



Using Machine Learning Technique In Health-Care

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Abstract— Applications like machine learning. Machine learning is widely employed and prevalent in a variety of applications. It is crucial to many sectors of the economy, including security, healthcare, and banking. Machine learning is used to uncover patterns in medical data sources and improve disease prediction. In this article, we investigate a number of machine learning approaches that have been utilized to make efficient decision support systems for healthcare applications.

Keywords—cyber security, Machine Learning,health care,artificial intelligence, decision support system

I. INTRODUCTION

Techniques for machine learning are employed in the healthcare industry. The growing number of machine learning applications in healthcare gives us a glimpse of a time in the future when data, analysis, and innovation will work together to help countless patients without their knowledge. [1] In the near future, it will be rather usual to look for ML-based applications that are integrated with real-time patient data from various healthcare systems across numerous nations, boosting the efficacy of the most recent treatment choices that weren't previously available.

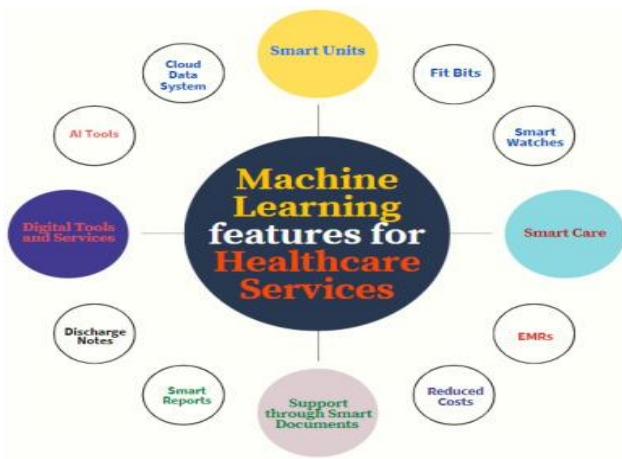


Fig. 1. ML Features in Healthcare

Many different jobs can be solved using machine learning techniques. The uses of machine learning in the healthcare sector include the following: -

- Classification: Using machine learning algorithms, you can identify and categories the sort of ailment or medical condition you're experiencing.
- Recommendations: Machine learning algorithms can deliver essential medical information without the need to actively search for it.
- Clustering: The ability of machine learning to "cluster" together similar medical situations in order to find patterns and direct future research;
- Prediction: Machine learning may predict how future events will unfold by using recent data and well-known tendencies;
- Anomaly detection: With the aid of machine learning, you can spot patterns that are out of the ordinary and decide whether they require action;
- Automation: Machine learning can handle routine repetitive chores, including data entry, appointment scheduling, inventory management, etc., that demand too much time and effort from doctors and patients.
- Ranking: Machine learning may priorities information, putting the most important data at the top to make it easier to locate. [2]

II. THE POSSIBILITIES OF MACHINE LEARNING TECHNIQUES IN HEALTHCARE

If healthcare businesses apply machine learning for the aforementioned tasks, they may have a lot of opportunities. In the first place, it frees up the time of healthcare professionals so they can focus on caring for patients rather than looking up or entering information. The second important contribution of machine learning to healthcare is the increase in diagnostic accuracy. For instance, it has been demonstrated that machine learning is 92% accurate at forecasting COVID-19 patient mortality. [3] Third, using machine learning in medicine can help develop more precise treatment plans. Many medical problems are rare and require a tailored approach to ensure effective treatment and reduce side effects. Machine learning techniques can simplify the search for such solutions. Healthcare service providers can choose better patient diagnoses and treatments thanks to machine learning, which enhances healthcare services in general.

III. BENEFITS OF MACHINE LEARNING TECHNIQUES IN HEALTHCARE

The use of machine learning to healthcare operations can be very profitable for the industry. Machine learning was created to handle the enormous data sets seen in patient files, which need for in-depth analysis and organising. Even if a healthcare professional and a machine learning algorithm will probably reach the same conclusion based on the same data set, using machine learning will produce the results much more quickly, allowing the therapy to start earlier. [4]The partial elimination of human involvement, which reduces the possibility of human error, is another advantage of implementing machine learning techniques in healthcare. This is especially true for activities involving process automation because individuals tend to make mistakes more frequently when performing boring, routine tasks.

Systems for supporting clinical decisions: Clinical decision support systems assist in the analysis of enormous volumes of data to diagnose a condition, choose the next stage of treatment, spot any possible problems, and improve the effectiveness of patient care as a whole. [5]A helpful tool, CDSS helps the doctor carry out their tasks quickly and effectively by reducing the likelihood of making a mistaken diagnosis or recommending an insufficient course of therapy. Although this use of machine learning in healthcare has existed for some time, it has recently grown in popularity. The reasons for this include the increased usage of the electronic health record system (EHR) and the digitization of a variety of data points, including pictures taken by doctors.

Keeping records wisely: Making sure that all patient records are updated on a regular basis may be challenging given that data entry is a laborious process. However, it is also necessary for making shrewd decisions and giving patients better treatment. One method for applying machine learning to the healthcare industry is to utilise optical character recognition (OCR) software on the handwriting of medical professionals. In order to improve patient care and decision-making, further machine learning methods can then look at this data.

Medical imaging using machine learning: For a very long time, X-rays and other medical images were analogue. This has limited the use of technology for locating anomalies, categorising cases, and doing broad study on illnesses. The process has fortunately gotten more digitalized, boosting opportunities for these types of data analysis, including those using machine learning. A recent meta-analysis also revealed that machine learning algorithms are capable of performing the same tasks as human experts, and in some cases, even better. For example, deep learning algorithms' sensitivity and specificity were found to be 87.0 percent and 92.5 percent, respectively, compared to human doctors' 86.4 percent and 90.5 percent. One of the most well-known and effective uses of machine learning in healthcare is the Microsoft InnerEye project. [6]

Personalized medicine: Every case is unique, which is what makes medicine such a difficult and resource-intensive specialty. People frequently have multiple conditions that need to be treated at once. In order to create an efficient treatment plan that accounts for drug interactions and reduces potential side effects, difficult decisions must be taken.

Behavior Adjustments: Every case is different, which is what makes medicine such a challenging and expensive field of study. People frequently need treatment for several illnesses at once. Difficult

decisions must be made in order to develop a treatment strategy that is effective, accounts for drug interactions, and minimizes potential side effects.

Predictive Approach to Treatment: Using a predictive treatment strategy, Early detection of the most deadly diseases can considerably increase the likelihood of a successful recovery. Additionally, it makes it possible to anticipate any prospective deterioration in the patient's condition. One example of the value of machine learning in healthcare is its ability to accurately forecast the onset of some of the most deadly diseases in people at risk. This covers the detection of diabetes symptoms (using a Naive Bayes algorithm), ailments of the liver and kidneys, and oncology.

Data Collection: Correctly compiling a patient's history is one of a doctor's most crucial duties. Since the patient is not an expert and is unsure of whether information is pertinent to provide, this might be difficult very frequently. Healthcare workers can use machine learning in healthcare management to find the most pertinent questions to ask a patient based on a variety of factors. This will facilitate the gathering of pertinent data and provide a forecast of the most probable scenarios.

Care for Seniors and Low Mobility Groups: By detecting typical impediments and figuring out the best routes, machine learning and medicine can help low-mobility populations (such as the elderly and persons in wheelchairs) better their day-to-day lives, forecast and avoid potential injuries, and get treatment as soon as they need it. These solutions work, but not to the extent that is required. Healthcare organisations, however, are already taking steps to make them publicly accessible. For instance, there is a proposal to have AIs handle 75% of senior care in Japan.[7]

Robotic surgery: Surgery necessitates a high level of accuracy, adaptability to changing circumstances, and a consistent approach over a lengthy period of time. Although expert surgeons already possess all these qualities, machine learning in the healthcare sector will soon allow robots to carry out these tasks. Robotic surgery is now very advantageous for human surgeons. Machine learning is particularly useful for enhancing surgical modeling and planning, evaluating the skills of the surgeon, and streamlining surgical processes like suturing.[8]

Drug Development and Production: Based on previously obtained data on active components in pharmaceuticals and how they affect the organism, ML algorithms can model an active component that might be beneficial against another similar ailment. Using this technique, a custom medication can be made for patients with specific medical requirements or a unique combination of ailments. In the future, this machine learning technique might be paired with nanotechnology to enhance the administration of medications.

Clinical Research: Conducting clinical trials and research is an expensive and time-consuming process. It makes sense to do safety studies on novel drugs and medical procedures before implementing them widely. One situation where the remedy needs to be made available right now is with the COVID-19 vaccines. The good news is that the process can be sped up with the use of machine learning techniques. It can be applied to select the best trial sample, gather more data, evaluate the trial participants' ongoing data, and reduce data-based errors.[9]

IV. ETHICS OF EMPLOYING ML IN HEALTHCARE

Machine learning can help people with psychiatric issues and the elderly make decisions that will enhance their health. This has to do with picking the right medications, creating healthy routines,

and when necessary, consulting an expert. But because it can cause people to lose their independence and comply with orders, this poses an ethical issue. It limits their potential range of options to a few put forth ones. As a result, a clear balance between algorithmic instructions and personal autonomy should be provided. The data that the machine learning algorithm was trained on is the only factor that influences its decisions. If the input is unreliable or faulty, the result will also be incorrect. The patient can be harmed or even die as a result of the incorrect decision. In this case, if a patient died as a result of an algorithm's decision, who would be held responsible? At the moment, this is still a question. The decision for the course of therapy will ultimately be made by the patient, who should be informed of all benefits and drawbacks of each treatment option.[10]

V. CONCLUSION

Machine learning has a lot more promise and is now being applied in the healthcare industry in a number of effective ways. Additionally, it can be used to develop medicines, diagnose patients, improve medical care, predict outcomes, and even assist with surgery. Even though machine learning has a lot of potential for the healthcare industry, there are a number of challenges that must be overcome, such as the requirement for a sizable team of data specialists, the development of physician-friendly products, and the integrity of healthcare data. There are also certain moral concerns, such as those related to patient safety and accountability. Despite some challenges, the benefits of ML in healthcare greatly outweigh the negatives.

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