



# AI-assisted Solutions for COVID-19 and Biomedical Applications in Smart-Cities

Fadi Al-Turjman<sup>1</sup>

Published online: 9 March 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

## Contents:

### **Structural Factors of Epidemic Transmission under Conditions of Inter-Provincial Openness: An Empirical Analysis of the COVID-19 Spread**

Linlin Yue, Xu Wang, & Dezhi Tong

### **Prevention and control of COVID-19 risks for long-term care facilities based on the prospect theory**

Xiaofeng Xie, Jianhui Kong, Xiuying Hu, Li Zhao, Xudong Chen, Yang Yang & Fengying Zhang

### **Design of an Intelligent Acquisition System for Athletes' Physiological Signal Data Based on Internet of Things Cloud Computing**

Kai Jiang & Yuntao Zhou

## Editorial:

COVID-19, known as the Corona Virus Disease 19, is a disease which created a significant impact by being a cause of death to the majority of the deceased population of the world in 2019–2020. The primary source for the transmission of the disease, detection and treatment methods are still unknown. Lots of the details about this virus is still missing. How it spreads, prevention measures and vaccinations issues need to be further investigated. In this field, Artificial Intelligence (AI) and computer-assisted paradigms can play a key role in achieving many effective and efficient solutions. Such intelligent techniques can achieve very effective diagnosis for the COVID-19 and alike diseases in the biomedical field by even being better than physicians. It can examine extended counts of the possibilities and exchange the found results in

timely manners. Current smart cities infrastructure includes a number of smart devices having the sensing and data routing capabilities to communicate with each other using various protocols, allowing the disease updates to be accessed any-time from anywhere. They have the potential to provide innovative services which could not be possible without the progress made in the AI field.

This special issue features three selected papers with high quality. The first article, “**Structural Factors of Epidemic Transmission under Conditions of Inter-Provincial Openness: An Empirical Analysis of the COVID-19 Spread**”, conducts an empirical analysis of the structural elements of epidemic transmission under conditions of inter-provincial openness in China by establishing an inter-provincial openness index system. It comprises natural and social factors as transmission elements of COVID-19. It finds that aside from temperature and relative humidity, the rate of Wuhan’s inflow is directly related to a province’s COVID-19 incidence. Inter-provincial distance, daily passenger transport, and the proportion of equity investments reflect the proportion of Wuhan’s inflow into the provinces. These four elements reflect the scope of the epidemic. The urbanization rate, per capita GDP, business environment index, passenger density, and population density indirectly reflect the degree of population mobility in the province, which constitutes the transmission route of the epidemic. The theoretical framework of the structural elements of epidemic transmission under conditions of inter-provincial openness is constructed based on extensive analysis. The article found out that in the process of preventing and controlling the spread of the virus, isolation of infectious sources is the most important factor. Under conditions of inter-provincial openness, limiting inter-provincial openness is the key to mitigating the spread of COVID-19.

The second article titled “**Prevention and control of COVID-19 risks for long-term care facilities based on the prospect theory**” was also included in this special issue.

✉ Fadi Al-Turjman  
fadi.alturjman@neu.edu.tr

<sup>1</sup> Faculty of Engineering, Near East University, Nicosia, Mersin 10, Turkey

In order to study the prevention and control strategies of COVID-19 risks in long-term care facilities, this paper uses the prospect theory to construct the decision-making model of COVID-19 risk behavior of long-term care facilities, analyses the risk behavior strategies of the caregivers and managers, and reveals the impact of risk management cost, risk loss and external supervision on the risk behavior decision-making of the caregivers and managers. Furthermore, from the perspective of long-term care facilities, this paper analyzes the constraints that enable it to achieve optimal risk management strategy. Combined with the simulation analysis, it is found that the decision of risk behavior of the caregivers and managers is positively related to the risk behavior choice, risk loss, and supervision. Then, only when the incentives set by the supervision are within a reasonable range can the caregivers and managers be motivated to take proactive risk management strategies. The study has important theoretical and practical significance for the management of COVID-19 risks in long-term care facilities.

In the third article with the title “**Design of an Intelligent Acquisition System for Athletes' Physiological Signal Data Based on Internet of Things Cloud Computing**”, authors aim to provide some ideas and directions for the research on collecting physiological signal data of athletes under the cloud computing environment and the application of Internet of Things technology and mainly introduces the design of the intelligent acquisition system of physiological signal data of athletes under cloud computing paradigms in the pandemic. This paper proposes an intelligent acquisition method for athletes' physiological signal data under cloud computing, including the design of power frequency filter and the energy model of the TDMA protocol system, which is used to conduct research experiments on the design of an athlete's physiological signal data intelligent acquisition system under cloud computing. The experimental results of this article show that the average collection accuracy rate of the system is 97.01%, the test of the intelligent acquisition system shows that the stability of the system is very high, and the accuracy rate is high, which can better collect the physiological signal data of athletes.

**Acknowledgement** The guest editor are thankful to the anonymous reviewers for their effort in reviewing the manuscripts. We are also thankful to the Edit-in-Chief, Dr. Imrich Chlamtac for his supportive guidance during the entire process.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Fadi Al-Turjman** received his Ph.D. in computer science from Queen's University, Canada, in 2011. He is the *associate dean for research* and the *founding director* of the International Research Center for AI and IoT at Near East University, Nicosia, Cyprus. Prof. Al-Turjman is the head of Artificial Intelligence Engineering Dept., and a leading authority in the areas of smart/intelligent IoT systems, wireless, and mobile networks' architectures, protocols, deployments, and performance evaluation in Artificial Intelligence of Things (AIoT). His publication history spans over 400 SCI/E publications, in addition to numerous keynotes and plenary talks at flagship venues. He has authored and edited more than 40 books about cognition, security, and wireless sensor networks' deployments in smart IoT environments, which have been published by well-reputed publishers such as Taylor and Francis, Elsevier, IET, and Springer. He has received several recognitions and best papers' awards at top international conferences. He also received the prestigious *Best Research Paper Award* from Elsevier Computer Communications Journal for the period 2015–2018, in addition to the *Top Researcher Award* for 2018 at Antalya Bilim University, Turkey. Prof. Al-Turjman has led a number of international symposia and workshops in flagship communication society conferences. Currently, he serves as book series editor and the lead guest/associate editor for several top tier journals, including the *IEEE Communications Surveys and Tutorials* (IF 23.9) and the Elsevier Sustainable Cities and Society (IF 7.58), in addition to organizing international conferences and symposiums on the most up to date research topics in AI and IoT.