounded theory involves analyzing the data in-depth; this approach may sometimes bias toward specific outcomes that do not align with reality, leading to misinterpretation and invalid conclusions (Goulding, 1999).

6. Conclusion

Grounded theory offers a powerful methodology for data scientists looking to derive insights from large, complex datasets. Also, Grounded theory enables researchers to explore data patterns, demonstrate their potential uses, identify actionable insights, and deliver better outcomes. With its focus on grounded empirical data, the approach is ideal for data scientists looking to derive fresh insights and develop theories that explain or predict patterns in data. However, it must be applied intelligently to provide useful insights without introducing biases that can impede a successful conclusion. At the same time, artificial intelligence and machine learning offer opportunities for better data analysis only with solid methodologies like Grounded theory methodology; they can lead to an improved classification system, more accurate prediction models, and higher quality information. Future data science research can take help from grounded theory method in data analysis. Also, future research can develop the grounded theory method and theorizing with the help of artificial intelligence.

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