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Review Article

Inevitable Epidemic Prediction Using Artificial Intelligence

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ABSTRACT

Intelligent Models for Predicting Diseases are becoming more popular by the day, whether it's for assisting doctors or even avoiding disease transmission internationally. The major focus of this study is on developing an epidemic search model that uses the capacity of social network data analysis to produce a probability score of the spread and to analyze which regions are likely to be affected by any epidemic spread-out. In this ever-expanding study field, the power of predictive modelling is gaining traction. Sentiment analysis is an example of a text analysis issue. It is an effective technique for analyzing a wide range of issues with human-computer interaction. Epidemic Search is a model that uses the power of social network data analysis to produce a probability score of the spread and to analyze the places across the world that would be affected by any epidemic spread-out. To accomplish the goal of epidemic prediction, we devised a revolutionary artificial intelligence-based prediction approach (AI). Many Internet machine learning methods may be used for the prediction approach as a result of the current model. As a consequence, we looked into a study project and assessed the most prevalent medical prediction systems.

Introduction

In Epidemiology, we study the illness distribution and determinants. Interventions generated from information gathered via epidemiologic studies can be attributed to improvements in community health and increased survival rates in humans [1]. Novel computer model methodologies are widely used in the scientific literature due to the wide diversity of fields of research in epidemiology and the distinct demands of each [2]. Artificial intelligence (AI) technology has influenced an unparalleled era of rapid progress and extensive use in the last decade, fuelled in part by substantial advancements in large data and raw processing capacity (Figure 1). Traditional AI research fields including computer vision, speech recognition, natural language processing, and robotics have spawned a slew of new applications in a variety of real-world scenarios, including medical [3]. AI is already being used in a variety of healthcare applications, assisting doctors in the early diagnosis of diseases such as diabetes and cancer. The healthcare sector was severely impacted in the years 2020 and 2021 as a result of the global spread of COVID-19, which resulted in a global pandemic. In some places, hospital beds were full, and critical care units (ICUs) were overflowing.

Figure 1: Epidemic Prediction using AI

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Management of Epidemic Diseases Through Intelligent Learning:

Machine learning in healthcare systems allows machines to learn many factors connected to patients and diseases, such as behaviours, symptoms, and pathological variables. AI-assisted diagnoses and therapies are now being used in a variety of healthcare-related applications to describe a methodology for optimizing the parameters of Deep Learning (DL) techniques to forecast infectious diseases while taking huge data into account [4].

Multiple scientific fields are required to create and develop new enabling methodologies and technical advances for quick response and management to meet the enormous difficulties posed by epidemics (Figure 2). The community of medical experts, for example, urgently needs a detailed image of the new virus. The industrial community should be flexible to improve the design of personal protective equipment and enhance productivity [5].

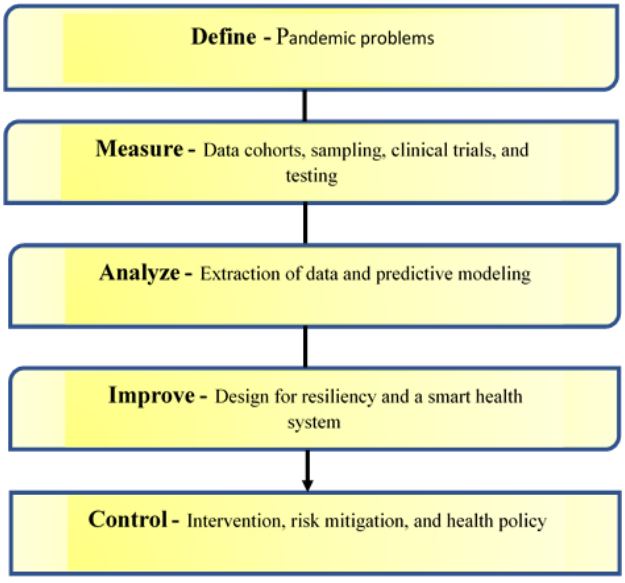

Figure 2: Epidemic response and Risk Management using System informatics

Using a back-propagation method, a predictive analysis method for epidemic diseases is used to discover and find contaminated locations. In the context of pandemic influenza, the authors developed a deep reinforcement learning mechanism for automatically learning preventative techniques (Figure 3) [4].

Artificial Intelligence for Connected and Smart Health Systems:

Health systems must be robust in the face of epidemic outbreaks. Artificial intelligence (AI) has a wide range of applications in health care, and it can help to accelerate changes and transformations in current procedures.

I. Error reduction: It's human to make mistakes, but medical errors can have serious repercussions. Physical condition, skill level, training, attitude, emotion, and cognitive bias can all contribute to human mistakes. AI technologies may aid in the reduction and minimization of human errors, such as the thorough examination of acceptable dose levels and the decrease of diagnosing errors [5].

II. Medical diagnostics: As the number of illnesses rises, so does the amount of data generated in the care and treatment process. A hospital is typically asked to run hundreds of CT scans each day during an epidemic to evaluate the status of lung infections. Human professionals must visually review and interpret these CT pictures, which takes time and effort. AI screening, on the other hand, is faster than physicians and enhances operational efficiency greatly [6].

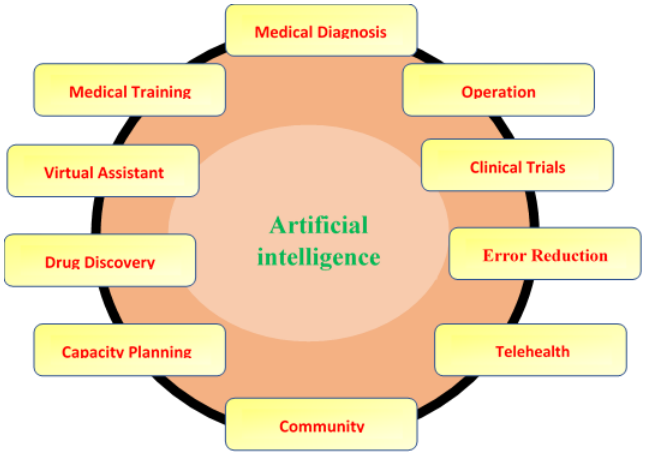

Figure 3: Artificial Intelligence for Smart Health System

Artificial Intelligence in Health Care Application:

AI mixed with analytics (AIA) is becoming more widely used in a variety of industries, including healthcare. Medicine was, in fact, one of the most productive uses of analytics and is now a viable AI application field. Clinical apps were developed and suggested to doctors to support them in their practice as early as the mid-twentieth century. Clinical decision support systems, automated surgery, patient monitoring and aid, healthcare administration, and other applications are among them [7].

I. Data quality and availability: Obtaining significant volumes of high-quality clinical datasets is challenging because they are in many forms, dispersed across multiple systems, and have restricted access.
II. The issue of bias: AI systems learn to make choices based on training data that may contain biases.
III. Cost of computation: The majority of the works assessed are computationally expensive, which is inconvenient for both clinicians and patients.
IV. Interpretability: In the healthcare area, the most crucial task is analyzing and verifying the suggested strategy for it to be accepted by the community.
V. Injuries and errors: An AI system can make mistakes, such as failing to detect illnesses, making a medicine suggestion, or anticipating a patient's reaction to a certain therapy [8].

Approaches to Artificial Intelligence in Health Care:

In health-care applications, AI technologies can be divided into two categories: machine learning (ML), which includes deep learning (DL), and natural language processing (NLP). The ML and DL strategies look at structured data including imaging, genetics, and electronic medical records data to identify patients' features or predict infection outcomes. This research outlines multiple AI models that can be used to detect and diagnose

coronavirus infections, track the spread of COVID-19 outbreaks, and provide a variety of healthcare services.

Robots and Robotic Processes are Two Terms that are Frequently Used Interchangeably:

In hospitals and other quarantine zones, robots are utilized to deliver medical supplies. Surgical robots equipped with artificial intelligence (AI) have the potential to revolutionize surgery (Figure 4).

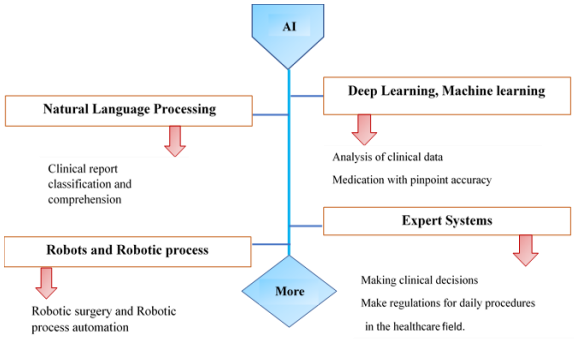

Figure 4: Robots and Robotic Process

Using robotic surgery regularly. Gynecology surgery, prostate surgery, and head and neck surgery are just a few of the procedures available. Instead of using robots, computer programs are used to conduct monotonous duties in the healthcare industry, such as authorization, upgrading medical records, and billing. AI may be able to help in several ways. early detection, tracing, and containment of a coronavirus pandemic, for example, Forecasting, diagnosis and projection, treatments and drugs, and social management and services [9].

AI-Assisted Data Analysis for Early Detection and Warning of Outbreaks:

Data analysis with artificial intelligence for outbreak detection and early warning. To increase the accuracy and timeliness of outbreak detection and early warning, As the deadline approaches, public health specialists continue to look into and study sensor data. Health, environmental, sociological, and economic indicators from the physical world many other things. Efforts have been made to make data from the survey useful (Figure 5). We'll go through two sets of AI-enhanced data analysis approaches in the rest of this section: one for data from the physical world and the other for data from cyberspace. Then we look at how machine learning approaches for text analysis and classification can help [3].

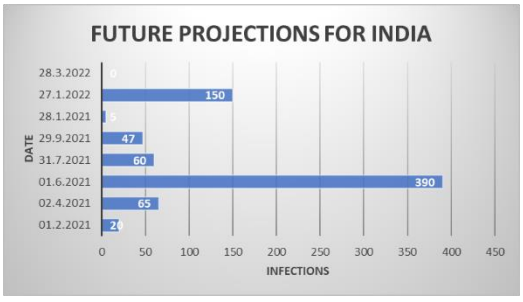

Figure 5: Future Projections for India

In Support of Public Health Surveillance, Artificial Intelligence has Improved Prediction:

Seasonality, non-stationarity, and sparsity are all characteristics of epidemiological data time series. Predicting such time series has huge public health consequences, and it has sparked a lot of interest among researchers and practitioners. To identify meaningful patterns, researchers have proposed complicated models for univariate prediction. There have also been efforts to construct multivariate prediction models. The whole AI-enhanced prediction architecture shows how AI plays an essential role in both research streams.

i. Prediction of time series based on dependent factors.

ii. Prediction of time series using dependent and independent variables [10].

Platform Design Prediction:

The uses of this platform based on machine learning analyzing patient data, early detection, and prevention are all part of the project. Early warning of epidemics, prompt screening of suspected cases patients, as well as telemedicine diagnosis and treatment. The early detection and early warning of epidemic scenario application service must do frequent and fixed-point investigations of illness data in various locations, conduct in-depth analysis utilizing knowledge maps, and properly grasp the warning of epidemic situation.

The multi-process integration of investigation, advanced detection, diagnosis, and treatment after the outbreak of the epidemic achieved by the epidemic prevention and control platform based on machine learning devised in this paper achieves the unified analysis of various data and has the characteristics of consistency, intelligence, and ease of understanding [11].

Prediction Models Based on AI Deployment and Use in Day-To-Day Healthcare:

i. Implementation in the clinic: All of the processes required to deploy the AIPM in the healthcare environment outside of a clinical trial setting are included in the clinical implementation. Before beginning with the implementation, the literature highly advises stating the essential conditions for deployment [12].

ii. Updating and maintenance: Although AIPMs that are significantly reliant on changes in the outside world require maintenance, there is little instruction available on the subject. AI-based diagnostic algorithms can automate a variety of clinical evaluation jobs, measuring methods, and classification schemes. Developers should update their AIPMs frequently to increase prediction performance as new advancements become available and to prevent dataset shift [13].

Predicting and Forecasting the Outbreak of an Epidemic:

Several experiments have been conducted to obtain training data from the current epidemic and construct an accurate pandemic prediction model. Google Flu Trends introduced a strategy that uses AI and massive social data to estimate and predict real-time flu occurrence via web searches. Health professionals can build better reaction strategies and control the epidemic with this forecasting and prediction. AI-based forecasting models may not accurately depict genuine transmission patterns due to a lack of data. COVID-19's spread through time and place has been tracked and predicted using artificial intelligence proposed a prototype of a dynamic artificial neural network to predict the COVID-19 pandemic's duration [14].

Analytics that Predicts's the Future:

Predictive analytics extracts important information from data to identify critical risk indicators and anticipate real-time virus spread positions. Treatment efficacy and outcome prediction are two more key topics having clinical implications in illness management methods and tailored care plans. Only molecular and clinical data were used to predict cancer outcomes a decade ago. New types of input parameters have been gathered and used for prediction as a result of the development of high-throughput technologies, such as genomics, proteomics, and imaging technologies. Artificial Intelligence analytics can be used to treat chronic diseases with multi-organ involvement, acute variable occurrences, and extended illness progression times [15].

CONCLUSION:

A prediction platform was built based on considerations of different characteristic limitations and forecast result accuracies. The random forecast provides considerable benefits over regression analysis and the support vector machine in epidemic prediction, according to simulation. In this article, Inevitable Epidemic Prediction various diseased conditions can be analyzed by the presence of Artificial Intelligence in the healthcare system. Artificial intelligence (AI) has the potential to create revolutionary and disruptive innovations in health care, thereby improving the lives of both patients and healthcare workers. The established systems have the ability to forecast future outbreaks of the virus by early screening or diagnosis of patient data, as well as explain the legal and ethical problems of medication development in response to public health emergencies, thanks to AI-related technologies.

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Conflict of Interest

The author(s) confirm that this article content has no conflict of interest.

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