

Guest Editorial Preface

Special Issue on AI-Enabled Multiple-Criteria Decision-Making Approaches for Healthcare Information Systems

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The success of healthcare decision-making lies in whether healthcare staff, patients and healthcare organization managers can comprehensively understand the choices and consider future implications to make the best decision possible. Multiple-criteria decision making (MCDM), including multiple rule-based decision making (MRDM), multiple-objective decision making (MODM), and multiple-attribute decision making (MADM), is used by clinical decision-makers to analyze healthcare information systems issues from various perspectives. In practical health care cases, semi-structured and unstructured decision-making issues involve multiple criteria (or goals) that may conflict with each other. Data process focuses on analyzing and identifying healthcare management issues, information systems, and data features for solving practical cases. Evaluation and selection focus on evaluating the performance of each solution for healthcare information systems and these methods can be used to support decision-making and help organizations choose the best solution for practical healthcare management cases. Finally, planning and design focus on analyzing and designing the goals of healthcare management applications and information systems, which can be modelled as a minimizing or maximizing problem for finding the optimal solutions. Furthermore, these methods can explore the relationship structure construction among criteria between various related issues arising from healthcare information systems.

The aim of this special issue of International Journal of Operations Research and Information Systems (IJORIS) was to attract research investigating the contributions of practical multiple criteria decision analysis applications and cases for healthcare information systems. We have collected four original research articles, including papers studying data process, evaluation and selection, and planning and design of novel applications and tools.

The four paper of our special issues highlights recent advances and research developments in designing robust healthcare information systems enabled by multiple criteria decision making approaches ranging from COVID-19 related problems, cancer related problems which are analyzed using Artificial Intelligence enabled tools and applications.

The first paper, "COVID-19 Vaccine Ranking Using ANP Method," proposes Analytical Network Processing (ANP) method to rank eight vaccines according to seven criteria. The Study proposes a decision tool to select best vaccine among the candidate vaccines. A mathematical model based on ANP approach with three clusters having interrelationships within and among the clusters is proposed.

In this pandemic period, glycemic management and the implementation of suitable interventions are crucial considerations for diabetic patients. The article “A Role of Artificial Intelligence in Health Care Data for Diabetic People Affected by COVID-19” examines the present state of knowledge and limitations in using AI to prevent and manage individuals with diabetes and COVID-19 infection. Furthermore, social media and online groups improve patient engagement in diabetes care. These innovative technological advancements have enhanced glycemic management by lowering fasting and tracking postprandial glucose levels and glycosylated haemoglobin.

Particle swarm optimization (PSO) is recognized as one among several efficient and promising approach for diagnosing breast cancer by assisting medical experts for timely and apt treatment. The paper “Artificial Intelligence Based on Breast Cancer Treatment by Using WPSO” uses weighted particle swarm optimization (WPSO) approach for extracting textural features from the segmented mammogram image for classifying microcalcifications as normal, benign or malignant thereby improving the accuracy. In the breast region, tumor part is extracted using optimization methods. Here, Artificial Intelligence (AI) is proposed for detecting breast cancer which reduces the manual overheads.

The research paper titled “Artificial Intelligence Biosensing System on Hand Gesture Recognition for Hearing Impaired” examines Artificial Intelligence (AI) models, which might be local or external. Due to the complexity of sign fragmentation and the inadequacy of capturing hand gestures, present Sign language recognition (SLR) systems and wearable surface electromyography (sEMG) biosensing device based on a Deep SLR that convert sign language into printed message or speech, allowing people to better understand sign language and hand motions. On the forearms, two armbands containing a biosensor and multi-channel sEMG sensors are mounted to capture quite well arm and finger actions. Deep SLR was tested on an Android and iOS smartphone, and its usefulness was determined by comprehensive testing.

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