

# **Studies in Systems, Decision and Control**

Volume 322

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Aboul Ella Hassanien · Ashraf Darwish  
Editors

# Digital Transformation and Emerging Technologies for Fighting COVID-19 Pandemic: Innovative Approaches

*Editors*

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*This book is dedicated to all members of the  
scientific research group in Egypt (SRGE)*

# Preface

In the age of digital transformation, artificial intelligence (AI) and big data are playing a key role in processing the data to be converted into knowledge and decisions. With the rapid growth in the number of newly confirmed and suspected COVID-19 cases in 2020, COVID-19 extremely threatens public health, countries' economic, social life and the international relations around the world. In the fight against COVID-19, AI techniques and big data analytics have played a significant role in many aspects. Moreover, AI, big data, Internet of things and Blockchain-driven technologies present visualization for COVID-19 outbreak information that helps in detecting risk allocation and regional transmissions. Thus, many researchers have been developing specialized tools using AI techniques and big data analytic tools for early prediction and diagnosis of COVID-19 cases to contribute to its containment before spreading.

These models had been a great help to clinicians and decision-makers for making the appropriate recommendations for treatments. The value of integrating AI and big data tools strongly will provide clinicians and decision-makers with helpful information on COVID-19 disease, which will reduce their efforts. Thanks to its high ability to isolate and pick features, AI techniques have today been used in the medical imaging domain. Machine and deep learning technology is primarily applied to identify and distinguish pediatric viral pneumonia and bacteria.

Some recent technologies such as unmanned aerial vehicle (UAV) or drones are used to detect the infected people in different areas in the same country. In addition, robots are used in fighting the COVID-19 by protecting the workers and staff people who are dealing with infected people. On the other hand, other technology such as robotics plays an important role in saving the life of medical staff during COVID-19 pandemic and to assist patients during the treatment process.

Blockchain technology will play an important role with COVID-19 in securing many transactions and dealing in strict confidentiality, as patient's image transmission, digital and statistical data related to the patients. In addition, the adoption of Bitcoin as an official currency alternative to banknotes currencies in order to avoid the transmission and spread of infection is a great challenge for governments.

The book aims to present the AI and big data analytics solutions to help healthcare sectors and the medical staff to protect them and limit the spread of the COVID-19. Also this book presents the problems and challenges and presents to the researchers

and academics some future research points from the AI point of view that can help healthcare sectors and limit the spread of COVID-19.

The content of this book is divided into three parts.

- The first part presents the effective role, importance and practical applications which include new models, systems and results of AI technology in fighting against COVID-19.
- The second part analyzes and describes the role of digital transformation and different emerging technologies for monitoring and controlling COVID-19. Some recent technologies such as big data, drones, 3D printing, robotics and the Fourth Industrial Revolution to tackle COVID-19 have been presented.
- The third part introduces the smart networks for tracking COVID-19 and Blockchain technology for securing and management of COVID-19 patient's data.

Finally, editors would like to encourage the readers and researchers to expand and explore the knowledge in the main topic of this book in order to create their implementations and obtain new results to tackle COVID-19 as a global pandemic. We acknowledge the members of the Scientific Research Group in Egypt (SRGE), for their effort and handling this book.

Cairo, Egypt  
August 2020

Aboul Ella Hassanien  
Ashraf Darwish

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