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Review Article

Evolution of Artificial Intelligence Is a Revolution in Medical Science

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Abstract

Artificial Intelligence (AI) is a prime instance of a technological breakthrough that has widespread medical applicability at present as well as future. This technology has multi-dimensional progression. Modern medical service became vibrant with the use of this technology. AI has its rich history of development which has been contributed by genius people around the globe. History of AI is important to realize its potentiality by analyzing its past, which helps in forecasting future. AI is becoming popular in different arena of medical science. It is now applied in cardiovascular diseases, Pulmonary Medicine, Endocrinology, Nephrology, Gastroenterology, Neurology, Dermatology, Ophthalmology, Pathology, Oncology, Radiology, Surgery and also in Telemedicine. Algorithms like Aidoc's detect pulmonary embolism in chest CT scans with 85% sensitivity and 99% specificity. AI based (deep-learning model) mammography and skin cancer diagnosis performs at or above human specialist level. It is the need of time to train medical man power in this field. Enhancing the skill of medical professional in this regard will develop a new generation of doctors to fulfill the need of future. It should be noted that the ethical dilemmas, privacy, data protection, informed consent, social gaps, medical consultation, empathy, and sympathy are various challenges in using AI. We should be aware that its negative aspects might not outweigh its benefit. Introduction of AI and machine learning in medicine helped health professionals to improve the quality of care. It has the potential to improve even more in near future and beyond.

Keywords

Artificial Intelligence, Neural Networks, Medical Field, Healthcare

1. Introduction

Artificial Intelligence is the technological advancement which has spread its involvement in almost every sphere of life. Medical science is the subject which always gets priority for progression of human civilization. AI is a prime instance of a technological breakthrough that has wide spread medical applicability at present as well in future. Modern medical services became vibrant with the use of this technology. AI is applied to a machine or software and refers to its capability of

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simulating intelligent human behavior, instantaneous calculations, problem-solving, and evaluation of new data based on previously assessed data. AI includes various techniques such as machine learning (ML), deep learning (DL), and natural language processing (NLP), shown in Figure 1. AI has undergone significant transformations, from the early days of rule-based systems to the current era of ML and deep learning algorithms [1, 2]. This technology in medical science is expanding very rapidly and it is expected to be more popular in coming days.

AI has a tremendous potential to revolutionize health care and make it more efficient by improving diagnostics, detecting medical errors, and reducing the burden of paperwork [3, 4]. The year 2022 brought AI into the mainstream through widespread application of generative pre-training transformed (GPT). The most popular application is Open AI's Chat GPT. Chabot is a computerized program that uses AI and Natural Language Processing (NLP) to understand questions and automated responses simulating human conversation. OpenAI's Chatbot allegedly gained more than 1 million users in the first few days after its launch and 100 million in the first 2 months, positioning itself as the fastest-growing consumer application in history [5]. Technology attracted scientists of all arenas to take advantage of their rapidly growing sophisticated advancement. Medical sector also increasingly becoming involved in this technology. Everyday newer methods are applied to get better medical service to serve humanity. Figure 1.

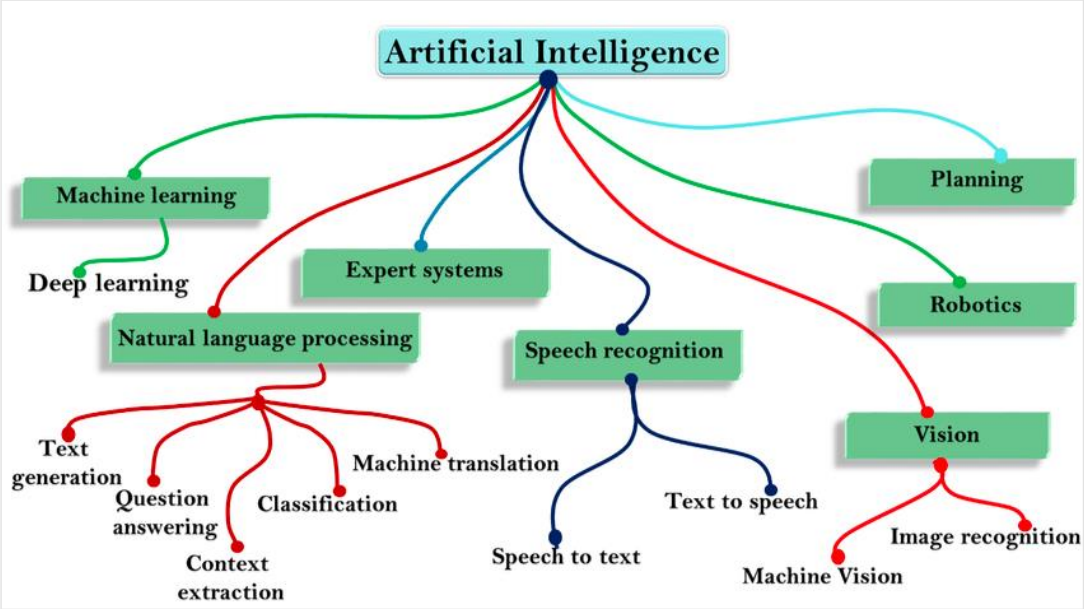

Figure 1. *Role of different component of AI, used in medical science.*

Numerous applications of AI have been introduced to enhance the strength and performance of available medical infrastructure. These implementations include assistance in disease detection, enhancement of pathology classification, interpretation of radiology scans and outlining electrocardiogram for cardiac study [6]. Apart from these applications, researchers have used AI for the detection of tumor, tuberculosis, and even COVID-19. A recent study (February 2025) launched by NHS (National Health Service), the world's biggest trial of AI to detect breast cancer, AI will be deployed to analyze two-thirds of at least 700000 mammograms done in England [7]. Medical imaging such as electrocardiography (ECG), electroencephalography (EEG), skin images, retinal photography, histology, X-ray, computed tomography scan (CT scan), magnetic resonance imaging (MRI) are the potential tools which can be interpreted by AI. In a study published in March 11, 2024, issue of Communications Medicine, John Hopkins researchers showed that a deep neural network based automated detection tool could assist emergency room clinicians in diagnosing COVID-19 by analyzing lung ultrasound images with a high degree of accuracy. [8] A substantial chunk of healthcare data, including clinical laboratory reports, physical examinations, discharge summaries, and operation notes - usually remains narrative, which would be amorphous and inaccessible to computer algorithms. In this situation, Natural Language Processing (NLP) aims to gather relevant data from the available chunk to support clinical judgments [9]. AI can provide earlier warning for seizure and sepsis that often require intense manual analysis physically and almost impossible to guess by doctors. Thus, this technology can easily predict those life threating incidences long before its attack. Using real- time data, collected by electronic medical record (EMR), from the intensive care unit (ICU) daily practice, AI algorithm established with preselected features and X G Boost can provide a timely diagnosis of sepsis with an accuracy greater than 80%. [10] Early prediction and detec-

tion are critical for improving prognoses through targeted prevention. For instance, AI holds significant potential in preventing dementia by predicting its onset well before clinical symptoms arise, enabling timely interventions to delay progression and enhance quality of life [11]. AI's application in artificial reproductive technique (ART) has immense potential to improve success rates, streamline treatment processes, and provide personalized care to patients. Some studies, including research published in The Lancet, have shown AI-enhanced embryo selection significantly increases IVF success rates. [12, 13] The advent of artificial intelligence technologies particularly emerging large language model (LLM) and generative AI, encompasses identification of disease targets, drug discovery, preclinical and clinical studies, and post-market surveillance. [14] According to WHO, Artificial Intelligence is being used to strengthen health research, support diverse public health intervention, such as disease surveillance, outbreak response and health systems management. AI could empower patients to take greater control of their own health care and to better understand their evolving needs. Artificial Intelligence have the characteristics of observation, learning, analytical ability and problem-solving. One of the most significant benefits of AI is improved diagnostic speed and accuracy. This review article provide insight of the current state of AI in medical science, its application and challenges. By doing so, it helps to contribute to a better understanding of AI's role in healthcare and to facilitate its integration into clinical practice.

2. Methodology

Medline and internet searches were carried out using the keywords 'Artificial Intelligence' and 'neural networks (computer)'. Further references were obtained by cross referencing from key articles. An overview of different Artificial Intelligence is presented in this paper along with the review of important applications.

3. History

Every invention in this world is the result of hard work and passion of a group of scientists. Similarly, AI has its rich history of development which has been contributed by genius people around the glove. To know the history of AI is important to realize its potentiality by analyzing its past, present and which helps in forecasting future. AI has gained momentum in recent past in all spheres of life more specifically in medical sector, but concept and basic work started long before. Earliest substantial work in the field of AI was done in mid-20th century by the British logician and computer pioneer Allan Matheson Turing. Scientists began laying the groundwork for artificial intelligence in the earth 1950s and here exploring multiple AI medical applications by the 1970s. In the 1980s and beyond, Al found its way into maximum clinical settings, using artificial neural network, Bayesian network and hybrid intelligence. AI the term first coined by American scientist John Mc Cathy in Dartmouth conference in 1956. He is one of the founding fathers of Al, defined it as "the science and engineering of making intelligence marching ". The period from 1956 - 1974 could be considered as the golden year of Artificial Intelligence research while robot was first introduced, termed WABOT-1 in Japan. Late 1980 WABOT -2 was developed. The 1980s and 1990s brought the proliferation of the microcomputer and new levels of network connectivity. During this time, there was a recognition by researchers and developers that AI systems in healthcare must be designed to accommodate the absence of perfect data and build on the expertise of physicians. Approaches involving fuzzy set theory, Bayesian networks, and artificial neural networks, have been applied to intelligent computing systems in healthcare [15-19]. Further in 2010 Computer Aided Diagnosis (CAD) was applied to endoscopy for the first time. In 2015 Pharmbot was developed. In 2017 the first FDA approved cloud-based DL application. From 2018 to 2020 several AI trials in gastroenterology were performed.

Medical and technological advancements occurring over the last half-century that have enabled the growth of healthcare-related applications of AI to include: Improvements in computing power resulting in faster data collection and data processing, growth of genomic sequencing databases, widespread implementation of electronic health record systems, improvements in natural language processing and computer vision, enabling machines to replicate human perceptual processes enhanced the precision of robot-assisted surgery, increased tree-based machine learning models that allow flexibility in establishing health predictors, improvements in deep learning techniques and data logs in rare diseases [20-26]. Medical institutions such as The Mayo Clinic, Memorial Sloan Kettering Cancer Center, and the British National Health Service, have developed AI algorithms for their departments. Large technology companies such as IBM and Google, have also developed AI algorithms for healthcare [27-30]. In 2020 Google Deep Mind used AI to solve the "protein folding problems "a grand challenge that existed for over fifty years and predicts a protein three-dimensional structure from its amino acid sequence. Open AI in 2021 introduced Dall-E multimodal AI system that can generate image from text prompts. Open AI released Chat GPT in November 2022. Open AI announced GPT 4 multimodal large language model (LLM) that receives both text and image prompt. History of AI shows modern technology is rapidly growing in different sectors.

4. Application

AI has numerous applications in pharmacology as well as different sectors of clinical medicine shown in Figure 2.

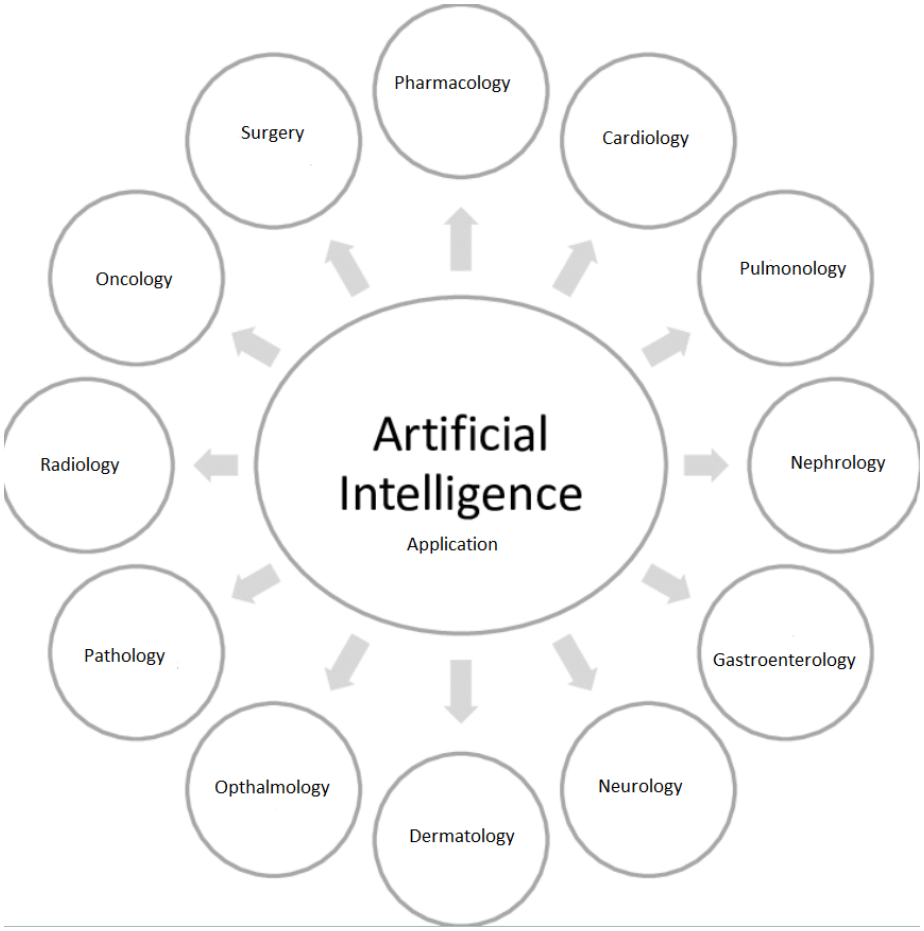

Figure 2. *AI application in different branch of medical science.*

4.1. Pharmacological Application

AI is rapidly transforming pharmacology, impacting everything from drug discovery and development to clinical trials and patient care. Important AI component such as machine and deep learning algorithms have been used in a variety of drug discovery processes, including physio-chemical, poly-pharmacology, drug repositioning, quantitative structure-activity relationship, pharmacophore modeling, drug monitoring, toxicity prediction, ligand-based virtual screening, structure-based virtual screening, and peptide synthesis activities [31]. AI accelerates drug discovery, improves clinical trial and optimizes supply chain resulting greater efficiency and innovation.

4.2. Clinical Applications

4.2.1. Cardiovascular

(i) Atrial Fibrillation - The early detection of atrial fibrillation was one of the first applications of AI in medicine. AliveCor received FDA approval in 2014 for their mobile application Kardia allowing for a Smartphone-based ECG monitoring and detection of atrial fibrillation.

(ii) Cardiovascular risk - AI has been used to predict the risk of cardiovascular disease, for instance acute coronary syndrome and heart failure better than traditional scales by using electronic patient record [32, 33].

(iii) Valvular disease - Potential area of research is the utility of AI in classifying heart sound and diagnosing valvular disease.

4.2.2. Pulmonary Medicine

The interpretation of pulmonary function tests has been reported as a promising field for the development of AI applications in pulmonary medicine. A recent study reported how AI-based software provides more accurate interpretation and serves as a decision support tool for pulmonary function tests [34, 35].

4.2.3. Tuberculosis

Monitoring the treatment of tuberculosis both Directly Observed Therapy (DOT) and other ways are well controlled and manipulated by AI.

4.2.4. Endocrinology

Medtronic received FDA approval for their Guardian system for glucose monitoring, which is smartphone paired [36].

4.2.5. Nephrology

Artificial Intelligence has been applied in several settings in clinical nephrology. For instance, it has been proven useful for the prediction of the decline of glomerular filtration rate in patients with polycystic kidney disease, and for establishing risk for progressive IgA nephropathy [37, 38].

4.2.6. Gastroenterology

Gastroenterologists are using convolutional neural networks among other deep learning models to process images from endoscopy and ultrasound and detect abnormal structures such as colonic polyps [39, 40]. Endoscopic procedures with AI help clinicians to rapidly identify diseases, determine their severity and visualize blind spots.

4.2.7. Neurology

(i) Seizure detection devices using AI devices are promising technologies that have the potential to improve seizure management through permanent ambulatory monitoring.

(ii) Gait, Posture, and Tremor Assessment Wearable sensors have proven useful to quantitatively assess gait, posture, and tremor in patients with multiple sclerosis, Parkinson's disease, Parkinsonism, and Huntington's disease [41].

4.2.8. Dermatology

Dermatology is an imaging abundant specialty. There are three imaging types in dermatology- contextual images, micro images and macro images. AI is a promising technology for analyzing these images.

4.2.9. Ophthalmology

AI is utilized in screening of eye diseases. In 2018 US FDA authorized the marketing of the first medical service to diagnose diabetic retinopathy using AI algorithms.

4.3. Pathology

AI assisted pathology tools have been developed to assist with the diagnosis of a number of diseases including breast cancer, hepatitis B, gastric cancer and colorectal cancer. AI has also been used to predict genetic mutations and prognosticate disease outcome.

4.3.1. Oncology

AI has been explored for use in cancer diagnosis, risk stratification, molecular characterization of tumors, and cancer drug discovery. A challenge in oncologic care that AI is being used to predict accurately the best treatment protocols for each patient based on their genetic, molecular, and tumor-based characteristics.

4.3.2. Radiology

AI is being studied within the field of radiology to detect and diagnose diseases through Computed Tomography (CT) and Magnetic Resonance (MR) Imaging. It may be particularly useful in settings where demand for human expertise exceeds supply, or where data is too complex to be efficiently interpreted by human readers. AI can also provide non-interpretive benefits to radiologists, such as reducing noise in images, creating high-quality images from lower doses of radiation, enhancing MR image quality, and automatically assessing image quality.

4.3.3. Surgery

(i) Robots that may undertake complex surgical treatments, such as minimally invasive and surgeon-less surgeries, are known as "Surgical Robots". The systems represented are the gold standard of care in many laparoscopic operations, with approximately a million operations performed each year. Robotic surgery enhances the effectiveness, precision, and reliability of surgical operations allowing quicker recovery and better patient outcome [42, 43].

(ii) Polyp Detection and Treatment with AI.

(iii) Patients undergoing robot-assisted radical hysterectomy required fewer blood transfusions than those undergoing total laparoscopic radical hysterectomy (9.7% vs. 5.4%) and had shorter lengths of stay.

4.3.4. Telemedicine

AI integrated telemedicine has gained popularity day by day which contribute health care in remote station including diagnostic, treatment planning & patient monitoring. AI can remotely monitor information through sensors [44-46].

5. Discussion

The use of AI technology in medicine involves the use of machine learning and deep learning models to analyze medical data that help improvement of patient outcomes. The availability of data and computing power allowed the exponential rise of Artificial Intelligence in research work and its application in various fields of medical science. Various medical disciplines have increasingly adopted use of AI technology to enhance better health care.

Artificial Intelligence research in healthcare has attracted researchers around the globe, but high-income countries dominate the field. The United States contributed about 41.84% of the studies in this field. In comparison, this research field in developing nations remains small because many low income countries have limited healthcare resources, but their public health issues are growing dramatically as a result of rapid globalization and urbanization. Consequently, most research outputs were generated in developed countries, even though 80% of the global population resides in developing countries. These disparities are caused by several factors, including funding, prioritization, research capacity, infrastructure, and language [47].

A number of ways it will be augmenting health care system but human socialization, and doctor's clinical judgment for individual case will be lacking. It is also essential need of time to train medical man power in this field. Enhancing the skill of medical professional in this regard will develop a new generation of doctors to fulfill the needs of the future. AI applications in healthcare have changed the medical field, including imaging and electronic medical records (EMR), laboratory diagnosis, treatment, augmenting the intelligence of the physicians, new drug discovery, providing preventive and précised medicine, biological extensive data analysis, speeding up processes, data storage and access for health organizations. It should be noted that the ethical dilemmas, privacy and data protection, informed consent, social gaps, medical consultation, empathy, and sympathy are various challenges that will be faced in using AI. Therefore, before integrating artificial intelligence with the healthcare system, practitioners and specialists should consider all four medical ethics principles, including autonomy, beneficence, no maleficence, and justice in all aspects of health care [48-52].

AI is being successfully applied for image analysis in radiology, pathology, and dermatology, with diagnostic speed exceeding, and accuracy paralleling medical experts. As dermatology is strongly based on analyzing skin surface texture. Han et al. showed keratinocytes skin cancer detection from face photographs [53]. Esteva et al. demonstrated dermatologist-level classification of skin cancer from lesion images [54]. Noyan et al. demonstrated a convolutional neural network that achieved 94% accuracy at identifying skin cells from microscopic Tzanck smear images [55]. All these works indicate dermatology will be dependent on AI in near future.

In 2018, a paper published in the journal Annals of Oncology mentioned that skin cancer could be detected more accurately by an Artificial intelligence system (which used a deep learning convolutional neural network) than by dermatologists. On average, the human dermatologists accurately detected 86.6% of skin cancers from the images, compared to 95% for the CNN machine [56].

Several deep learning and artificial neural network models have shown accuracy similar to that of human pathologists.

AI uses data from types of sensing technology, including vital sign monitoring, wearable's such as insoles in shoes, pressure sensors, and computer vision, to embed clinical alarms and reports in the workflow.

Sepsis has become an area of focus in recent AI efforts, given the high mortality associated with this condition and the importance of early detection. AI algorithm used Electronic Health Record (EHR) data in combination with blood pressure and heart rate measures to predict sepsis much earlier in intensive care unit (ICU) [57, 58]. By 2030, chronic diseases will account for 70% of all human deaths, resulting in a serious global disease burden [59]. As a result, researchers are concentrating their aspirations and endeavors on early detection and condition management using advanced AI technology [60, 61].

The rise of surgical robots and robotic nurses in healthcare environment, operating instead of surgeons and caring for patients instead of nurses, threatens their future job opportunities [62]. Due to uniquely human emotions, human and medical robots might not evolve together in a short time. Physicians and other care providers should seek consultation from or provide consultation to their colleagues, which is not possible in autonomous (robotic) systems. On the other hand, it seems unlikely that patients will accept "machine-human" medical relations instead of "human-human [63]. Doctors and nurses are expected to provide treatment in an empathetic and compassionate environment, which will significantly affect the healing process of patients. The use of medical robots in psychiatric hospitals may adversely affect patients who have severe psychiatric disorders. Consequently, we should be aware that its negative aspects might outweigh its benefits. To overcome this problem, experts must consider humanity and ethics in this regard. Surgical robot which helps explain the Neural ink brain chip has come up with a next-generation neuroprosthetic that intricately interfaces with thousands of neural pathways in the brain. This process allows a chip, roughly the size of a quarter, to be inserted in the place of a chunk of a skull by a precision surgical robot to avoid accidental injury.

The introduction of AI will change the skills and expertise of healthcare professionals. AI could enable automation of tasks that have previously been carried out by human. This could free up health professionals to spend more time engaging directly with patients. Frey and Osborne estimated that, probability of future employment in administrative healthcare jobs automation is relatively high (e.g., 91% for health information technicians), the probability of automating the jobs of physicians and surgeons is only 0.42% [64]. The tremendous potential of AI in healthcare does not lie in the possibility of replacing physicians, but rather in the capacity to increase physician's efficacy by redistributing workload and optimizing performance. AI offers numerous benefits; it also raises ethical concern related to data privacy, algorithmic bias and potential for job displacement.

6. Conclusion

With the introduction of more innovative and new generation artificial intelligence tools, healthcare is more advanced in the sense of more awareness, more efficient patient care, prediction of disease and its complication earlier, accurate diagnosis and precise treatment. AI made medical intervention and procedure pinpoint.

Abbreviations

AI	Artificial Intelligence
ML	Machine Learning
DL	Deep Learning

NLP	Natural Language Processing
GPT	Generative Pre-training Transformed
NHS	National Health Service
ECG	Electrocardiography
EEG	Electroencephalography
CT scan	Computed Tomography Scan
MRI	Magnetic Resonance Imaging
EMR	Electronic Medical Record
ICU	Intensive Care Unit
ART	Assisted Reproductive Technology
CAD	Computer Aided Diagnosis
LLM	Large Language Model
DOT	Directly Observed Therapy

Author Contributions

Inzamamul Islam: Methodology, Supervision, Writing – original draft, Writing – review & editing

Nargis Ara Begum: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Md Aminul Islam: Supervision, Writing – review & editing

Alfi Rafita Islam: Software, Visualization, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] New a. Suleimenov IE, Vitulyova YS, Bakirov AS, Gabrielyan OA. Artificial Intelligence: what is it? Proc 2020 6th Int Conf Comput Technol Appl. 2020; 22-5. https://doi.org/10.1145/3397125.3397141

[2] New. b. Davenport T, Kalakota R. The potential for artificial intelligence in Healthcare. Future Healthc J. 2019; 6(2): 94-8. https://doi.org/10.7861/futurehosp.6-2-94

[3] Ahn, J. S., Ebrahimian, S., McDermott, S., Lee, S., Naccarato, L., Di Capua, J. F., Wu, M. Y., Zhang, E. W., Muse, V., Miller, B., Sabzalipour, F., Bizzo, B. C., Dreyer, K. J., Kaviani, P., Digumarthy, S. R., & Kalra, M. K. (2022). Association of Artificial Intelligence-Aided Chest Radiograph Interpretation With Reader Performance and Efficiency. JAMA network open, 5(8), e2229289. https://doi.org/10.1001/jamanetworkopen.2022.29289

[4] Patel, S. B., & Lam, K. (2023). ChatGPT: the future of discharge summaries? The Lancet. Digital health, 2023 Mar, 5(3), e107-e108. https://doi.org/10.1016/S2589-7500(23)00021-3

[5] Homolak J. Opportunities and risks of ChatGPT in medicine, science, and academic publishing: a modern Promethean dilemma. Croat Med J. 2023, Feb; 64(1), 1-3. https://doi.org/10.3325/cmj.2023.64.1

[6] Yan Li, Li Q, Fu K, Zhou X, Zhang K. Progress in the Application of Artificial Intelligence in Ultrasound Assisted Medical Diagnosis. *Bioengineering* 2025, 12(3), 288; https://doi.org/10.3390/bioengineering12030288

[7] Denis Campbell. NHS to launch world's biggest trial of AI breast cancer diagnosis. The Guardian. Tue 4 Feb 2025. https://www.theguardian.com/society/2025/feb/04/nhs-to-launch-worlds-biggest-tr

[8] Roberto Molar Candanosa. AI can now detect Covid-19 in lung ultrasound images. Communication Medicine. March 2024. Johns Hopkins Magazine.

[9] Kumar K, Kumar P, Deb D, Unquresan ML, Muresan V. Artificial Intelligence and Machine Learning Based Intervention in Medical Infrastructure: A review & future trend. Healthcare (Basel). 2023 Jan 10; 11(2): 207. https://doi.org/10.3390/healthcare11020207

[10] Yuan K C, Tsai L W, Lee K H, Cheng Y W, Hsu S C, Lo Y S, Chen R J. The development an artificial intelligence algorithm for early sepsis diagnosis in the intensive care unit. I J Med Inf. 2020, September 104176 volume 141. https://doi.org/10.1016/j.ijmedinf.2020.104176

[11] Guo Y., You J., Zhang Y., et al. (2024). Plasma proteomic profiles predict future dementia in healthy adults. *Nat. Aging* 4. https://doi.org/10.1038/s43587-023-00565-0 [11, dementia].

[12] Illingworth P. J., Venetis C., Gardner D. K., et al. (2024). Deep learning versus manual morphology-based embryo selection in IVF: A randomized, double-blind noninferiority trial. *Nat. Med*. 30. https://doi.org/10.1038/s41591-024-03166-5

[13] Kieslinger D. C., Lambalk C. B. and Vergouw C. G. (2024). The inconvenient reality of AI-assisted embryo selection in IVF. *Nat. Med.* 30: 3059-3060 https://doi.org/10.1038/s41591-024-03289-9

[14] Zhang K, Yang X, Wang Y, Yu Y, Huang N, Li G et al. Artificial Intelligence in drug development. Nature Medicine. 2025 january (31), 45-59.

[15] Miller RA. "Medical diagnostic decision support systems--past, present, and future: a threaded bibliography and brief commentary". Journal of the American Medical Informatics Association. 1994 Jan, 1(1): 8-27. https://doi.org/10.1136/jamia.1994.95236141

[16] Adlassnig KP. "A fuzzy logical model of computer-assisted medical diagnosis". Methods of Information in Medicine. 1980 July, 19(3): 141-148. https://doi.org/10.1055/s-0038-1636674

[17] Reggia JA, Peng Y. *"Modeling diagnostic reasoning: a summary of parsimonious covering theory". Computer* Methods and Programs in Biomedicine. 1987 Sept, 25(2): 125-134. https://doi.org/10.1016/0169-2607(87)90048-4

[18] Baxt WG. "Use of an artificial neural network for the diagnosis of myocardial infarction". Annals of Internal Medicine. 1991. Dec, 115(11): 843-848. https://doi.org/10.7326/0003-4819-115-11-843

[19] Maclin PS, Dempsey J, Brooks J, Rand J. "Using neural networks to diagnose cancer". Journal of Medical Systems. 1991, feb, 15(1): 11-19. https://doi.org/10.1007/bf00993877

[20] Koomey J, Berard S, Sanchez M, Wong H. "Implications of historical trends in the electrical efficiency of computing". IEEE Annals of the History of Computing. 2010, Mar, 33(3): 46-54. CiteSeerX 10.1.1.323.9505. https://doi.org/10.1109/MAHC.2010.28 S2CID 8305701.

[21] Barnes B, Dupr éJ (2009). Genomes and what to make of them. University of Chicago Press.

[22] Jha AK, DesRoches CM, Campbell EG, Donelan K, Rao SR, Ferris TG, et al. "Use of electronic health records in U.S. hospitals". The New England Journal of Medicine. 2009, april, 360(16): 1628-38. https://doi.org/10.1056/NEJMsa0900592

[23] Banko M, Brill E (July 2001). "Scaling to very very large corpora for natural language disambiguation" (PDF). Proceedings of the 39th Annual Meeting on Association for Computational Linguistics. Association for Computational Linguistics: 26-33. Archived from the original (PDF) on 2019-04-07. Retrieved 2019-04-07.

[24] Dougherty G (2009). Digital image processing for medical applications. Cambridge University Press.

[25] "Artificial Intelligence and Machine Learning for Healthcare". Sigmoidal. 21 December 2017. Archived from the original on 17 August 2020. Retrieved 26 March 2018.

[26] Hu L, Li L. "Using Tree-Based Machine Learning for Health Studies: Literature Review and Case Series". International Journal of Environmental Research and Public Health. 2022, Dec, 19(23): 16080. https://doi.org/10.3390/ijerph192316080

[27] Power B (19 March 2015). "Artificial Intelligence Is Almost Ready for Business". Harvard Business Review. Massachusetts General Hospital.

[28] Bahl M, Barzilay R, Yedidia AB, Locascio NJ, Yu L, Lehman CD. "High-Risk Breast Lesions: A Machine Learning Model to Predict Pathologic Upgrade and Reduce Unnecessary Surgical Excision". Radiology. 2018, Mar, 286(3): 810-818. https://doi.org/10.1148/radiol.2017170549

[29] Bloch-Budzier S (22 November 2016). "NHS using Google technology to treat patients". BBC News.

[30] Lorenzetti L (5 April 2016). "Here's How IBM Watson Health is Transforming the Health Care Industry". Fortune.

[31] Gupta R, Srivastava D, Sahu M, Tiwari S, Ambasta R K, Kumar P. Artificial intelligence to deep learning: Machine intelligence approach for drug discovery. Mol. Divers. 2021, 25, 1315-60.

[32] Huang Z, Chan TM, Dong W. MACE prediction of acute coronary syndrome via boosted resampling classification using electronic medical records. J Biomed Inform. 2017, 66: 161-170. https://doi.org/10.1016/j.jbi.2017. 01.001

[33] Mortazavi BJ, Downing NS, Bucholz EM, Dharmarajan K, Manhapra A, Li SX, et al. Analysis of machine learning techniques for heart failure readmissions. Circ Cardiovasc Qual Outcomes. 2016, 9: 629-40. https://doi.org/10.1161/CIRCOUTCOMES.116.003039

[34] Topalovic M, Das N, Burgel PR, Daenen M, Derom E, Haenebalcke C, et al. Artificial intelligence outperforms pulmonologists in the interpretation of pulmonary function tests. Eur Respir J. 2019 Apr 11; 53(4): 1801660. https://doi.org/10.1183/13993003.01660-2018

[35] Delclaux C. No need for pulmonologists to interpret pulmonary function tests. Eur Respirat J. 2019 Jul 18; 54(1): 1900829. https://doi.org/10.1183/13993003.00829-2019

[36] Christiansen MP, Garg SK, Brazg R, Bode BW, Bailey TS, Slover RH, et al. Accuracy of a fourth-generation subcutaneous continuous glucose sensor. Diabet Technol Therapeut. (2017) 19: 446-56. https://doi.org/10.1089/dia.2017.0087

[37] Niel O, Boussard C, Bastard P. Artificial intelligence can predict GFR decline during the course of ADPKD. AmJ Kidney Dis 2018 Jun; 71(6): 911-912. https://doi.org/10.1053/j.ajkd.2018.01.051 Epub 2018 Mar 30.

[38] Geddes CC, Fox JG, Allison ME, Boulton-Jones JM, Simpson K. An artificial neural network can select patients at high risk of developing progressive IgA nephropathy more accurately than experienced nephrologists. Nephrol Dialysis Transplant. 1998 Jan; 13(1): 67-71. https://doi.org/10.1093/ndt/13.1.67

[39] Yang YJ, Bang CS. Application of artificial intelligence in gastroenterology. World J Gastroenterol. 2019 Apr 14; 25(14): 1666-83. https://doi.org/10.3748/wjg.v25.i14.1666

[40] Fern ández-Esparrach G, Bernal J, L ópez-Cer ón M, C órdova H, S ánchez- Montes C, Rodr íguez de Miguel C, et al. Exploring the clinical potential of an automatic colonic polyp detection method based on the creation of energy maps. Endoscopy. 2016 Sep; 48(9): 837-42. https://doi.org/10.1055/s-0042-108434

[41] Dorsey ER, Glidden AM, Holloway MR, Birbeck GL, Schwamm LH. Teleneurology and mobile technologies: the future of neurological care. Nat Rev Neurol. 2018 May; 14(5): 285-297. https://doi.org/10.1038/nrneurol.2018.31

[42] Kim, W.; Choi, Y.; Cho, J. Y.; Yoon, Y. S.; Han, H. S. Robot single incision left lateral sectionectomy via da Vinci® Xi™ Single Site™ & vaginal extraction of the specimen. Surg Oncol. 2020 Jun: 33: 254-55. https://doi.org/10.1016/j.suronc.2019.11.002

[43] Morelli, L.; Guadagni, S.; Caprili, G.; Candio, G. D.; Boggi, U.; Mosca, F. Robotic right colectomy using the Da Vinci Single-Site® platform: Case report. Int J Med Robot. 2013 Sep; 9(3): 258-61.

[44] Talati, D. Telemedicine and AI in Remote Patient Monitoring. Journal of Knowledge Learning and Science Technology. 2023; 2(3), 254-55.

[45] Shaik, T., Tao, X., Higgins, N., Li, L., Gururajan, R., Zhou, X., & Acharya, U. R. Remote patient monitoring using artificial intelligence: Current state, applications, and challenges. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 2023 January, 13(2). e 1485.

[46] Field, M. J., & Grigsby, J. Telemedicine and remote patient monitoring. JAMA, 2002 Jul; 288(4): 423-5. https://doi.org/10.1001/jama.288.4.423

[47] Jimma B L. Artificial Intelligence in Healthcare: A Bibliometric Analysis. 2023 january. Telematics and Informatics Reports. 9 (suppl 1): 100041. https://doi.org/10.1016/j.teler.2023.100041

[48] Varkey B. Principles of Clinical Ethics and Their Application to Practice. *Med Princ Pract*. 2021, 30: 17-28.

[49] Jahn WT. The 4 basic ethical principles that apply to forensic activities are respect for autonomy, beneficence, nonmaleficence, and justice. *J Chiropr Med*. 2011, 10: 225-26.

[50] WHO. Review of Ethical Issues in Medical Genetics. 20 Avenue Appia, 1211 Geneva 27, Switzerland.: Human Genetics Programme, Management of Noncommunicable Diseases.; 2003 https://www.who.int/genomics/publications

[51] Farhud DD, Nickzat N, Mahmoodi M. Views of group of phisicians, nurses and midwives on ethical principles in medical genetics, in Tehran. *Iran J Public Health*, 1970; 28(1-4).

[52] Farhud DD. Epigenetic and Ethics: How are Ethical Traits Inherited? *International Journal of Ethics & Society (IJES)*, 2019, 1: 1-4.

[53] Han S S, Kim Y J, Moon I J, Jung J M, Lee m Y, Lee W J et al. Evaluation of Artificial Intelligence-Assisted Diagnosis of Skin Neoplasms: A Single-Center, Paralleled, Unmasked, Randomized Controlled Trial. J Invest Dermatol. 2022 sep; 142(9): 2353-62.e2. https://doi.org/10.1016/j.jid.2022.02.003

[54] Esteva A, Kuprel B, Novoa R A, Ko J, Swetter S M, Blau H M, Thrun S. Dermatologist-level classification of skin cancer with deep neural networks. Nature 2017, Feb, 2; 542(7639): 115-18. https://doi.org/10.1038/nature21056

[55] Noyan M A, Durdu M, Eskiocak AH. Tzanck Net: a convolutional neural network to identify cells in the cytology of erosive-vesiculobullous diseases. Nature Scientific Reports 10, 18314, 2020 october.

[56] Mar v J, Soyer H P. Artificial intelligence for melanoma diagnosis: How can we deliver on the promise? *Annals of Oncology*, 2018; https://doi.org/10.1093/annonc/mdy193

[57] Goh k H, Wang L, Yeow A, Poh H. Artificial Intelligence in sepsis early prediction and diagnosis using unstructured data in healthcare. Nature Communications 2021 january -12(1). https://doi.org/10,1038/s41467-021-20910-4

[58] Islam K R. Prithula J, Kumar J, Tan T L, Reaz M B I, Sumon M S I, et al. Machine Learning Based Early Prediction of Sepsis by Using Electronic Health Records: A Systematic Review. J Clin Med. 2023, 12(17) 5658, https://doi.org/10.3390/jcm12175658

[59] H Barrett D, W Ortmann L, Dawson A, et al. Cham (CH): Springer, 2016. Public Health Ethics: Cases Spanning the Globe.

[60] Karalis V D. The integration of Artificial intelligenceinto Clinical Practice. Biosci. 2024, 3(1). 14-44. https://doi.org/10.3390/applbiosci3010002

[61] Ucar A, Karakose M, Kinmca N. Artificial Intelligence for Predictive Maintainance, Application: Key Components, Trustworthiness, and Future Trends. Applied Sciences. January 2024-14(2): 898. https://doi.org/10.3390/app14020898

[62] Zemmar A, Lozano AM, Nelson B. The rise of robots in surgical environments during COVID-19. Nature Machine intelligence, 2020 October 2(10): 566-72. https://doi.org/10.1038/s42256-020-00238-2

[63] Sargon J U. The influence of AI in Medical Ethics and Warfare. American J Neurol Res. 2025; 4(1): 1-4.

[64] Sharma M. The impact of AI on Healthcare Job: Will Automation Replace Doctors. American Journal of Data Mining and Knowledge Discovery. 2024 Nov. 9(2): 32-35. https://doi.org/10.11648/j.ajdmkd.20240902.11