Applications of Artificial Intelligence in Public Health

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Abstract

The enormous recent advances in technology infrastructure and computer processing speed have enabled an exponential growth in the use and development of artificial intelligence algorithms in many specific domains of engineering, finance, art, business, etc. There is a global trend to take advantage of insights generated by data analysis to enable decision makers to make better decisions. Public Health is no exception to this trend and the ongoing COVID-19 pandemic made it clear to the world that worldwide efforts are needed to improve our current public health systems. Artificial Intelligence -AI-, promises public health practitioners with tools to make their work more efficient and proactive. In this paper we survey the applications of AI in the public health domain. We offer a unique approach by adapting technology to public health domain instead of the opposite, trying to adapt public health to technological trends. We do this because we acknowledge that even the latest technology is of no use if it does not solve the real-life problem of the final user.

Introduction

One of the main goals of public health is to prolong life and close the big gap in health access inequity. Artificial Intelligence promises to support these goals by making the right information accessible for individuals to make informed decisions for a healthy lifestyle as well as building tools that will give access to treatment to more vulnerable populations. The greater goal of Artificial Intelligence should be the one other major technological breakthrough have had in the past; to benefit humanity and to help in building a better world for everybody in this planet. Artificial intelligence is spreading widely and fast. It makes sense that its benefits expand to public health which is the discipline that can help individuals to have a better health and a better life in any social or economic status.

Public Health processes can be expensive and time consuming. This creates underserved communities which lack resources to protect themselves. AI promises to build tools that will shorten the inequity gap and to build safe communication channels that can detect outbreaks in a timely manner before diseases spread to a level in which they become out of control.

Public Health

Public health is concerned with the health and well-being of the entire community. Recently, we learned that we are more connected than ever before in history.

Diagram

Description automatically generated

Applications in Epidemiology

Over the years of human history humanity has dealt with the devastating effects of global pandemics. Because of the technological context of past times, there are not abundant electronic records of exact numbers of deaths and infections of previous big pandemics. Another factor that acts as an impediment for precise data in epidemiology is the speed in which pandemics spread and the usual lack of preparedness for authorities in public health and governments.

Usually pandemics are unpredictable, totally unplanned, and extremely difficult to face. The usual fast rates of deaths and infections imply devastation for communities, economic and financial hardship, and negative impacts in people’s mental health. All these facts make it necessary for researcher to find ways to gain more understanding on pandemic dynamics so that decision makers can respond quickly to new coming ones.

Deep learning models require a lot of data to produce precise predictions. One of the limitations of epidemiological predictions is that there is not lots of data easily available for epidemiological predictions. This is a limitation since quality data and more data translates to better and more predictions available.

One alternative to mitigate the lack of data in epidemiology is the use of synthetic data. Synthetic data is an alternative to model possible scenarios and different outcomes in the pandemic data analysis process.