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Analyzing role of machine learning in health care system

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Abstract

It has been said before that the best machine learning tool in health care is the doctor's brain. Could there be a tendency for doctors to view machine learning as an unwanted second opinion? At one point, automatic workers worry that robots will get rid of their jobs. Similarly, there may be doctors who fear that machine learning is the beginning of a process that can make them obsolete. But it's an art of medicine that can never be replaced. Patients will always need a human touch and a caring and caring relationship with the people who provide care. Both machine learning, as well as other future technologies in medicine, will eliminate this but will be a tool that doctors use to improve ongoing care.

Keywords: machine, health care system

Introduction

Since the early days of Machine Learning (ML) was inserted in the domain of health sector so as to learn from data, to gain knowledge from experience and to make predictions. The field accelerated by the introduction of statistical learning theory in the late 1960. Although it was at that time a purely theoretical analysis of the problem of function estimation from a given collection of data. With the introduction of new statistical learning algorithms e.g. support vector machine statistical learning theory became more and more interesting as a tool for developing algorithms of practical use for the estimation of multidimensional functions. Machine learning is one of the fastest growing areas of computer science, with far-reaching applications in multiple spheres of life. The role of machine learning in the domain of human health can never be nullified. It holds fundamentals instrumental vale in health sector.

Location of the research gap

Indeed after surveying the related literate, the investigator found numerable research studies had been explored in the same area like machine learning, its applicability, role and process and so on. The coherence based research studies has been conducted by; David R. K. (2018), Chris Williams (2014), Oana Frunza *et al.* (2015), Boser, B. E., Guyon, I. M., Vapnik, V. N. (2015) ^[1] However, there seems least research studies has been conducted in analyzing the role of machine learning in Health care system. In context to same, the investigator availed this opportunity to explore this research study:

Problem in hand

The statement of the research problem is reported as under:
"Analyzing role of machine learning in health care system"

Purpose of the study

The purpose of the study is itemized as under:
To explore the role of machine Learning in Health Care System.

Rationale of the study

In the contemporary world, Machine Learning (ML) hold fundamental significance in and information for classifying short transcripts and relation between diseases and treatments. According to machine learning system the information are shown in short texts when identifying relations between two entities such as diseases and treatment.

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Indeed it is too difficult to grasp the signs and language machine learning. However, continuous efforts are being made by designers to make it process so as to meet its challenges.

Machine learning and computational challenges

The changing needs of healthcare Much has been written concerning the manner in which healthcare is changing, with a particular emphasis on how very large quantities of data are now being routinely collected during the routine care of patients. The use of machine learning methods to turn these ever-growing quantities of data into interventions that can improve patient outcomes seems as if it should be an obvious path to take. However, the field of machine learning in healthcare is still in its infancy. However, for all its difficulties, working with healthcare data is exceptionally rewarding, both in terms of the computational challenges that exist and in terms of the outputs of research being able

to affect the way in which healthcare is delivered. There are few application areas of machine learning that have such promise to benefit society as does that of healthcare.

Data science of healthcare data analytics

There has been information explosion of big data in the healthcare field. Traditional technologies adopted earlier to analyze genomics, DNA, and cancer with trial and methods through Human Genome Project have taken more than a decade to understand and analyze the composition of DNA and the patterns of the data. Big Data Analytics introduced revolutionary tools and techniques to analyze the chronic diseases for prevention and cure. The healthcare data from X-Rays, CT scan and MRI has increased by leaps and bounds concerning the volume of the big data. Though there are several theories and techniques that can be applied for the diagnosis of the illnesses, this paper briefly review some of the key techniques.

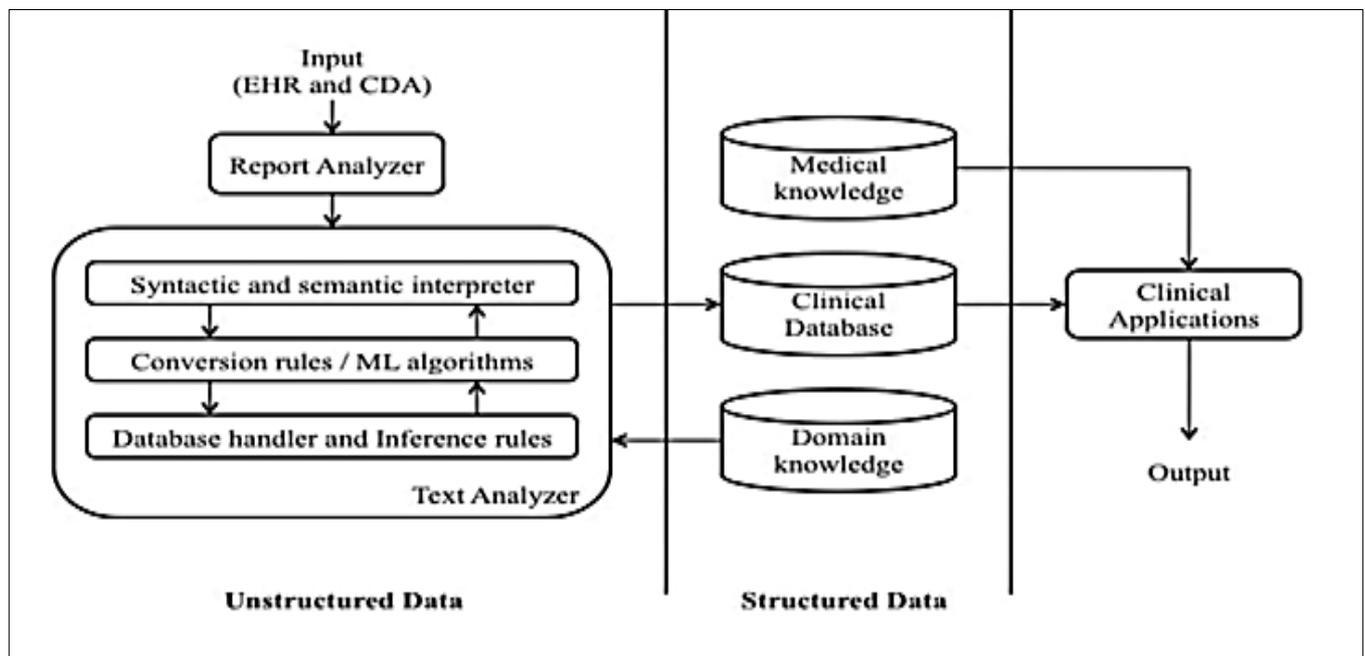


Fig 1: Showing processing process

Healthcare needs to move from thinking about machine learning as a futuristic concept to seeing it as a real-world tool that can be used today. If machine learning has a role in health care, then we must take a new approach. We have to find individual use cases where machine learning capabilities provide value from specific technological applications (e.g., Google and Stanford). This will be a step-by-step path for incorporating more analytics, machine learning, and prediction algorithms into everyday clinical practice. In consonance to same, David R. K. (2018), argued that the role of machine learning is very much significant in the contemporary health care system. Besides, Oana Frunza *et al.* (2015) argued the role of by analyzing that Machine Learning Approach involves automatic extraction of relation between medical concepts. A dictionary of medical terms is used for sentence classification.

Machine and Healthcare

It is noted previously the old adage that “healthcare is hard and a contributing factor to this is that biomedical devices typically operate independently, without knowledge of other

aspects of the patient’s physiology other than that which it is measuring. In this regard, Prof. Gari Clifford of Emory University, USA, is a long-standing contributor to the field of computational approaches to cardiology, and in performing analysis in the presence of the substantial noise that typically exists when patients are monitored while ambulatory. The latter is an important factor in the limited impact that “mobile health” (or m-health) has had in clinical practice, due to the fact that most ambulatory monitoring systems are typically insufficiently robust due to an inability to cope with such data uncertainty. Thus, from the above reported discussion; it is evident that machine learning has vital nexus with human healthcare. Besides, in the contemporary world it is almost impossible to detach machine learning from healthcare system.

Key role of machine learning

The team led by Chris Williams (2014) at the University of Edinburgh, UK, has long been at the forefront of various aspects of machine learning and an important theme of their work is the application of time series analysis methods to

healthcare applications most notably, those pertaining to the intensive care unit (ICU) in the hospital. The ICU is a data rich environment, in which patients are typically monitored continuously for the duration of their stay, and where the nurse-to-patient ratio is typically 1:1 in many healthcare systems. Entering an ICU is to be deluged by data in all its forms: various machines, which may or may not be interoperable, report measurements to the clinician almost constantly. On seeing such an environment, one almost immediately concludes that machine learning has a key role to play in aiding the clinician, by guiding their attention to those components of the data that are most pertinent.

Applied machine learning in health services

Machine learning in medicine recently made headlines. Google has developed a machine-learning algorithm to help identify various diseases on a mammogram article recently reported the results of a deep machine learning algorithm capable of diagnosing diabetic retinopathy in retinal images. It is clear that machine learning places another arrow in the vibration of clinical decision making. However, machine learning is suitable for some processes better than others. Machine learning can provide direct benefits to scientific disciplines with methods that can be reproduced or standardized. Also, those who have large drawing datasets, such as radiology, cardiology, and pathology, are strong and fundamental pillars in treating human health. Machine learning can be trained to see images, identify abnormalities, and point to areas that need attention, thereby increasing the accuracy of all these processes. Long-term, machine learning will be beneficial for family practitioners or internists at the bedside. Machine learning can offer objective opinions to improve efficiency, reliability, and accuracy in the field of treatment of human health.

Challenges of machine learning in healthcare

Having discussed the techniques used in health it is now time to shed light on the challenges we are facing concerning the same. There are various challenges to overcome to quickly integrate ML to Health. By now you would have understood that the key aspect of any machine learning techniques is the availability of data. The major concern faced in machine learning is its implementation in health is also the readiness of data. To be precise, the availability of reliable patient data which fits into the quantity and size required for machine learning training data. Taking into account the constraints prevailing for data privacy and protection it is difficult to find the perfect data that can be fed to the system. Along with this, the format in which the data is available and refining those data (medical history blood samples, MRI/other scan reports, vaccinations, DNA sequences, etc.) into structured data is also a big concern. Another challenge faced is safeguarding ethics while using these data. Machine learning algorithms can wind up providing biased output while decision-making if the data fed is not unbiased. As a significant example, programs developed to assist judges in decision making of sentencing to reflect a huge propensity towards racial discrimination. These errors can also happen in algorithms used in health. A machine learning model would provide different health suggestions for people depending on their race or locality if this issue is not addressed while training the model.

Conclusion

Machine Learning has developed through several transformations since 1952. The scope of integrating various Machine learning techniques as discussed, to any domain, is all-time relevant. Health is one of the fast-developing domains that Machine Learning has already established a strong foundation in. However, Machine Learning in Health is still in its embryo stage. With new machine learning techniques emerging constantly it is difficult to say a certain technique is the best match for Machine learning in health. Even though we have gone through many state of the art techniques used in Health, there is always a chance of a new technique being invented anytime soon that will outperform the existing ones. Health is also finding new ways to collect voluminous data without breaching data privacy issues. There is great potential for further utilization of Machine Learning in health.

Declaring conflict of interest

The investigator found that there is no any scope for conflict of interest.

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