



## A review of Artificial intelligence – driven innovations in the healthcare and pharma sector

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### ABSTRACT

This paper aims to examine the use of artificial intelligence (AI) in human healthcare and a number of critical areas as well as their effects. The first section of the report explains the history of artificial intelligence in the healthcare department and about the present report. When the show's host discusses the use of such a technology it then proceeds to explore some of the fields in which AI is registering a considerable impact. In the presented section on Medical Imaging and Diagnosis, objectives of the usage of AI in the analysis of medical images, forms of pictures that may be analysed, valuable use of AI in diagnosis, and samples of AI applications are elaborated. In the section about the personalized medicine the change in working of healthcare as a result of the use of AI to analyze patient data, linking of Genetic data and patient records, and creating personalized treatment plans are discussed. Going further, the report looks into the application of AI in the drugs discovery and development processes the challenges facing drug discovery, how AI can speed up the discovery of drugs, machine learning algorithms and predictive modelling, as well as the AI-enabled clinical trials and drug optimization. Virtual assistants and chatbots are reviewed as AI solutions in healthcare with regards to advantages, patient awareness, remote surveillance, feasible applications, concerns, and disadvantages. The section on enrollment data shares the information on enrollment trends, proactive data analytics for patient profiling, and the use of predictive modeling for developing strategies for early intervention of disease conditions. The report then turns to robot-assisted surgery looking at the introduction of robot- assisted surgery, advantages of using AI-enabled robotic systems, surgical accuracy, improvements in capabilities, existing uses and future potential. Organizational and process changes are considered in relationship to automating administrative tasks, improving the scheduling and billing processes, handling of EHRs and the consequences for human health care workers and patients. Altogether, this report can be Actually consider a detailed overview of how AI is being applied to human-healthcare to enhance the approach by which health-care is delivered, enhance Patient's outcomes and changing the health-care system.

**Key Words:** Artificial intelligence, Healthcare, Surveillance, Clinical trial, Patient, Drug

### Introduction :

Transformative technology Artificial Intelligence (AI) is gaining significant attention and being implemented in human healthcare to improve patient care, enhance diagnostic accuracy, streamline administrative processes, and facilitate medical research. [15]

In various industries, including healthcare, AI is emerging as a technology with immense potential. Technologies such as machine learning, natural language processing, computer vision, and robotics are employed by AI to replicate human intelligence, process large data volumes, identify patterns, and make informed decisions. In the healthcare context, diseases can be diagnosed, treated, and managed through the use of AI, leading to improved patient outcomes and more efficient healthcare delivery. [1]

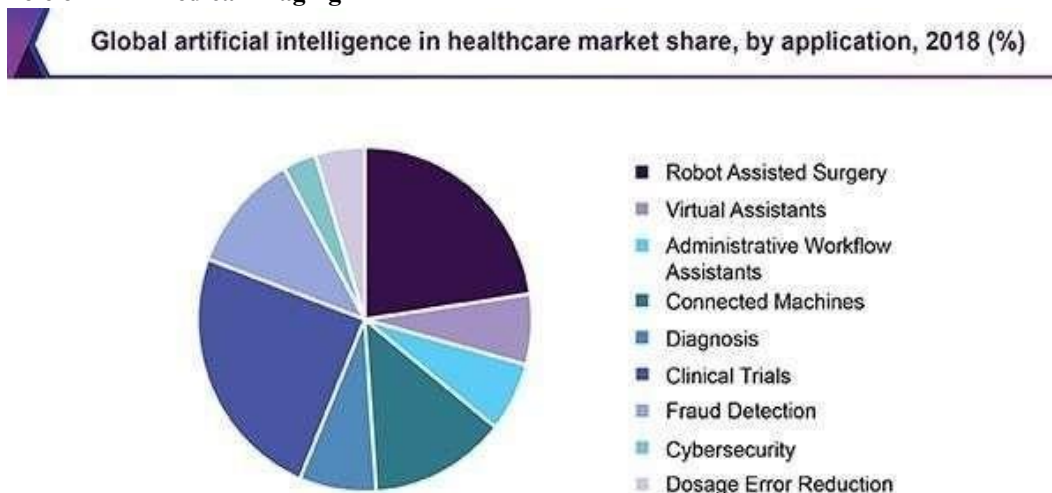
An in-depth exploration of the implementation of AI in human healthcare is provided by this report. Various aspects of healthcare are being transformed through the utilization of AI, shedding light on the methods in which this technology is being applied. In medical imaging and diagnosis, AI is used to enhance accuracy and efficiency. Personalized medicine

benefits from AI's ability to analyze vast amounts of data to tailor treatments to individual patients. Drug discovery and development are accelerated through AI's predictive capabilities. Virtual assistants and chatbots use AI to provide efficient and personalized patient care. Predictive analytics and early intervention rely on AI to identify potential health issues before they become serious.[14]

Robot-assisted surgery allows for greater precision and consistency, while administrative and workflow optimization streamline processes and reduce errors. The benefits, challenges, and ethical considerations associated with integrating AI into healthcare systems will be examined. The potential impact of AI on healthcare providers, patients, and the overall healthcare landscape will be explored. [2]

Figure 1 Artificial Intelligence in the Field of Medicine  
**MEDICAL IMAGING AND DIAGNOSIS**

**A. Role of AI in medical imaging**



Source: www.grandviewresearch.com

Medical imaging is crucial for diagnosing and monitoring various diseases. It is revolutionized by AI, which enhances its capabilities. AI algorithms analyze medical images, such as X-rays, CT scans, MRIs, and ultrasound images, to assist healthcare professionals in making accurate diagnoses by detecting abnormalities. Potential areas of concern in medical imaging can be automatically identified and highlighted by these algorithms, assisting radiologists and clinicians in their decision-making process. Healthcare providers can reap benefits such as improved efficiency, increased diagnostic accuracy, and reduced interpretation errors by utilizing AI in medical imaging. [3]

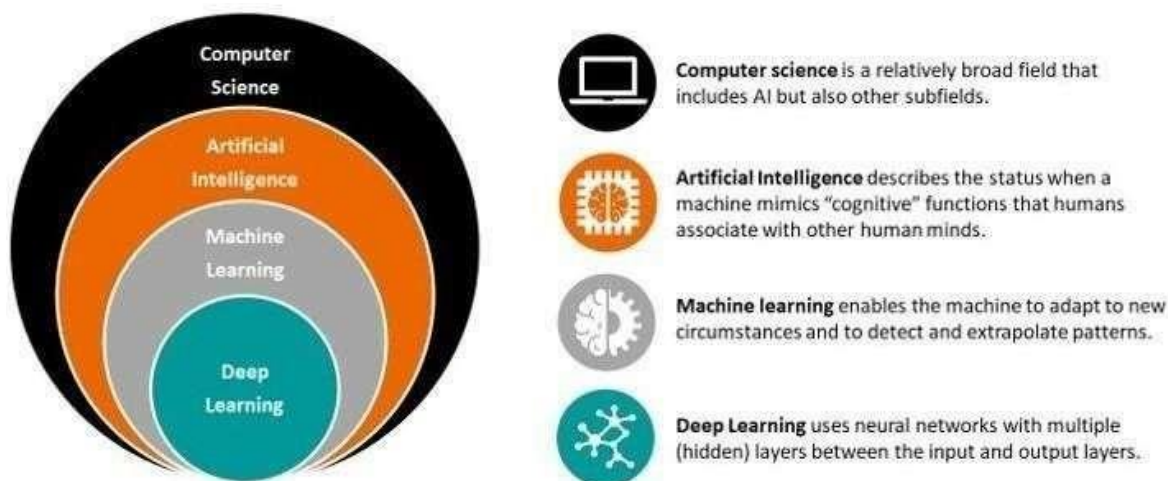


Figure 2 Artificial Intelligence in Radiology

**B. Types of medical images analysed by AI**

Medical images across multiple specialties can be analysed by AI algorithms.

For example, in radiology, AI can analyze X-rays to identify fractures, detect lung nodules, or assess signs of pneumonia. In neurology, MRI scans can be analysed by AI algorithms to detect brain tumors, strokes, or abnormalities in brain structure. AI can also analyze cardiac images, such as echocardiograms, to evaluate heart function and detect cardiac abnormalities. [4] The versatility of AI in analyzing various medical images makes it a valuable tool in different areas of healthcare.

### **C. Benefits of AI in diagnosis**

Several benefits are brought to the diagnostic process by the use of AI in medical imaging. AI algorithms can identify subtle patterns and anomalies in medical images, assisting in the early detection of diseases that might be missed by human observers. Timely interventions and improved patient outcomes can result from this early detection. [5] Additionally, AI can help reduce diagnostic errors and improve accuracy by providing a second opinion and flagging potential abnormalities for further review by healthcare professionals. The diagnostic process can be made more efficient by AI, which automates tasks such as triaging and prioritizing images. This results in a reduced workload for radiologists and faster turnaround times. [13]

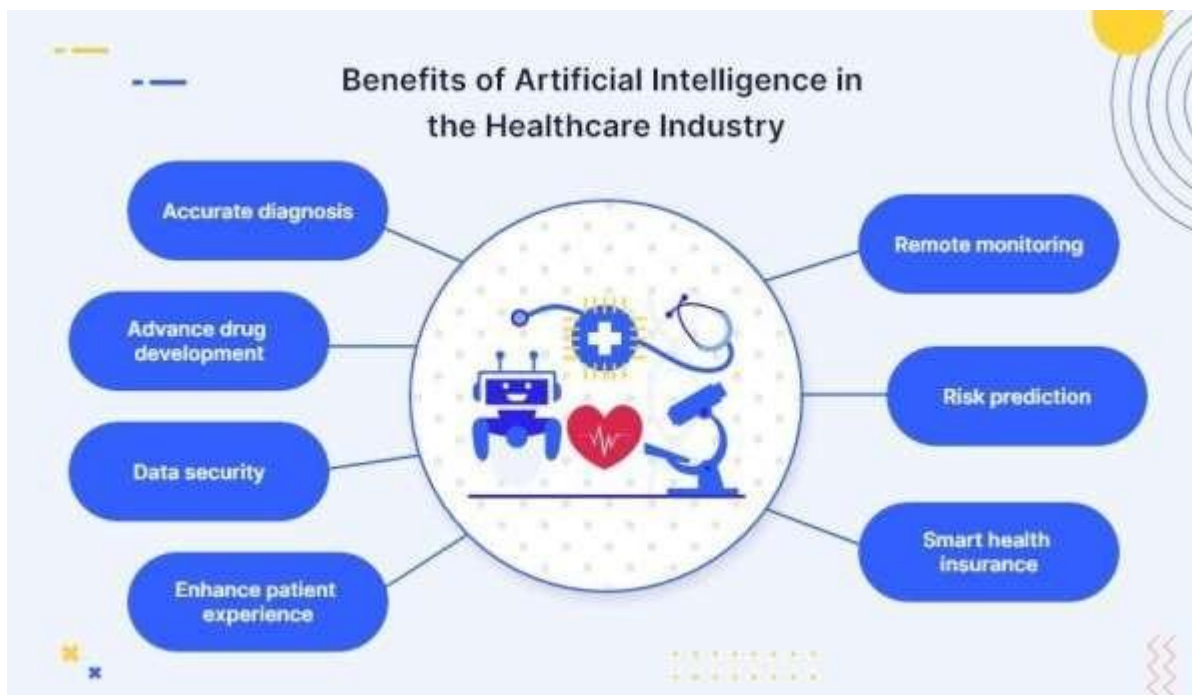


Figure 3 Benefits of AI

### **D. Examples of AI applications in medical imaging**

Use cases in medical imaging are rapidly evolving with AI applications. One prominent example is the detection of breast cancer in mammograms. Mammographic images and retinal images can be analysed by AI algorithms, assisting in the identification of suspicious lesions or calcifications in mammographic images and diabetic retinopathy in retinal images. This analysis can lead to early detection and improved survival rates in mammographic cases, as well as prevent complications in diabetic patients. AI algorithms can assess retinal images for signs of retinopathy, enabling early intervention and preventing vision loss. Also, AI has been applied to analyze lung CT scans for the early detection of lung cancer, helping identify nodules and assess their malignancy potential. The significant impact of AI is highlighted in these examples, as it improves diagnostic accuracy and facilitates early intervention in critical conditions. [6]

Healthcare professionals can benefit from the advanced algorithms of AI in medical imaging and diagnosis, which can enhance their accuracy and improve patient outcomes.

## **DRUG DISCOVERY AND DEVELOPMENT**

### **A. Challenges in traditional drug discovery**

Traditional drug discovery and development processes are time-consuming, costly, and often yield limited success rates. Identifying potential drug candidates requires extensive experimentation, screening of large compound libraries, and rigorous testing in preclinical and clinical stages. This process typically takes years and involves substantial financial investments. Additionally, the identification of drug targets and understanding their

complex interactions within biological systems presents significant challenges. Traditional methods rely heavily on trial and error and can overlook potential drug candidates or fail to accurately predict their efficacy and safety profiles. [12]

### B. Role of AI in accelerating drug discovery

Potential drug candidates can be identified by analyzing vast amounts of biological and chemical data using AI algorithms. These algorithms can process genomic data, protein structures, and molecular interactions within the realm of traditional drug discovery. AI-based approaches can systematically search large databases, predict drug-target interactions, and prioritize molecules for further investigation. [7]

AI leverages can reduce the time and cost involved in drug discovery for researchers, potentially leading to the development of novel therapeutics for various diseases.

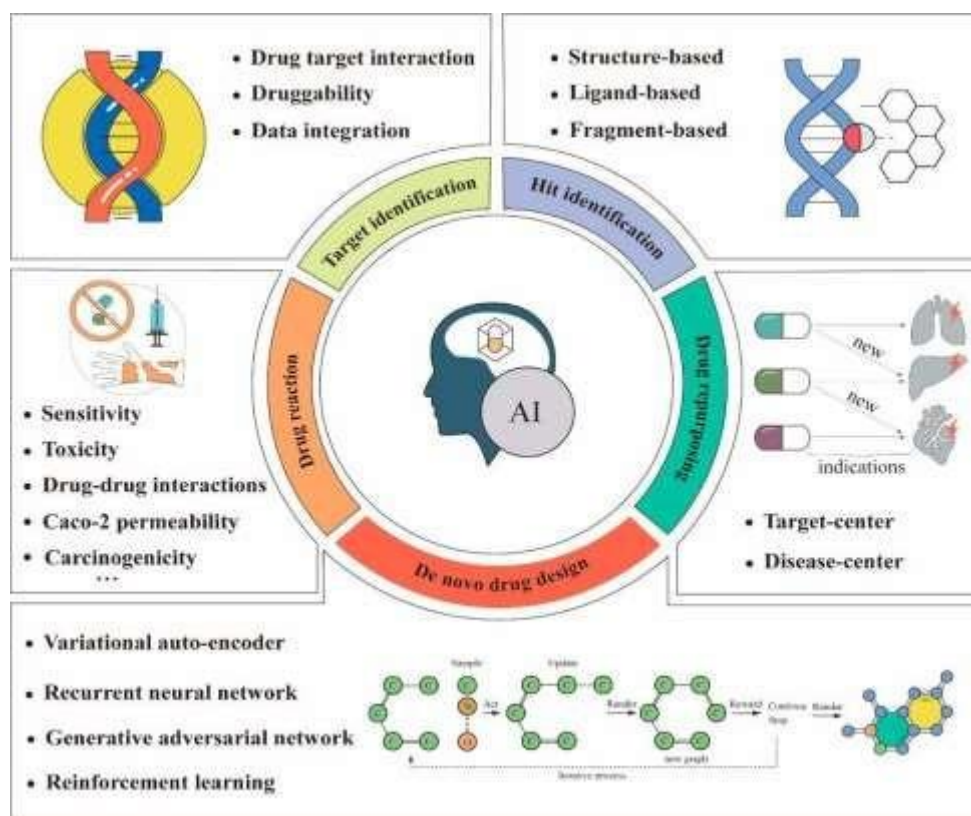


Figure 5 Anti-Cancer Drug Design

### C. Machine learning algorithms and predictive modeling

Machine learning algorithms are key components of AI used in drug discovery. These algorithms can analyze and learn patterns from large datasets to make predictions and guide decision-making. In drug discovery, machine learning algorithms can be trained on existing drug data, including information about molecular structures, biological activities, and clinical outcomes. Once trained, these algorithms can predict the effectiveness of new compounds, optimize molecular structures to enhance drug potency, and identify potential off-target effects or adverse reactions. Predictive modeling through machine learning enables researchers to narrow down the pool of potential drug candidates and focus resources on the most promising ones. [11]

### D. AI-assisted clinical trials and drug optimization

Clinical trials and drug optimization are being transformed by AI. Patient populations are identified, suitable patient responses are predicted, and trial protocols are optimized through the use of AI algorithms. [8]

By analyzing diverse patient data, AI can aid in patient stratification, enabling more targeted and efficient clinical trials. Additionally, AI algorithms can monitor and analyze real-time patient data during clinical trials, providing insights into treatment efficacy, safety, and potential adverse events. This real-time analysis can help optimize dosing regimens and enhance patient outcomes.

Moreover, AI can assist in drug repurposing, which involves identifying new therapeutic uses for existing drugs. Large-scale data, including electronic health records and molecular profiles, can be analysed by AI to uncover

connections between existing drugs and different disease indications. This approach offers the potential for accelerated drug development by repurposing known drugs with established safety profiles. [9]

AI expedites drug discovery and development, identifying potential candidates faster, optimizing clinical trials, and aiding in drug repurposing. Researchers harness its power to improve efficiency and success rates, potentially leading to safer and more effective therapeutics being developed. [10]

### **Conclusion:**

This report, we have explored the implementation of AI in human healthcare. Various areas are making significant impacts with AI, including medical imaging and diagnosis, personalized medicine, drug discovery and development, virtual assistants and chatbots, predictive analytics and early intervention, robot-assisted surgery, administrative and workflow optimization, and the associated challenges, being discussed. Healthcare can be revolutionized by AI, which can improve diagnostic accuracy, personalize treatment plans, accelerate drug discovery, enhance surgical precision, streamline administrative tasks, enable early intervention and preventive care, optimize workflows, improve patient experiences, and contribute to better health outcomes. The challenges of implementing AI in healthcare, including data privacy, regulatory compliance, system integration, and ethical considerations, must be addressed by healthcare organizations, policymakers, and technology providers through the development of robust frameworks ensuring responsible and ethical use. Essential for successful implementation are investing in infrastructure, training healthcare professionals, and fostering a culture of innovation. These challenges can be addressed, and the power of AI can be harnessed to unlock its full potential in human healthcare, transforming the way we deliver and experience healthcare services.

AI can revolutionize human healthcare, improve patient outcomes, and enhance the overall healthcare experience in the future. Challenges notwithstanding, careful planning, collaboration, and adherence to ethical principles can enable AI to create a more personalized, efficient, and accessible healthcare system for all.

### **Reference :**

1. Shah, N. H., & Wright, A. (2018). Artificial intelligence in healthcare: Past, present, and future. *American Journal of Managed Care*, 24\*(5), 150-156.
2. He, J., Wu, J., & Zhang, L. (2020). Artificial intelligence in healthcare: Past, present, and future. *Nature Medicine*, 26\*(1), 16-28.
3. Razzak, M. I., Imran, M., & Xu, Y. (2018). Deep learning for medical image analysis: A survey. *Computerized Medical Imaging and Graphics*, 66\*, 1-10.
4. Neri, E., & Castiglioni, I. (2020). AI in medical imaging and healthcare. *AI Open*, 1\*, 1-8.
5. Esteva, A., Kuprel, B., & Novoa, R. A. (2017). Dermatologist-level classification of skin cancer with deep neural networks. *Nature*, 542\*(7639), 115-118.
6. Siontis, K. C., & Ioannidis, J. P. (2018). The role of artificial intelligence in healthcare. *American Journal of Clinical Pathology*, 150\*(4), 453-462.
7. Kumar, V., & Ghosh, M. (2019). Advances in AI for drug discovery and development. *Pharmaceutical Research*, 36\*(3), 1-12.
8. Choi, E., Schuetz, A., & Stewart, W. F. (2017). Doctor AI: Predicting clinical events via recurrent neural networks. *Proceedings of the 2017 Conference on Neural Information Processing Systems (NeurIPS)\**.
9. Greenwood, B. N., & Agarwal, A. (2020). Exploring the use of predictive analytics in healthcare. *Health Affairs*, 39\*(5), 865-873.
10. Krittanawong, C., Wang, Z., & Aydin, O. (2020). Artificial intelligence in healthcare: An overview and future directions. *Journal of Clinical Medicine*, 9\*(6), 1774.
11. Obermeyer, Z., Powers, B. W., Vogeli, C., & Mullainathan, S. (2019). Dissecting racial bias in an algorithm used to manage health of populations. *Science*, 366\*(6464), 447-453.
12. Min, J. K., & Kim, Y. W. (2020). Artificial intelligence in radiology: Current trends and future directions. *Journal of the American College of Radiology*, 17\*(10), 1379-1386.
13. Liu, X., & Chen, H. (2020). Artificial intelligence in medical imaging: A review. *Journal of Healthcare Engineering*, 2020\*, Article ID 9239235.
14. Bresnick, J. (2021). Virtual assistants and chatbots in healthcare: Transforming patient care. *Health IT Analytics\**.
15. Mittelstadt, B. D., & Floridi, L. (2019). The ethics of artificial intelligence in healthcare. In *Oxford Handbook of AI Ethics\**.