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Systematic review of MCDM approach applied to the medical case studies of COVID-19: trends, bibliographic analysis, challenges, motivations, recommendations, and future directions

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Abstract
When COVID-19 spread in China in December 2019, thousands of studies have focused on this pandemic. Each presents a unique perspective that reflects the pandemic's main scientific disciplines. For example, social scientists are concerned with reducing the psychological impact on the human mental state especially during lockdown periods. Computer scientists focus on establishing fast and accurate computerized tools to assist in diagnosing, preventing, and recovering from the disease. Medical scientists and doctors, or the frontliners, are the main heroes who received, treated, and worked with the millions of cases at the expense of their own health. Some of them have continued to work even at the expense of their lives. All these studies enforce the multidisciplinary work where scientists from different academic disciplines (social, environmental, technological, etc.) join forces to produce research for beneficial outcomes during the crisis. One of the many branches is computer science along with its various technologies, including artificial intelligence, Internet of Things, big data, decision support systems (DSS), and many more. Among the most notable DSS utilization is those related to multicriterion decision making (MCDM), which is applied in various applications and across many contexts, including business, social, technological and medical. Owing to its importance in developing proper decision regimens and prevention strategies with precise judgment, it is deemed a noteworthy topic of extensive exploration, especially in the context of COVID-19-related medical applications. The present study is a comprehensive review of COVID-19-related medical case studies with MCDM using a systematic review protocol. PRISMA methodology is utilized to obtain a final set of (n = 35) articles from four major scientific databases (ScienceDirect, IEEE Xplore, Scopus, and Web of Science). The final set of articles is categorized into taxonomy comprising five groups: (1) diagnosis (n = 6), (2) safety (n = 11), (3) hospital (n = 8), (4) treatment (n = 4), and (5) review (n = 3). A bibliographic analysis is also presented on the basis of annual scientific production, country scientific production, co-occurrence, and co-authorship. A comprehensive discussion is also presented to discuss the main challenges, motivations, and recommendations in using MCDM research in COVID-19-related medial case studies. Lastly, we identify critical research gaps with their corresponding solutions and detailed methodologies to serve as a guide for future directions. In conclusion, MCDM can be utilized in the medical field effectively to optimize the resources and make the best choices particularly during pandemics and natural disasters. © 2023, The Author(s).

Author Keywords
COVID-19; Data privacy; Federated learning; Monoclonal antibodies; Multi-criterion decision making; Treatment

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