

Editorial

Application and Decision-Making Implications of Novel Optimization Models in Public Health

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Optimizing the results of public health management is a goal of many managers. Contracting inputs and service providers oriented towards health outcomes, such as models anchored in the population's health, building the capacity to contract, allow countries to make a difference in a pandemic. For example, systems have been increasingly used in various novel optimization models in public health such as disease prevention, detection, diagnosis, innovative education environments, security, and authentication. These systems are suggested in the literature with alternative tools to aid specialists in their decision-making by analyzing and interpreting data.

The main objective of this special issue was to promote a broad discussion on the recent advances in optimization models with novel methods and applications, seeking to identify potential contributions to public health. This special issue of the Computational and Mathematical Methods in Medicine journal contains 13 original works. Therefore, the selected studies address new trends in methods and applied techniques to different public health.

The first article by Xiaobo Lai et al. proposed a digital breast tomosynthesis (DBT) image automatic segmentation algorithm using a U-Net architecture to improve automatic breast mass segmentation accuracy in DBT imaging. The proposed automatic segmentation obtained promising results, which are superior to some classical architectures, and it is expected that they have perspectives of clinical application.

The second article by J. Feng et al. investigated patients with facial paralysis who were enrolled as study objects. The eye aspect ratio (EAR) index was proposed for the eye region. The correlation between EAR and the score facial nerve grading system (FNGS 2.0) was analyzed to verify the ability of EAR to enhance FNGS 2.0 for the rapid and objective assessment of the severity of facial paralysis.

Moreover, *the third article* by Pingao Huang et al. describes a new flexible and extensible nanogold sensor developed to acquire muscle shape change (MSC) signals used to decode various classes of limb motion intentions. The results suggest that the MSC-based method should be feasible in movement identifications for human-robot interaction. At the same time, they provide a frequent reference for using flexible and stretchable sensors in human-robot interaction systems.

Furthermore, *the fourth article* by Jia Wu et al. proposes a framework that uses six relevant tumor markers as the input features. They employed classical machine learning models (support vector machine and artificial neural network) for auxiliary medical decision systems for prostate cancer (PCa). Results revealed the increasing prevalence of PCa and the great negative impact caused by a high-fat diet and genetic inheritance.

In addition, *the fifth article* by Li Lou et al. presented a hybrid model structured on the queuing theory and mixed integer linear programming to develop flexible scheduling for nurses working in blood centers. The number of nurses

needed during a working period was reasonably determined and nursing schedules were organized flexibly, ensuring sufficient rest periods for each nurse.

On the other hand, the *sixth article* by Murat Sayan et al. describes an approach to compare the selection of effective diagnostic methods to make a mutual comparison between existing SARS-CoV-2 diagnostic tests and determine the most effective. The study results with proposed multicriteria decision-making methods (MCDM) indicated that the most effective diagnostic method for COVID-19 was chest CT.

Following, the *seventh article* by Jun Zhang et al. propose a novel intelligent data decision-making system for prostate cancer based on a neural perceptron network. Decisions are mainly made by associating relevant indicators of the disease and combining them with medical images to solve the problems and social contradictions faced by most developing countries.

The *eighth article* by Danae Carreras-Garcia et al. investigates a scheduling system based on the nonattendance probabilities of patients with variable time intervals and a dynamic priority allocation scheme. The system is structured around a mixed integer programming model that is aimed at maximizing the clinic's expected profits, accounting for the first appointments and returns.

The *ninth article* by Lucia Reis Peixoto Rosetti et al. presents a utility-based multicriteria model to support physicians in dealing with an important decision—the screening decision problem—due to the scarcity of resources due to the COVID-19 pandemic. The model is applied to generate the best alternatives for treating patients with suspected COVID-19, namely, an intensive care unit (ICU), a hospital ward, or an isolated home.

The *tenth article* by Shijie Li and Yongchuan Tang proposes an intelligent geriatric nursing framework that consists of three aspects of competent nursing: smart geriatric nursing in physical health using advanced biosensors and devices, intelligent geriatric nursing in mental health based on user profile, and intelligent geriatric nursing for daily life based on big data in health. The implementation of the proposed method relies on Internet of Things (IoT) technologies, user profile systems, big data, and many other advanced information technologies.

The *eleventh article* by Nana Yaw Asabere explored a referral algorithm called socially aware referral of people likely to be infected with COVID-19. Initially, it applies intermediation centrality in a social network to measure the number of target touchpoints (nodes/users) that met an infected touchpoint (patient COVID-19). Then, the clashing forces of the same contact points are also calculated using contact durations and contact frequencies.

The *twelfth article* by Evandro Andrade et al. evaluated a hybrid approach based on machine learning algorithms composition to discover knowledge and concepts associated with the multicriteria method of decision support based on verbal decision analysis to refine the results. The study is aimed at evaluating how the mentioned hybrid methodology proposal can make the protocol derived from ICD-10 more efficient, providing agility to diagnosing autism spectrum disorder by observing a minor symptom.

The *last article of the special issue*, by Luana Ibiapina Cordeiro Caliope Pinheiro et al., describes an approach that is aimed at identifying the best performing algorithm and the most relevant characteristics to categorize individuals with HIV/AIDS at a high risk of dementia from the application of data mining. The principal component analysis (PCA) algorithm was used and tested comparatively between the following machine learning algorithms: logistic regression, decision tree, neural network, KNN, and random forest.

Conflicts of Interest

The guest editors declare that there are no conflicts of interest.

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