

Data Science in Healthcare

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ABSTRACT

Data Science is important in monitoring patients' wellbeing and alerting necessary steps to be taken to avoid diseases. The symptoms of a disease can be predicted quite before they are exhibited by the body. Doctors can now monitor the health of patients without having to be physically present near them, thanks to the advancement of various sophisticated instruments and technology.

Key Words: Data Science, Algorithms, Applications in healthcare.

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INTRODUCTION

The amount of data being stored expands at a rapid rate, and the key issue today is not how to obtain data, but how to extract valuable information from it. There are several powerful resources available to data scientists to aid them in this process, but in order to use them effectively, data scientists must have a strong foundation in mathematics, math, and computer science, as well as the ability to see business issues through the lens of data. "Data science is a discipline that extracts knowledge and insights from structured and unstructured data using scientific methods, procedures, algorithms, and systems."

Algorithms that are currently being used in the healthcare industry:

1. Deep learning
2. Support Vector Machines



Figure 1:

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APPLICATIONS OF DATA SCIENCE IN HEALTHCARE

Medical Image Analysis

One of the most fascinating areas of image recognition technology is medical imaging. Data Science facilitates the identification of scanned images in order to identify a person's defects and assist clinicians in designing a treatment plan that is appropriate for the person. Among these, diagnostic image checks are sonography, X-rays, CT scans, MRI (Magnetic Resonance Imaging), and many more. Through Deep-learning algorithms now it is possible to determine the difference in resolution, and dimension between medical images obtained from X-ray, tomography, and other medical imaging techniques. The comprehensive analysis of these pictures provide useful information for doctors

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which helps them in offering better care to patients, also to improve medical accuracy, detect various diseases, and in assisting the discovery of better care alternatives.

Medical Image Analysis

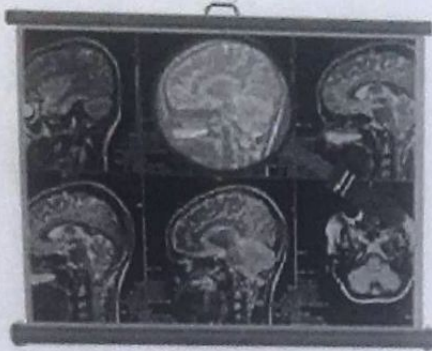


Figure 2:

DRUG DISCOVERY

Finding a new medicinal drug necessitates a number of procedures and tests, as well as a significant investment of time and resources. Data Science helps in minimizing the time as well as resources since millions of calculations are performed in a very short interval of time. The effects of the drug on the human body and the probability of its success can be predicted with the help of analysis of data and using various algorithms. Data is obtained from patient insights such as mutation, response to medication, side effects of the medication etc. and it is analyzed using Data Science to improve the efficiency of drug. As a result, using Data Science and Machine Learning, a properly developed vaccine or drug can be launched in a very short span of time.

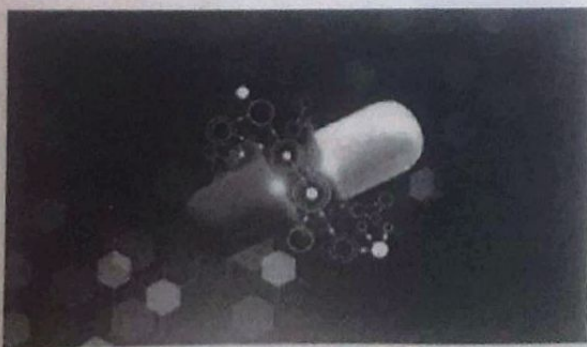


Figure 3:

GENOMICS IN DATA SCIENCE

The goal of genomics research is to discover the characteristics and abnormalities in DNA. It also aids

in the discovery of a connection between an illness its effects, and the health of the individual affected. Doctors can administer therapy more effectively they understand how DNA cells reacts to a certain medication for a patient. Prior to the availability of efficient computing, companies invested a significant amount of time and resources for studying gene sequences. This was a costly and time-consuming operation. With modern data science techniques, it has become possible to study and gain information from human DNA in far less time and at a much cheaper cost. These methods, such as MapReduce, Bioconductor, SQL, and Galaxy, assist the researcher to identify particular genetic conditions and the medicine that better reacts to a particular strain of gene.

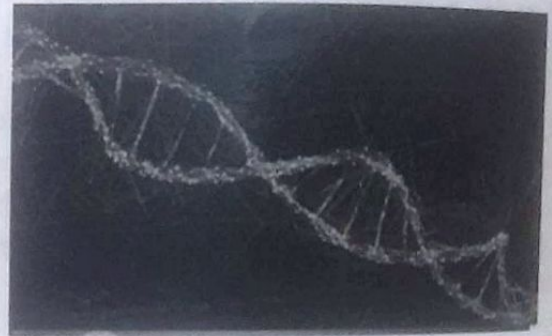


Figure 4:

PREDICTIVE ANALYTICS IN HEALTHCARE

A predictive analytics model is used to forecast outcomes depending on the conditions of patients. It aids in developing plans for the most effective therapy for the patient. It analyses a patient's disease or mutation, makes assumptions, and develops a treatment for the patient. Collecting accurate information of patient is necessary task in predictive analytical model. The Patient's condition becomes worse if we collect incorrect information about patients like Patients' body temperature and BP. This model collects accurate data related to patients and starts evaluation for checking similarities and associations and predicts symptoms of a disease, the degree of injury, and other factors. Predictive analytics can be used to measure and maximize the utilization of staff. Workers can adapt workflow and thereby increase efficiency based on the data. This can also help to minimize waiting time and improve customer satisfaction.

TRACKING AND PREVENTING DISEASE

Data science often informs us of new disease prevention measures that need to be taken, also it is essential in tracking the health of patients. Powerful predictive analytical tools are used by data scientist to detect chronic diseases at an early level. In certain severe scenarios, infections are not detected at an early stage due to their negligibility.

VIRTUAL ASSISTANCE FOR PATIENTS

Researchers have created a robust virtual network that assists patients with the application of disease predictive modelling. There are various applications available that use the concept of data science, where patients simply input their symptoms and the desired application predicts the type of disease and provide solutions to cure it. Often, patients have a tendency of skipping certain doses of medication, which can be avoided with the help of a data science application that notifies patients about their medication intake on a daily basis.

CONCLUSION

Data science will bring us to a world in which there is a lot of technological innovation in the healthcare industry, which will potentially improve our life expectancy.

Medicine and the healthcare sector have made extensive use of data science to forecast diseases at an early stage. Furthermore, with the help of medical image analysis now it possible to find out microscopic tumors. Therefore, data science has come with innovation in healthcare and the medical industry in large ways.

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