Leveraging Artificial Intelligence in Global Epidemics

Overview of the Book:

In the fight against epidemics, medical staff is on the front line; but behind the lines the battle is fought by the government officials, researchers, and data scientists. Artificial Intelligence (AI) has been helping nations with computer modeling and simulation for predictions about e.g. the overall economic situation, tax incomes and population development. In the same manner, AI can prepare the government for emergency situations by backing the medical science. AI plays a key and cutting-edge role in the preparedness for and dealing with the outbreak situation of global epidemics. It can help researchers analyze global data about known viruses to predict the knows-hows of the next pandemic and the impact it will have. Not only for prediction, but also AI plays an increasingly important role in assessing a country's readiness, early detection, identification of patients, generating recommendations, situation awareness and more. It is upto the right input and the innovative ways by humans to leverage what AI can do.

As COVID-19 has grabbed the world and its economy today, an analysis of the COVID-19 outbreak and the global responses and analytics will pay a long way in preparing humanity for such future situations. While there exist books about AI in various application domains, what is currently lacking is a book that provides a comprehensive coverage of disease outbreak and specifically how AI can help fight with epidemics. To fill this gap, this book contains chapters describing the role AI plays in various stages of a disease outbreak, with COVID-19 as a case study.

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Deadlines
Extended Summary:
Sep 30, 2020
Notification of Proposal Approval:
Oct 20, 2020
Full Chapter Submission:
Jan 10, 2020

Invitation to Contribute a Chapter:

The individual chapters should provide a comprehensive overview of the chosen topic covering advances in the area and should be tutorial in nature and presentation, to appeal to a broad range of readers who may NOT be researchers on the topic. Hence, they shouldn't be like a research paper. You are hereby invited to submit first, a 2-3 page extended summary including (a) an abstract, (b) an outline / TOC / list of headings and sub-headings along with a summary of each heading, (c) short biographies of the authors, and (d) a statement why you are experts for the proposed chapter. Following a review of your summary, we'll offer our feedback and suggestions for improvement and better synergy with rest of the chapters and cohesive coverage.

Chapter Submission Link: https://easychair.orgconferences/?conf=aige2021

Structure of the Book:

The book is planned to have 11-12 chapters divided into two sections. Part I consists of 3 chapters providing a holistic overview of global epidemics, a motivation for the book and challenges. Part II consists of emerging technologies that help fight against epidemics. Part II has 6 chapters as listed below. This makes 9 chapters. The rest 2-3 chapters are to be added dynamically based on the availability of authors (These chapters may be on The Use of Social Media for Tracking Public Behavior, Does AI help in Genome Sequencing, AI-assisted Testing, Computational Drug Repurposing, or any other trending and suitable topic in line with the title and the theme of the book).

Part I: Controlling Epidemics: A Perspective This part provides an overview and study of Global Epidemic situations. It starts with assessing the countries' readiness for coping with epidemics, goes through the challenges in battling with epidemic, and then closes with a survey of existing approaches, techniques and tools available or developed by academicians or industry professionals for controlling the epidemics.	
1	**Setting the Scene (A Chapter by the Editors)**
This chapter provides an overview and summary of the complete book as a whole It acts as glue between the chapters written by different authors and brings in synergy to all the chapters in both the parts of the book. In effect, it sets the scene for the reader and acts as an introductory and a must read before proceeding for the further chapters.	
2	**An Overview of Global Epidemics and the Challenges Faced**
(a) Assessing Countries' Readiness for Coping with Epidemics: There is a need of retrospective evaluation of each country's readiness for coping with epidemics. An automated data collection followed by evaluation will help in knowing if the human kind is well-equipped to deal with it. (b) A Study related to Ebola, Corona viruses, Zika, influenza, Dengue, Chikungunya, Malaria like infectious diseases will be presented in this chapter. A discussion on the most fatal pandemics recorded in the history (like the Plague, Spanish Flu, HIV/AIDS, COVID-19) and their economic consequences. What is common in these? All these have jumped to humans after being originated in animals somehow. (c) Challenges in Battling with Epidemics (d) … …	
3	**A Survey of Existing Approaches and Tools to fight against epidemic and the lessons learnt**
(a) Survey of tools/techniques/methodologies/software already available at the time of writing of this book to predict/detect/recommend actions during an epidemic situation. (b) Lessons learnt by every epidemic that has struck this world (including COVID-19)	
Part II: Emerging Technologies Fight Against Epidemics Having gone through the background of controlling global epidemic situation, this part of the book covers the emerging techniques to fight against epidemic. A number of digital technologies……………This book focuses on …"Artificial Intelligence"….	

At the time of writing this book, COVID-19 pandemic was caused by coronavirus and was widespread with deadly results. The case study of COVID-19 has been presented to better exploit the study presented in each chapter.

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4	**AI Technologies specialized to the need in the fight against epidemic**

All current technologies under the umbrella of AI or surrounding AI should be covered like Data Science, Big Data, Machine Learning, Semantic Technologies, Data Analytics, cyber security.

5	**Does AI help in Forecasting?**

This chapter will speak about WHO statistics on pathogens. AI can help predicting everything about spillovers, hence allowing the governments to plan ahead. AI can predict what, when, why, and where of the epidemic. We define AI and discuss the various machine learning models to predict the same.

   Case Study of Covid-19 for Predictions will be presented.

6	**AI and Detection / Improved Diagnosis**

In case of outbreak of a disease; after detection, we need to publicize the threat. AI makes possible quick detection in order to enable possible vaccination and treatment; and alerts for the public. Diagnosis and Monitoring of cases is of paramount importance.

   Case Study of Covid-19 for Early Detection will be presented.

7	**Generating Recommendations**

A global, AI-enabled data system can provide advices and issue warnings in real time. Help manage socio-economic impacts.

8	**Role of AI in Contact Tracing**

The architecture of so called "Corona apps" and their backends is described in this chapter. The role of AI is clarified for these approaches and also other aspects like privacy and security. Furthermore, other approaches to contact tracing are introduced in this chapter.

9	**Situation Awareness**

In any disaster, it is essential that the citizens get the correct information and organizations get the correct data. This chapter describes AI approaches to detect fake news or scams.

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10-12	**Open Topics dynamically picked by the authors**

Any other trending and suitable topic in line with the title and the theme of the book can be incorporated.