AI-ASSISTED DIAGNOSTICS IN HEALTH MANAGEMENT

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Abstract
Healthcare suffers too much pressure in a context where there is no room for experimentation or mistakes, given the fatal consequences and unpredictable outcomes. This paper aims to present the specifics of health management and usage of artificial intelligence to improve work performance, job satisfaction, and, most importantly, patients' health. This is achieved through the introduction of an artificial intelligence system in healthcare facilities.

Keywords: *artificial intelligence; predictive analysis; health management; health sector.*

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Introduction

Lack of access, cost, waste, and an ageing population are global challenges facing healthcare systems. To name a few significant effects of pandemics like the

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coronavirus (COVID-19) one, shortages of personal protective equipment, insufficient or inaccurate diagnostic tests, overburdened clinicians, and imperfect information sharing are common. More importantly, a healthcare crisis like COVID-19 or the emergence of HIV in the 1980s exposes our health systems' flaws. As healthcare crises exacerbate current issues, we can reimagine and realize new care and back-office systems.

There is no magic solution or technology such as artificial intelligence (AI) that fixes healthcare totally, nor a single technology that resolves all banking, retail, automotive, tech, or other industry problems. Existing healthcare systems are immensely complex, and several structural and functional revision attempts have failed. Complex healthcare systems cannot be repaired, but this paper proposes to rethink how we create productive instruments, experiences, and intelligent systems using data for doctors, nurses, healthcare workers, patients, and healthcare facilities. AI is ready to transform every aspect of healthcare from customer experience and hospital care to cost reduction in healthcare [10].

The Synergy of the Artificial Intelligence and Healthcare

It is long overdue to utilize new technologies in healthcare because of how badly they are needed now. People in healthcare need intelligent systems to aid them because they cannot process the constantly growing complex data AI, machine learning, and deep learning have proven solutions to offer; when implemented, these solutions can improve diagnoses and treatment recommendations while also freeing up time for experts to make better decisions. In addition, by improving the existing process for obtaining more accurate patient data and having automated work help with the less-informative administrative jobs, medical staff can have more satisfying jobs while using this to improve personalized treatment plans for their patients [2].

AI can usually do a specific set of tasks better than humans because there is no fatigue, moral reasoning, or design error when applied to the healthcare industry. This results in better outcomes—patients and employees will benefit [11].

Patients, physicians, and administrators alike will benefit from these technologies, enhancing the patient care system and streamlining many office procedures. Nevertheless, scientific research has shown the benefits of these technologies: early diagnosis of diseases and avoid further consequences. Since algorithms can detect cancer tumours more efficiently than radiologists, this should be viewed as a positive because algorithms can access data about clinical trials

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with detailed information and instructions, whereas if radiologists were the only ones conducting these tests, the resources needed to invest in them would be more significant in terms of money, time, and energy. At the moment, the possibilities of AI in healthcare are considerable. [3]

A general lack of satisfaction with work today is evident in the research and by what we observe in most respondents: They say they are even more dissatisfied with work today than they were five years ago. We should introduce new technologies and relieve human resources to make smarter decisions based on evidence. Is human life, every day, at their mercy? More than 36% of those who believe there is no difference in their work now than before clearly recognize the need for a significant overhaul. [3]

AI is a phrase to describe something that improves cognitive ability with the addition of technology. Machine learning is a subdivision of AI and focuses primarily on algorithms that gather information based on data. Traditional statistics cannot perform those functionalities. In addition, research has shown that theory and experimentation are not the only components of research.

It is a well-known fact that cardiothoracic surgeons are ecstatic to accept the implementation of (AI) and machine learning (ML) to assist them in their surgical procedures. Over the years, experts have improved risk prediction and patient recovery outcomes by utilizing new technologies that support their impressive response efforts. While some think of prophecy as the end-all, be-all of intuition, the options for predicting future outcomes are more numerous than one might believe. Detection of anomalies in medical data is a tool surgeons can use to their advantage in the operating room. There are numerous options available to them, including various risk models. To figure out what is going to happen, you must identify and examine the predictive factors. In addition, the benefits of ML are found in discovering hidden links that the human eye and today's advanced analytics tools are both unequally successful in finding. [8]

ML offers a multitude of advantages. In order to treat patients effectively, doctors must choose from many different types of treatment methods and algorithms. Employees in medical institutions are sceptical about the use of new technologies because of the absence of education. Before they see the direct results of their implementation, they can be worried about implementing the technologies. This is understandable since it shows incompletely processed data, the model learning from algorithms in the operating room or what might be inaccurately predicted treatment and procedure outcomes.
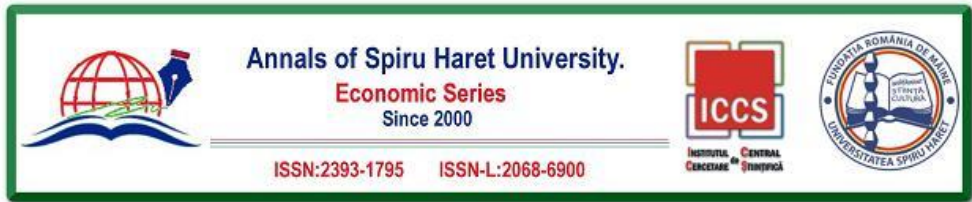
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The algorithms in question are not a total mystery, though they can learn from data and are good at detecting error-causing patterns and errors caused by human mistakes. Rather than being a detriment to their job performance, it should motivate professionals to learn new technologies alongside each other and share that learning with patients. AI, known for its power to drive tremendous development, has drawn scepticism regarding its capacity to innovate without succumbing to bias. It is common to see AI touted as a "cure-all" solution, only to see such benefits stripped away by concerns about its ability to remain free of bias in healthcare and other domains. [8]

In order to avoid discriminatory treatment, there is a process of new model development going on right now that makes sure patients will not be discriminated against based on gender, race, or some other variable when they receive treatment. Despite these issues, every patient will have a tailored treatment plan because humanity has battled for equality through the years. It is not the right time for algorithms to encourage discriminatory behaviour; instead, their job calls for working together to help others. It is impossible to completely understand how the model developed a particular prediction, given the simple terms. It is essential to be aware of the source of your data and the context under which it was acquired to confirm that your model's results are correct [13].

When the analysis uses poor data quality — i.e., to correct extreme values — it could result in wrong predictions, creating complications that were not intended. Although the model can overcome these issues with a high degree of success, there are concerns that the ML algorithm will not solve problems with the data. [6] Low interoperability models must be given robust tests in light of this. The models need to be examined thoroughly and, before using them, we need to understand the data and eliminate any bias.

This is the only way to ensure that they do not create undesirable and dangerous patterns (to say, templates), considering they guide important decisions that will have life-altering consequences. Compared to the humans they serve, intelligent models have access to more significant volumes of data. By using more data, trends can be observed, leading to real-time predictions for each patient. These trends are built from a significant amount of data, but time series patterns also make it possible to discern how patients respond to treatments.

This strengthens the idea that we should all concentrate on bettering our work's design instead of eliminating all present work arrangements. Many institutions, like ours, are trying to figure out how ML and AI will impact the operating room:

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everything from ML assisting in surgery to machines performing surgeries on their own. This development work is being performed given today's advancements in the field. Potential errors are decreased, and thus the procedure results will be more compelling examples of excellent cardiovascular care. As mentioned, the primary goal of predictive analytics is to project future results based on the current data used to store models. Forms of predictive analytics can be seen in the example of cardiac surgery. Siemens Healthineers has developed a solution to read Chest CT automatically produce a medical report containing valuable clinical images and quantifications. [2]

AI-Rad Companion enhances the accuracy of the imaging diagnosis through algorithms. Apart from this, it improves routine tasks and thus facilitates the employees' daily responsibilities, focusing on solving significant problems. AI-Pathway Companion, designed to optimize patient care, is another excellent solution that this company has created. It works by collecting all the patient data, establishing the diagnosis and best course of treatment. This type of long-term diagnostic decision can help doctors better understand patients' needs and help patients learn the context of choices. [7]

In addition to solutions for which the development process is ongoing, standard procedures also stress the importance of using new technology to enhance doctor-patient relationships. Further criteria for necessary clinical research and optimized choice in personalized therapy are established—the Society of Thoracic Surgeons (STS). Consequently, the American Academy of Cardiology's National Cardiovascular Data Registry (NCDR) uses statistical models for similar purposes. [1]

Different ML algorithms, classification and selection methods are used for the prognosis and prediction of diseases. K. Kourou et al. proposed predictive models based on different techniques of supervised ML, including support for vector machines, Bayesian networks and artificial neural networks, and decision-making bodies. They are intended to predict patient outcomes and create further treatment models for high-risk diseases. [4] Sindhu et al. are using six techniques of classifying the thoracic surgery process - Naive Bayes, J48, DEO, OneR, Decision Stump and Random Forest. In conclusion, the Random Forest technique has been determined to provide the best classification accuracy at all percentages [9].

One study included an analysis of four ML techniques (Naïve Baies, Simple Logistic Recovery, Multilayer Perceptron). The results show that the technology for logistical regression is generally better or at least more competitive than the other four ML techniques, which had an accuracy of 84.53% [5].

Conclusion

People have never had the opportunity of a more significant role in healthcare than the one provided by the proliferation of personal healthcare gadgets, intelligent medical equipment and intelligent wearables with sensors that monitor the vital signs of people. Add AI to these technologies, combine them with ambient sensory spaces, and prescribe to improve personal health. Invisible computing is emerging as we now see AI in our daily lives, and it is needed to be even more present in health care facilities [12].

Efforts to implement AI in healthcare care offer great hope of improving general processes and procedures. Given the timeless progress and accelerated development of AI, it is likely that a "machine" or program will at some point "read" radiology and pathology images. The main challenge in healthcare is not whether new technologies can improve everyday life but whether their implementation in daily clinical practices will provide an outstanding response. Given the complexity of the data, these challenges must at some point be overcome.

In addition, the complexity of decision-making goes beyond the capacity of the human brain. Therefore, regardless of their professionalism at work, medical personnel need to invest in education and training–for 5-10 years to gain the experience of using AI in clinical practice. Applying AI as a medical aid will not leave people without jobs. On the contrary, it will help employees themselves and patients. Over time, this synergy will increase employee motivation, improve patient treatment personalization, and use new technologies for the common good.

References
[1] Kilic A, MD (2019), Artificial Intelligence and Machine Learning in Cardiovascular Health Care, DOI: https://doi.org/10.1016/j.athoracsur.2019.09.042
[2] Desuky, L. Bakrawy, (2021) Improved Prediction of Postoperative Life Expectancy after Thoracic Surgery.
[3] Hwang EJ, Park S, Jin K, et al. (2019) Development and Validation of a Deep Learning-Based Automated Detection Algorithm for Major Thoracic Diseases on Chest Radiographs. JAMA Netw Open;2(3): e191095. doi:10.1001/jamanetworkopen.2019.1095
[4] Kourou, K, Exarchos, T. Exarchos, K, Karamouzis, M. Fotiadisa D,. (2015), "Machine learning applications in cancer prognosis and prediction," Computational and Structural Biotechnology Journal, Vol. 13, pp.8-17.
[5] Ahasan, M, Harun U, Nure Alam, M. (2015), "Predicting the outcome of thoracic surgery by data mining techniques," IJARCSSE, Vol. 5, No. 1, pp.7-10.

[6] Ostberg, N. P., Zafar, M. A., & Elefteriades, J. A. (2021). Machine learning: principles and applications for thoracic surgery. European journal of cardio-thoracic surgery: official journal of the European Association for Cardio-thoracic Surgery, ezab095. Advance online publication. DOI: https://doi.org/10.1093/ejcts/ezab095

[7] Robotics and Automation News, 2020, Available at: https://roboticsand-automationnews.com/2020/03/09/how-ai-technologies-accelerate-progress-in-medical-diagnosis/31184/ (Accessed 11.8.2021.)

[8] Stanford University Human-Centred AI, (2021), Available at: hai.stanford.edu/news/using-clinical-text-combat-selection-bias-medical-research (accessed 12.8.2021.)

[9] V. Sindhu, S. A. S. Prabha, S. Veni, and M. Hemalatha. (2014), "Thoracicsurgery analysis using data mining techniques," International Journal of computer Technology&Applications, Vol. 5 pp.578-586.

[10] Holley, K., Becker S., (2021). AI-first healthcare, AI Applications in the Business and Clinical Management of Health. O'Reilly Media.

[11] Davenport, T., & Kalakota, R. (2019). The potential for artificial intelligence in healthcare. Future healthcare journal, 6(2), 94–98. https://doi.org/10.7861/futurehosp.6-2-94.

[12] Bohr, A., & Memarzadeh, K. (2020). The rise of artificial intelligence in healthcare applications. Artificial Intelligence in Healthcare, 25–60. https://doi.org/10.1016/B978-0-12-818438-7.00002-2.

[13] Pager, D., & Shepherd, H. (2008). The Sociology of Discrimination: Racial Discrimination in Employment, Housing, Credit, and Consumer Markets. Annual review of sociology, 34, 181–209. https://doi.org/10.1146/annurev.soc.33.040406.131740.