Chapter 9
A Snapshot Survey of Data Acquisition Forms in Multi–Attribute Decision–Making Studies

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ABSTRACT

Multi-attribute decision-making (MADM) analysis is an important field widely used in the decision-making process. As the volume of data increases, it becomes critical to have a comprehensive understanding of large-scale data collection. However, current research lacks a holistic approach to obtaining large-scale data. This chapter aims to address this research gap by summarizing classic papers, open datasets, remote sensing data, sentiment analysis, and questionnaire survey data collection forms in MADM research. Classic papers provide a wealth of foundational knowledge, while open datasets provide diverse and large-scale data. Additionally, remote sensing data provides real-time information for urban planning and environmental management decisions. Finally, sentiment analysis leverages social media to gain unique insights, and questionnaire surveys are valid. Overall, this chapter helps researchers and professionals improve their selection and design of data collection methods to ensure reliable and impactful data collection, thereby improving the ability to make informed decisions.

INTRODUCTION

With the rapid development of emerging technologies such as Internet technology, cloud computing, and the Internet of Things, the scale of data has grown explosively. The accumulation and storage of massive amounts of data provide huge opportunities and challenges for national decision-making and enterprise operations. This data contains a wealth of information in various fields that can help people better understand how the real world works and evolves. Big data dynamically reflect the development trend of various economic and social indicators, and reflects the effect of policy implementation in multiple dimensions and levels, making social management more refined and intelligent, and providing people with a more scientific and data-based decision-making thinking (Yaqoob et al., 2016; Zhang et al., 2024). MADM is an important part of decision science, which refers to the decision-making process that requires comprehensive consideration of multiple attribute factors in the decision-making process to achieve the optimal decision-making goal (Zanakis et al., 1998). Decision-making problems in real life are often affected by multiple attribute factors, and the influence of multiple attributes needs to be considered comprehensively (Zhang, 2008a; Wang et al., 2021). By comprehensively considering multiple attribute factors, we can evaluate the decision-making object more comprehensively, grasp the decision-making environment more accurately, and make more scientific and reasonable decisions, which is helpful to improve the accuracy and effectiveness of decision-making (Zhang & Yager, 2008b; Zhang et al., 2023).

Data collection is a crucial part of MADM research, as its quality and comprehensiveness directly affect the final decision outcome (Platts et al., 2002). At present, there are five main data collection methods commonly used in academia:

(1) Obtaining Data from Classic Papers: Classic papers refer to research results that have important influence and representation in a certain field. Classic papers contain a wealth of data that can be used for the analysis and decision-making of MADM. Through in-depth analysis and evaluation of this data, decision-makers (DMs) can better understand the nature and context of the problem, so that they can make more accurate decisions (Van Oudenhoven et al., 2018). These data can be used to establish a variety of different types of decision-making models, such as analytic hierarchy process (AHP), fuzzy comprehensive evaluation method, entropy weight method, etc., and can also be used to optimize decision-making schemes, so as to help DMs evaluate and compare different decision-making schemes, so as to choose the optimal scheme and improve the scientificity and efficiency of decision-making (Zhang et al., 2019). However, the data in classic papers may have problems such as update lag, difficulty in obtaining, and lack of multi-dimensional information.

(2) Sentiment Analysis: Sentiment analysis, also known as opinion mining or sentiment analysis, refers to the use of natural language processing and machine learning (ML) techniques to identify and understand the emotions and sentiments expressed in text. There is a close relationship between sentiment analysis and multi-attribute decision making (Ji et al., 2018). Sentiment analysis can help DMs gain a more comprehensive understanding of the emotional tendencies and attitudes of decision objects, thereby better considering the emotional factors of decision objects in MADM (Tan et al., 2022; Awajan et al., 2021). By taking into account the results of sentiment analysis, emotional factors can be incorporated into the consideration scope of MADM, thus enabling a more comprehensive evaluation of the impact of different choices on emotional factors (Wu & Zhang, 2019). This can help in formulating decisions and strategies that better align with market

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