Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 11 [6] May2022 : 110-114

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

Patient Outcomes, Safety, Engagement, and Experience in the context of Artificial Intelligence

D.Venugopal[1], George Chellin ChandranJ[2], Richa[3],K.Deepti[4], P M Dinesh[5]
1.Professor, Department of Electronics and Communication Engineering, KPR Institute of Engineering and Technology, Coimbatore, Tamilnadu 641407, India.
2.Professor School of Computing Science and Engineering & Director Student Welfare, VIT Bhopal, Madhya Pradesh - 466114, India.
3.Principal,Government Leather Institute, Kanpur, Uttar Pradesh 282006, India.
4.Assistant Professor,Department of Electronics & Communication Engineering, Vasavi college of Engineering, Ibrahimbagh,Hyderabad - 500 031,Telangana, India.
5.Assistant Professor, Department of Electronics and Communication Engineering, Sona College of Technology,Salem 636005,India.
Correspondence e.mail-replyvenugopal@gmail.com

ABSTRACT
The rapid technological boom has resulted in the growth in the utilization of artificial intelligence in various industries. The healthcare industry has explored and deployed artificial intelligence to a vast extent. In this paper, we are going to study the role of artificial intelligence in patient outcomes, patient safety, patient engagement and patient experience. The proposed method utilizes artificially intelligent unsupervised learning in patient outcomes & patient safety. Unsupervised learning has been implemented in the patient's safety & patient outcomes and is an efficient system that provides excellent results.
Keywords: *Artificial Intelligence (AI), Patient Outcomes, Patient Safety, Unsupervised Learning, Deep Learning (DL), Machine Learning (ML), Healthcare Industry*

Received: 19.02.2022 Revised: 30.03.2022 Accepted: 18.04.2022

INTRODUCTION

Artificial intelligence (AI) is defined as the ability of a machine to do tasks that are similar to those performed by humans. These machines were controlled by computer systems. These jobs necessitate the use of human intelligence. It can alternatively be described as computer systems simulating human intelligence processes. Machine vision, natural language processing, and speech recognition are examples of AI applications. The healthcare sector is a multibillion-dollar industry that offers medical services, develops medical equipment, manufactures medications, and provides medical insurance to protect patients' health. The healthcare industry is made up of a variety of firms that provide medical and healthcare-related services. With enough algorithms, Artificial Intelligence can be produced. Combining low-cost human monitoring systems with high-capacity technical data processing units minimizes the work strain of healthcare staff in the medical industry. This comprehensive module examines sensor technologies and how Artificial Intelligence is used in the hospital maintenance environment. Several accelerometer sensors, and light and sound sensors, will be worn by the patients. All of this information is captured by a camera installed within the hospital. The doctors could acquire data relating to the patient's wrist, ankle, arm, and other vital areas using accelerometer type sensors, and we could get a set of information that matches the patient's respiration. Patient outcome is defined as the results of the healthcare services that patients get in the hospital; Patient outcome is characterized as maintaining a patient's functional status, maintaining patient safety, and wellness. Barrett, Matthew, et al. (1) proposed a predictive and preventative medicine strategy in which patients can self-care using an easy-to-access artificial intelligence internet application. This method of medication can also be tailored to the individual. They've identified the requirements in heart failure care, and the necessary paradigm change and the factors needed to make it happen. This technique will lower expenses per patient while also improving outcomes, ensuring the long-term viability of top-tier heart failure care. Park, Seong Ho, et al (2) explained the essential methodology elements at play in a clinical evaluation of AI technology for use

in healthcare, particularly high-dimensional models that use artificial deep neural networks (DNNs), primarily from biostatistics and clinical epidemiology perspectives. They concluded that this technique is necessary for avoiding performance overestimation.

LITERATURE SURVEY

Helm, J. Matthew, et al. (3) conducted a comprehensive analysis of recent and original literature in the field of orthopaedics, to determine its possible influence on the progress of musculoskeletal care. Haleem, Abid, et al. (4) suggested that the Artificial Intelligence (AI) Applications boost the system's ability to analyse and decide on therapy in orthopaedic surgery, in particular. Traumatic fractures, arthroplasty, bone marrow disease detection, and malignancy are all represented by Orthopaedics. AI makes decisions based on prior treatment iterations. This technology can be used to determine a patient's medical condition. Artificial intelligence (AI) in health care, according to Matheny, Michael E., et al (5), can improve patient and clinical team results, lower costs, and influence public health. Kelly, Christopher J., et al. (6) looked into the major obstacles and limitations of artificial intelligence in the healthcare industry. It explores the steps that must be taken to bring these potentially disruptive innovations from the lab to the clinic. Mintz, Yoav, and Ronit Brodie. Et al (7) came up with the notion of using machine learning to evaluate radiological images, patients' electronic medical records (EMR), and pathology slides to aid in patient diagnosis and treatment. In this work, they discuss the current state of AI in medicine. Johnson, Kipp W., et al. (8) provided clinicians with information about artificial intelligence (AI) and machine learning (ML), and an overview of some of these approaches' uses in cardiology. It also indicates how artificial intelligence could be used in cardiovascular therapy in the future. They've gone through predictive modelling topics important to cardiology, including feature selection, and common errors like incorrect dichotomization. In this study, Mushtaq, Junaid, et al. (9) looked at whether the severity of the initial chest X-ray (CXR) as assessed by an AI system might be used to predict prognosis in COVID-19 patients. They came to the conclusion that AI- and radiologist-assigned illness severity scores on CXRs recorded on ED presentation were an effective strategy in COVID-19 patients. In this article Haleem, Abid, et al. (10) have examined and demonstrated how artificial intelligence (AI) assist in providing the solution for difficult challenges in the medical industry through considerable study and development. They concluded that this technology is used to create and improve online patient appointment portals.

MATERIAL AND METHODS

Proposed Work

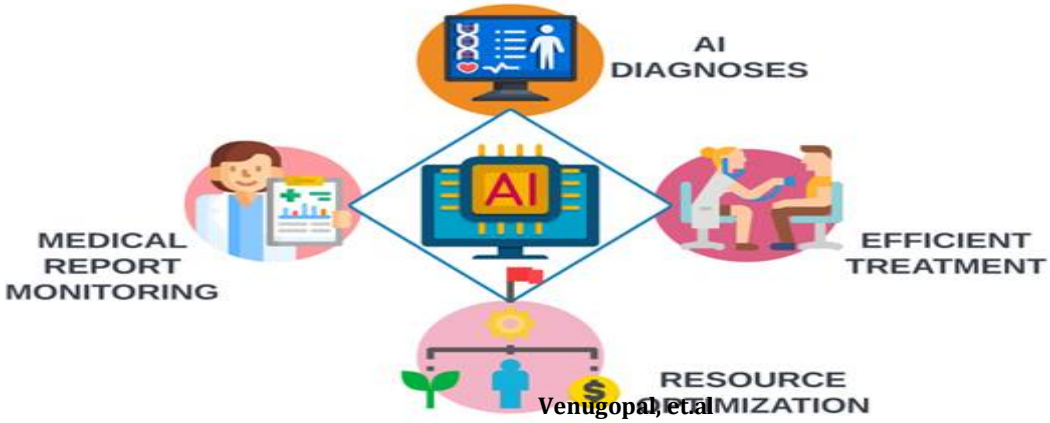

Figure 1: Resource Optimization

The proposed methodology deploys unsupervised learning, which comes under deep learning technology. Deep Learning is a type of Machine Learning that uses Artificial Neural Networks (ANN) to understand, as given in Figure 1. It is a set of algorithms that simulates the human brain's input processing and the creation of end patterns for use in decision-making. Artificial Intelligence's Deep Learning technology is used in various fields to perform automated and physical tasks without the need for human participation. For example, a digital assistant, self-driving automobiles, etc, come under deep learning. Unsupervised learning is a machine learning technique that analyses and clusters unlabeled datasets using machine learning algorithms. Without human intervention, these algorithms uncover hidden patterns and data groupings. It is capable of detecting similarities and contrasts in data. The artificially intelligent system provides efficient treatment to the patients. It handles tasks ranging from medical report monitoring to AI

diagnosis. The Hospital Resource is optimized with the help of the artificially intelligent system. By overcoming the limits in the healthcare industry, unsupervised learning enhances the productivity of healthcare applications. Deep learning algorithms, healthcare applications, and unsupervised learning approach all contribute to improving the process of the healthcare system.

Patient safety was defined as the lack of preventable injury to a patient and the reduction in risk of damage linked with the healthcare process. Every step of the patient process carries some level of danger. Patient security concerns and adverse incidents in healthcare environments have received increased attention. Despite federal and municipal governments, private organizations, and interested institutions' safety activities and investments, studies have revealed unsatisfactory patient care and safety. The incorporation of artificial intelligence (AI) through into healthcare delivery system not only changes aspects such as the role of healthcare workers but also creates new opportunities to improve patient care and safety and treatment quality.Notification of a particle's propagation direction is divided into three phases: velocity restriction, identity, and social behaviour. The $\frac{\sum_{i=1}^{O} Q_i P_i}{U}(Q_i \in Q))$ attitude updating of a material with and in generation has previously been defined by a subatomic particle stance t formation and also the generation demands mobility direction, as illustrated in the equation (1) well below.

$$e = \frac{(\varphi\phi_{35} + \varphi\phi_{04})^2 + 4\varphi\phi_{22}^2}{(\varphi\phi_{35} + \varphi\phi_{04})^2} + e^{i(Q_{q,p} * A)} - e^{-\frac{\delta^2}{3}} \qquad (1)$$

A Multiclass Support Vector Machine is being used as the supervised strategy to train, pre-process, extract features, and categorize the hospital's service categories using the equation (2).

$$B = e^{i(Q_{q,p} * A)} - e^{-\frac{\delta^2}{3}} + \frac{\sum_{i=1}^{O} Q_i P}{\sum_{i=1}^{O} P_i} = \frac{\sum_{i=1}^{O} Q_i P_i}{U}(Q_i \in Q) \qquad (2)$$

The learner's as a whole optimal solution effectiveness, along with $\phi_{q,p}$ the servicescape needing to learn path produced by comment section feature, is determined through recalibrating coefficients, as shown in equation (3), which is a usable representation of a personalised supervised learning navigation optimization algorithm.

$$\phi_{q,p} = \frac{\|Q_{q,p}\|^2}{\delta^2} exps\left(\frac{(Q_{q,p} * A)}{3\delta^2}\right) * \sum\left[e^{i(Q_{q,p} * A)} - e^{-\frac{\delta^2}{3}}\right] (3)$$

The total expenditure in patient information among the more hospital patients is determined by the equation (4) $w$the spending optimization problem incorporates both facility resources.

$$\boldsymbol{w = \frac{\nabla^a x}{|\nabla^a x| + t}|d|^{-0.6} \int_{-\infty}^{+\infty} d(\tau) h(\tau - r) e^{-jb\tau} d\tau} \qquad (4)$$

RESULTS AND DISCUSSION

AI is broadly described as a computer software that can make intelligent decisions. The definition of AI used in this analysis is a computer any health care smartphone's ability to analyse large amounts of clinical information, uncover secret information, identify hazards, and improve communication.

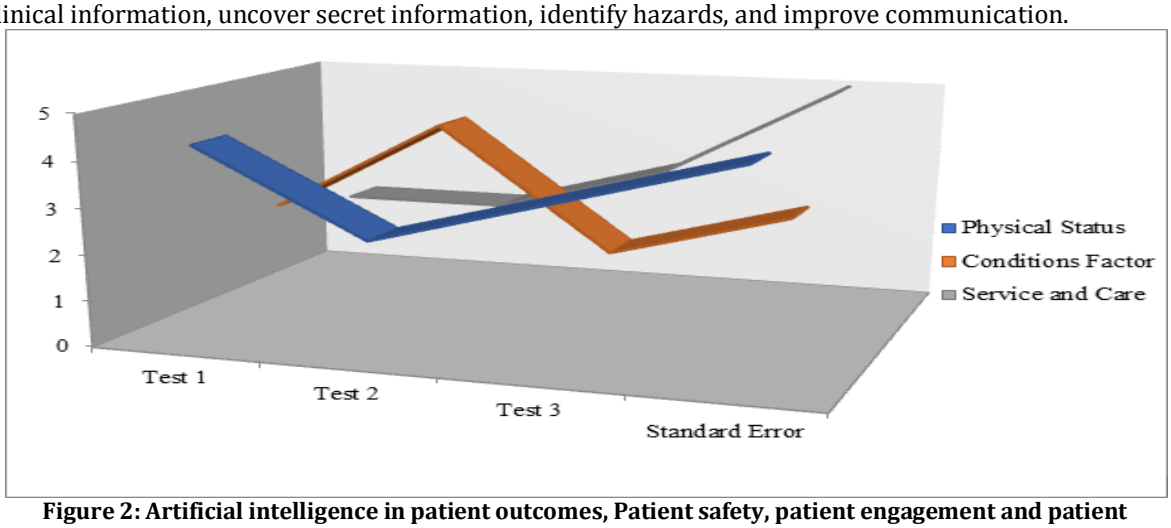

Figure 2: Artificial intelligence in patient outcomes, Patient safety, patient engagement and patient experience

In this sense, AI includes both machine learning and artificial intelligence language processing. Without explicit instructions, machine learning allows computers to use labeled (supervised learning) and unprocessed (unsupervised learning) information to identify hidden information and make predictions

about just the data. Among the different kinds of AI, machine learning like natural language processing has societal implications with in health care domain and are widely used in the field. Reinforcement learning is the third category of machine learning, where an algorithm strives to complete a task simultaneously learning of its failures and successes. Artificial neural networks and deep learning are further examples of machine learning.Artificial intelligence focuses on teaching a computer to understand the human language and sequentially convert literature to machine-readable data structure, which may subsequently be examined using machine-learning techniques. The distinction between natural image processing with machine learning wasn't well defined in the literature. However, as shown in Figure 2, investigations in the healthcare field have already been conducted employing machine learning and natural in conjunction using machine-learning algorithms.

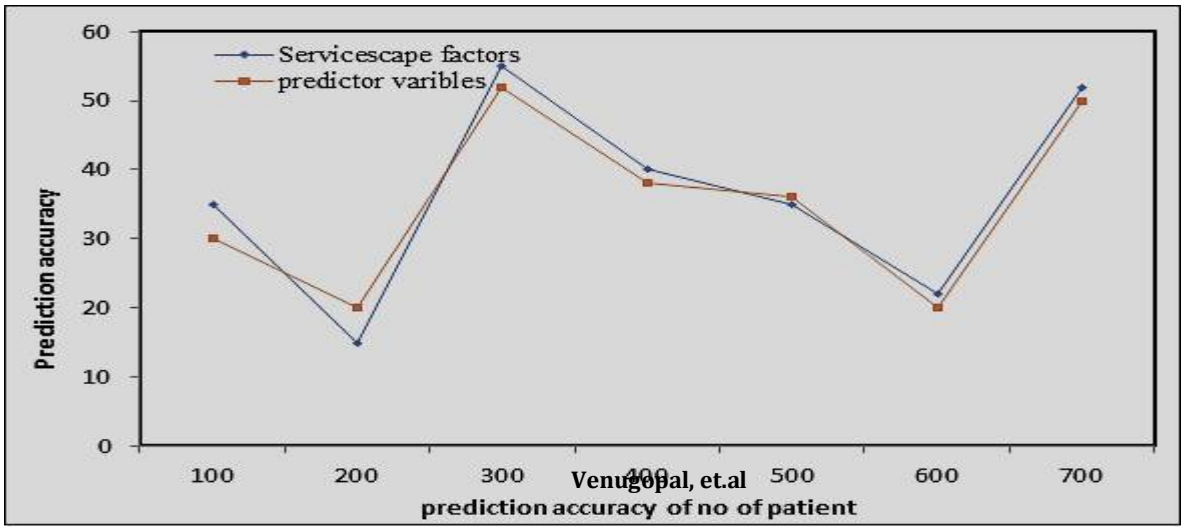

Figure 3: Analysis of Prediction Accuracy on Patient outcomes, Patient safety, patient engagement and patient experience

AI has the ability to help physicians make better diagnoses and has made contributions to medication research, customized medicine, including patient care monitoring. AI has also been integrated into Electronic Medical Record (EHR) systems to discover, assess, and mitigate patient safety hazards. However, with the implementation of AI within health care, a number of hazards and obstacles may arise on an individual basis. The measurement of AI accuracy often does not imply therapeutic efficacy. Another popular statistic, the Area underneath the Receiver Operating Characteristic Curve (AUROC), is not always the best indicator of clinical relevance. Such AI measurements may be difficult for clinicians to understand or may be clinically insignificant. Furthermore, the models have been tested using a range of factors and report various measures including the F1 score, accuracy, and false-positive rate, which seem to be indicative of diverse components of AI's analysis is given in Figure 3. Understanding how complicated AI works necessitates technical understanding that is uncommon among clinicians. Furthermore, clinicians may lack the necessary knowledge to detect underlying AI flaws such as information bias, overfitting, and other software faults that may result in misleading results. Such AI weaknesses can lead to inappropriate medicine dose and unsatisfactory treatment.

CONCLUSION

Patient Safety has become a challenging point that each hospital have to face. In this research, supervised and unsupervised algorithms are considered. The analysis is performed under parameters of physical status, conditions factor, service and care in the context of Artificial Intelligence. Further, the analysis is performed to predict the patient outcomes, patient safety, patient engagement and patient experience and the output is represented as AUROC.

ACKNOWLEGEMENT

The authors acknowledge the subjects who were involved in the study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest for this study

REFERENCES

1. Barrett, Matthew, et al.(2019). "Artificial intelligence supported patient self-care in chronic heart failure: a paradigm shift from reactive to predictive, preventive and personalised care." *Epma Journal* 10.4: 445-464.
2. Park, Seong Ho, and Kyunghwa Han. (2018)."Methodologic guide for evaluating clinical performance and effect of artificial intelligence technology for medical diagnosis and prediction." *Radiology* 286.3: 800-809.
3. Helm, J. Matthew, et al. (2020)."Machine learning and artificial intelligence: definitions, applications, and future directions." *Current reviews in musculoskeletal medicine* 13.1: 69-76.
4. Haleem, Abid, et al. (2020). "Artificial Intelligence (AI) applications in orthopaedics: an innovative technology to embrace." *Journal of clinical orthopaedics and trauma* 11.Suppl 1: S80.
5. Matheny, Michael E., Danielle Whicher, and Sonoo Thadaney Israni.(2020). "Artificial intelligence in health care: a report from the National Academy of Medicine." *Jama* 323.6: 509-510.
6. Kelly, Christopher J., et al. (2019). "Key challenges for delivering clinical impact with artificial intelligence." *BMC medicine* 17.1: 1-9.
7. Mintz, Yoav, and Ronit Brodie.(2019). "Introduction to artificial intelligence in medicine." *Minimally Invasive Therapy & Allied Technologies* 28.2: 73-81.
8. Johnson, Kipp W., et al.(2018). "Artificial intelligence in cardiology." *Journal of the American College of Cardiology* 71.23: 2668-2679.
9. Mushtaq, Junaid, et al.(2021) "Initial chest radiographs and artificial intelligence (AI) predict clinical outcomes in COVID-19 patients: analysis of 697 Italian patients." *European radiology* 31.3,: 1770-1779.
10. Haleem, Abid, Mohd Javaid, and Ibrahim Haleem Khan. (2019)."Current status and applications of artificial intelligence (AI) in medical field: An overview." *Current Medicine Research and Practice* 9.6: 231-237.

CITATION OF THIS ARTICLE

D.Venugopal, George Chellin Chandran, Richa, K.Deepti, P M Dinesh,Patient Outcomes, Safety, Engagement, and Experience in the context of Artificial Intelligence.Bull. Env. Pharmacol. Life Sci., Vol 11[6]May 2022: 110-114