Journal of Applied Data Sciences
Vol. 3, No. 1, January 2022, pp. 01-14

The Role of Methods and Applications of Artificial Intelligence Tools in the Field of Medicine to Diagnose and Discover Various Diseases

Ahmed Hammad Al-Shoteri [1,*]

[1] King Abdulaziz University, Jeddah, Saudi Arabia
[1] ahmed50018@hotmail.com*;
* corresponding author

(Received: November 14, 2021; Revised: December 20, 2021; Accepted: January 3, 2022; Available online: January 25, 2022)

Abstract

The use of AI in healthcare has increased. It is now used in diagnosis, drug production, and improving hospital workflow between medical departments. The ability to examine large numbers of patients quickly is also a major use of artificial intelligence. Indeed, this field has made remarkable advances in early diagnosis and discovery of diseases through data, information, and radiograph analysis. The ability to predict disease outbreaks using AI analytics is dependent on data analysis and disease prediction. The current study aimed to assess the validity of previous research on artificial intelligence applications and their role in diagnosing and discovering diseases. This is to fill several gaps, such as the lack of recent studies in this field, especially Arab studies. The study also seeks to understand how artificial intelligence tools can help diagnose and discover diseases. The study yielded several findings. It is necessary to design systems and algorithms, as well as mechanisms and methods, to fully utilize artificial intelligence in this field. Neural networks, deep learning, fuzzy logic and others were addressed in previous studies, for their adoption and possible application because of their great impact according to the results of previous studies. Artificial intelligence can simultaneously monitor and process an unlimited number of inputs, revealing complex correlations that cannot be easily reduced. Finally, the researcher believes that artificial intelligence will increase efficiency, save time and effort, and reduce errors. Also, AI does not replace doctors because it lacks human qualities like empathy and compassion. The use of artificial intelligence in medicine will thus contribute to an approved and unprecedented scientific approach in this field to achieve the desired goals and objectives.

Keywords: Artificial Intelligence; Neural Networks; Deep Attachment; Fuzzy Logic

1. Introduction

Artificial intelligence is defined as a general term that refers to the use of computers to model intelligent behavior with minimal human intervention [1]. Artificial intelligence in medicine is defined as the study of simulating human intelligence in computer technology [2]. The artificial intelligence in medicine or in the medical field provides multiple services as following:

- Providing a laboratory for examination, organization, representation and indexing of medical knowledge.
- Producing new tools to support clinical decision-making, training and research.
- Integrating activities in medical, computational, cognitive, and other sciences.
- Providing a rich content system for the future scientific medical specialization.

Fuzzy logic is a powerful tool for decision-making systems, such as expert systems or pattern classification systems. Fuzzy logic plays a vital role in medical evaluation because it provides an accurate examination report [3]. These types of frameworks provide an immediate and straightforward strategy for clinical evaluation, and are useful in the absence of an expert or a clinical specialist. These frameworks give a result depending on the knowledge base built within or from specialists or experts in the field [5]. It is used to detect coronary artery disease using an integrated fuzzy neuron system. The results reached a level similar to the opinion of the doctor in the case of high / low risk of

heart disease [6]. In general, the fuzzy logic process is carried out to diagnose the disease, as shown in the figure 1 below, through the following steps:

- Fuzzification done by a Fuzzifier is the process of changing an explicit input value to a fuzzy array. Hence, the Fuzzifier is used as a layout from observing the input to the fuzzy value.
- Inference engine: After completing the obfuscation process, the fuzzy value processed by the inference engine using a set of rules acts as a set of rules for the knowledge base.
- Knowledge base: This is the main component of a fuzzy logic system. The total occult system is based on a knowledge base. Basically, it consists of structured and unstructured databases and data also called databases.
- Defuzzifier: It is the process of converting the output of an inference engine into a brittle logic. The fuzzy value is an entry to cancel the obfuscation that sets the fuzzy value to the clear value.
- Artificial Neural Networks: A geometric representation that aims to simulate the work of neural networks in the human brain. Artificial neural networks consist of simple interconnected

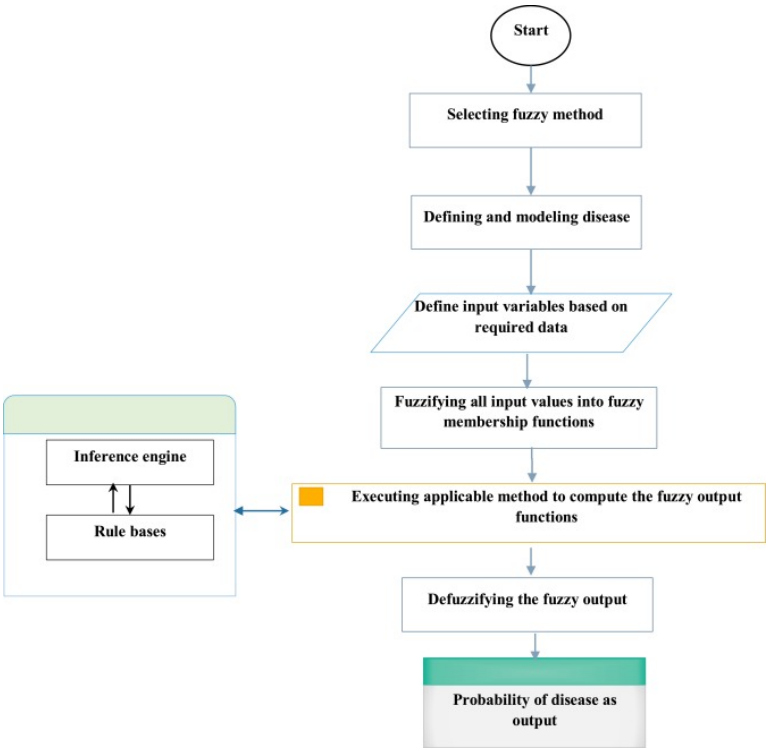

Figure. 1. Fuzzy logic process to diagnose the disease

Processing elements called neurons. Each neuron performs a simple computational task, but the overall behavior is determined by the connections between these various components [7]. The most important characteristic of artificial neural networks is their ability to learn and generalize. For this reason, it is widely applied, because it is possible to model the non-liminal script, where the relationship between the variables is unknown or very complex. The following figure 2 illustrates in a simplified way the mechanism and operation of artificial neural networks [8].

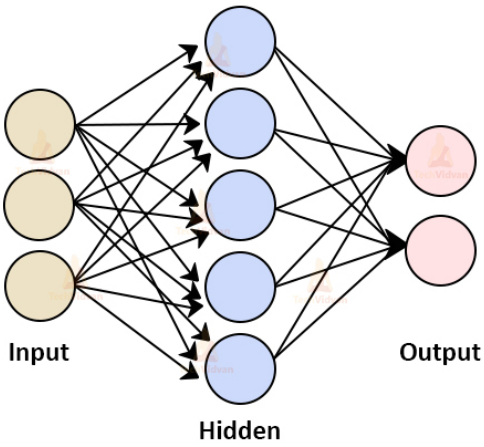

Figure. 2. Architecture of artificial neural networks

Deep Learning: An AI technology that mimics the workings of the human brain and creates patterns for decision-making known as deep learning [9]. While machine learning methods require breaking the problem statement into different parts first and then integrating its results in the final stage; The goal of the deep learning method is to solve the problem from start to end. In the medical sciences, deep learning achieves better results than traditional machine learning models.

1.1. Medical diagnosis using deep learning

The researcher mentioned in his study that the use of the traditional automated diagnostic method machine learning algorithm in the clinical expert who manually fetched the features in the diagnostic reports [10]. However, sometimes it became difficult to extract features from a large data set, and then these methods suffered accurately and efficiently. Here is the difference between machine learning and deep learning, as shown in the figure below:

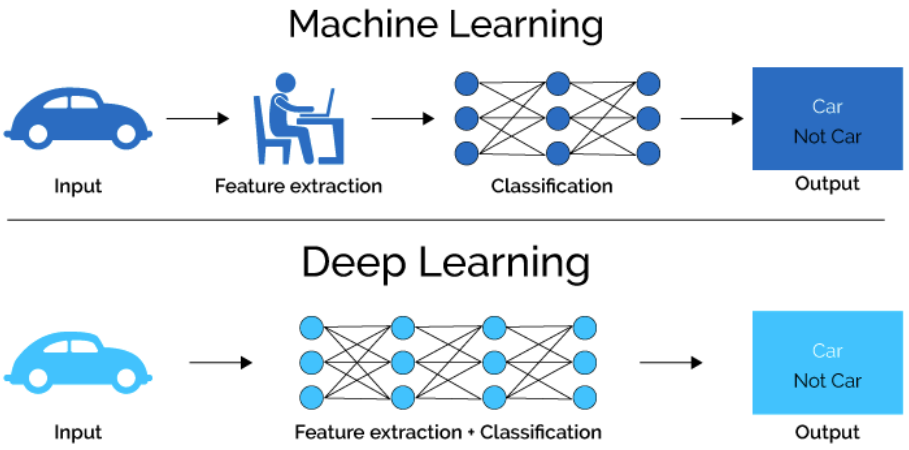

Figure. 3. Difference between machine learning and deep learning

The tools and methods of artificial intelligence applications have developed greatly during the past five decades and created wide opportunities, especially in the medical field. The tools, applications, and predictive methods were used to diagnose diseases and predict the future of treatment and potential preventive medicine [11]. Therefore, artificial intelligence may improve and contribute effectively to the accuracy of diagnosis, improves efficiency in Workflow, facilitates better disease monitoring and treatment, and improves accuracy of procedures and overall patient outcomes. Therefore, there are various applications, tools and methods of artificial intelligence, and because of the importance and usefulness of this technology in our daily lives, especially if it is in the medical field and related to

human health [12]. Therefore, this study sheds light on adapting the methods and applications of artificial intelligence and its applications in the medical field through diagnosis and discovery of diseases and the extent to which they can be avoided in the future.

The importance of this research in the application of artificial intelligence lies in the fact that it represents an important part of society's interest in promoting lifestyles and methods of development, which helps provide a decent life for citizens, improve living standards, and achieve expected performance in all aspects according to the Kingdom's vision 2030 and the areas proven by the objectives of this vision in relation to artificial intelligence and its tools and applications in several areas, including the medical field through early diagnosis and its role in the discovery of diseases [13]. Moreover, we found that institutions and organizations are working hard to implement many different applications of artificial intelligence and take advantage of the importance and benefits of this technology in daily life and the interests of all societies, especially if this is the case is related to human health and life. Among these tools are the applications of Artificial Neural Networks, Canada Protocol .MHSP, Multilayer Perceptron Training Tool, Deep Attachment, Risk Assessment Calculators Tool, Ulcer and Psoriasis Tool, etc. Therefore, advances in artificial intelligence have led to the emergence of smart systems and the development of tools that can help doctors in diagnosis and decision-making, and have greatly contributed to improving the field of diagnosis [14].

Through algorithms, AI predictive models can be used to diagnose diseases, predict therapeutic response and potential future preventive medicine. AI may improve diagnostic accuracy, improve efficiency of service provider and clinical processes, facilitate better disease monitoring and treatment, and improve the accuracy of procedures and overall outcomes for patients. Furthermore, these systems are able to learn from each additional case and can be exposed within minutes to more cases than a physician can see in many lifetimes [15]. This is why an AI-driven application is able to outperform doctors in terms of speed, efficiency, and quality. Human history has gone through several epidemics, almost ravaging all of humanity, from the plague or the so-called Black Death, to cholera epidemics, to smallpox, to the Spanish flu, to the SARS virus, to swine flu, ending with the emerging coronavirus (Covid- 19).

1.2. The problem of the study

Despite the huge studies that dealt with the topic of the methods and applications of artificial intelligence, and its application in the diagnosis and discovery of diseases in the medical field in particular, as indicated by the results of many studies that dealt with previous issues, we found that there is an obvious shortcoming which is the absence of a study that dealt with how to apply artificial intelligence methods and techniques for diagnosis and discovery of diseases, and the lack of references that dealt with the role of artificial intelligence in detecting and diagnosing diseases in the medical fields, especially in Arab references, according to the researcher's knowledge [16]. Among these shortcomings, for example, but not limited to, are that some tools and applications lack appropriate regulations and some political, ethical and financial transformations, and whether is it legal and appropriate in terms of safety and efficiency, in addition to the lack of human competencies and expertise. There are also some tools and applications that have not been adopted by higher and official bodies for discussing the extent to which this tool can be applied and officially approved, as it was applied in a specific way and then completed and not developed or upgraded [17]. Therefore, this study seeks to address this issue with study and research, with the need to pay attention to this field and how to apply artificial intelligence methods and techniques that effectively contribute to the process of predicting diseases and epidemics and quickly discovering treatments for them and avoiding them in the future.

2. Methodology Review

This study will use the documentary-analytical descriptive approach, which depends on referring to documents and literature such as research, articles, books, etc., and studying them through description and analysis. The goal of this study is to extract the results and indications that are related to answering its questions. From this point of view, the

current study will revise and analyze previous studies on the subject of artificial intelligence methods and applications, its applications, and its role in diagnosis and disease discovery.

Based on Jain et al. [6], This paper aimed at knowing how the tools and methods of artificial intelligence can be applied in improving this field of diagnosis. The proposed technology includes training (Perceptron) multi-layered and a kind of artificial neural network with backpropagation training algorithm to diagnose and predict five blood disorders, through the results of complete blood count (CBC). The results of this study showed the accuracy and reliability of the proposed diagnostic system, as the sensitivity, specificity and accuracy were as follows: 75.78%, 98.94%, 97.86%, respectively.

According to Mintz and Brodie [7], This research highlighted the role of artificial intelligence in combating future epidemics, as the Corona pandemic has prompted an increase in research efforts to find effective solutions to get out of the crisis and address its future effects. Artificial intelligence technologies have proven their importance in several areas, especially in the medical field, and their effectiveness in limiting the spread of the Coronavirus, using robots to disinfect hospitals, help patients, and accelerate the creation of a vaccine. In this regard, China is one of the leading countries in the use of artificial intelligence technologies, and is considered the best model that used these technologies to limit the spread of the Coronavirus. Thus, artificial intelligence has become an urgent necessity and a saving solution to face future epidemic challenges. The importance of the research lies in the novelty of its topic, which is in itself the topic of the hour as the Coronavirus (Covid 91) is a very recent topic.

The aim of the research is to highlight the role of artificial intelligence technologies in confronting the Corona virus and to present practical cases of countries in confronting this virus, and to find that the future and survival of humanity requires attention to the field of artificial intelligence as the savior solution to confronting future epidemics. This study reached several results namely the efficiency of the use of artificial intelligence technologies to limit the spread of the Coronavirus, the importance of artificial intelligence, especially in the field of medicine, and robotics as a complementary alternative to medical staff and assistance in hospitals, using drones for awareness and disinfection, as well as relying on smartphone applications to monitor patients.

Based on (8), The aim of this study is to investigate an appropriate role for the applications of artificial intelligence in dermatology in the not-too-distant future. Although many of the applications are technologically feasible, important implementation barriers have been identified including methodological biases, difficulty in standardization, interpretability, and acceptance by clinicians and patients alike.

Several general recommendations were presented in this study. It noted that there was a clear need for future clinical trials. The collaboration of dermatologists was highlighted as essential. The systems needed to be trained with the full population. The clinical presentations that challenge dermatologists into clinical practice. The systems could also benefit from receiving inputs about other metrics available to clinicians such as anatomical location, duration of injury, images of uninjured skin, and standardization practices for imaging new lesions must be implemented. Finally, given the lack of explanation of many AI applications, the researcher believed that improving general descriptions of algorithms and study designs can lead to better acceptance by clinicians and society at large. This would also assist organizational decision makers who would need to adopt positions on responsibility. The final conclusion of this paper was that the study of artificial intelligence is increasingly being done in dermatology and although most of the applications involve image analysis and classification, there are other tools such as risk assessment calculators. Moreover, the greatest advances have been made in the field of melanoma diagnosis, followed by ulcer and psoriasis assessment tools, and then many less well-studied applications. Barriers and gaps in the critical literature significantly limit the applicability of AI to clinical practice at this time. For less common applications, technology papers and

feedback are needed to improve capabilities and spark interest. For more saturated subjects, there should be a greater need for clinical trials that provide evidence of clinical efficacy, while successfully overcoming identified barriers with these research objectives in mind.

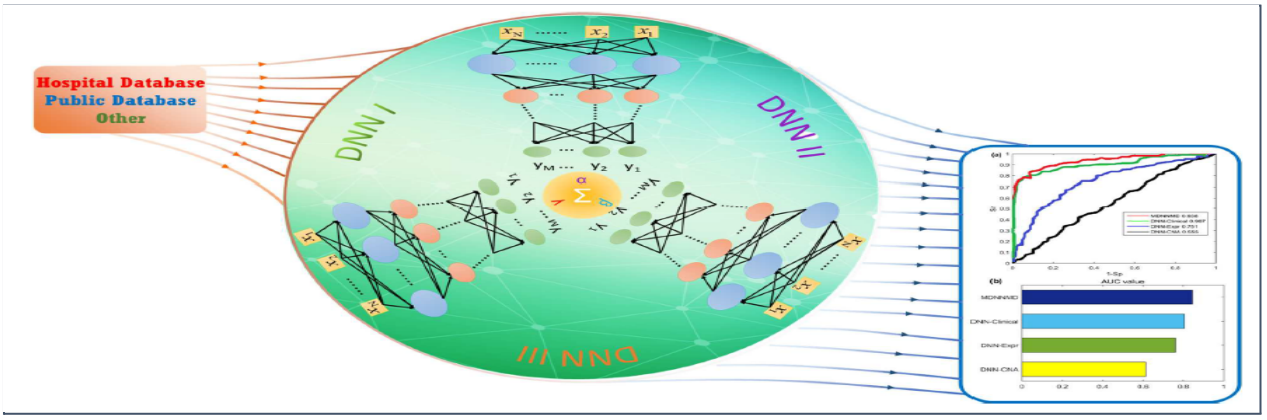

Figure. 4. The mechanism of predicting human breast cancer using multimodal DNNS

Based on Patel and Goyal [9] Research, This research paper aims to reveal some important insights into the various current and past AI technologies in the medical field used in medical research today, particularly in predicting heart disease, brain disease, prostate disease, liver disease, and kidney disease. The paper also provides some directions for future research on AI-based diagnostic systems based on a range of problems and challenges. The results showed that deep learning is very popular among current researchers, especially in the field of medical sciences, as shown in Table 1. The rapid growth in the study of artificial intelligence in disease diagnosis was reflected in the analysis of the papers in this research. The results indicated that the average published volume increased from 1% in 2009 to 20% in 2019 as shown in Figure 4. Based on the results of this research, the researcher was able to know the areas and diseases that used artificial intelligence technologies and which areas were ignored. A brief description of the articles reviewed is also provided for the available materials that use fuzzy logic, machine learning, and deep learning, respectively.

Table. 1. The Distribution of AI Methods by Medical Disciplines

Disease Name	Fuzzy Logic	Machine Learning	Deep Learning
Cardiology	2	2	2
Neurology	2	2	2
Dermatology	0	2	2
Breast Cancer	2	2	2
Diabetics	2	2	2
Kidney Disease	2	2	2
Arthritis	0	1	0
Liver Cancer	0	0	1

Thyroid	0	0	1
Dental Disease	2	2	0
Ebola	1	0	0
Asthma	1	0	0
Cholera	2	0	0
Influenza	0	1	0
Skin Cancer	0	0	2

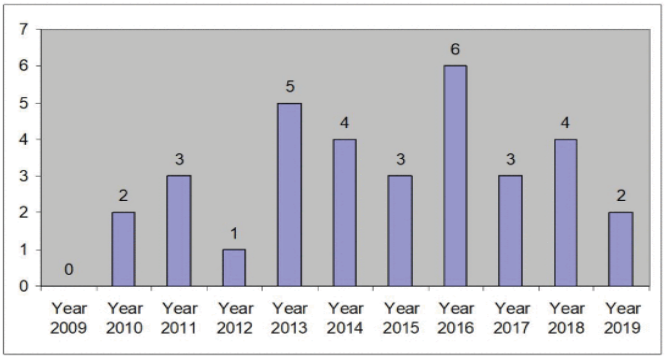

Figure. 5. The average published volume of Medical AI Methods

In Amato et al. [10] study, The purpose of the research is to determine the role of artificial intelligence in health care, its nature and details, the complexities of applying artificial intelligence in health care, and to suggest ways to avoid them. This study was conducted during the period from June to October of the year 2020. Through an extensive literature review, this study is based on an analysis of EU and USA regulatory laws, scientific research and the opinions of forward-thinking people in this field.

This paper provides a guide to understanding the essence of AI in healthcare and the details of its regulation. It is based on dialectical, comparative, analytical, synthetic and comprehensive methods. The analysis conducted in the study allows for the acceptance of many pros and cons in the field of using artificial intelligence in health care. The main challenge is not related to the technology itself, which is growing and developing rapidly and revealing new areas of its use, but it's related to the legal side, as it clearly lacks proper regulations and some political, moral and financial shifts. Thus, the basic questions regarding this are as follows: Is technology inherently appropriate for healthcare at all? Does the current legislative framework seem appropriate to regulate AI in terms of safety and efficiency? In fact, there are many questions that must be addressed in order to move in line with the development of the technology and to obtain the benefits of its practical implementation.

Miller and Brown [11] research propose a diagnostic system for detecting the type of brain tumor and classifying it among the three types in the magnetic resonance image. The proposed algorithm relied first on the use of self-organizing SOM maps for image segmentation and detection of the tumor area, followed by image processing, optimization and tumor characteristics extraction operations, and finally, forward propagation neural networks were used in order to diagnose the tumor type based on the detected characteristics. A database of 3064 optimized MRI images has been adopted, and each image contains tumor information, type, and location. The algorithm was trained

on 300 images equally distributed among the three types of brain tumor, and 100 images of a healthy case that does not contain a tumor. The results showed the accuracy and reliability of the proposed system, as 297 images were successfully detected and diagnosed out of 300 images, with sensitivity, specificity and accuracy reaching 99%, 98%, and 98%, respectively.

And Then, the aim of Ramesh et al [12] article is to provide a brief summary of the main applications of AI in gastroenterology, endoscopy, and GI endoscopy. This article provides a brief historical perspective on the development of AI over the past several decades and the introduction and development of AI in medicine in recent years. The potential applications of AI in gastroenterology currently have no limits. These applications improve our endoscopy diagnostic capacity, make endoscopic workflows more efficient, and even help increase risk more accurately in classifying patients with common gastrointestinal conditions such as gastrointestinal bleeding and tumors.

The results of this article were of the importance of further study and validation of the application of artificial intelligence algorithms and their applications in this field. Furthermore, additional clinical data will be required to demonstrate its efficacy, value, and impact on patient care and outcomes. Finally, we will need to develop cost-effective AI models and products to allow clinicians, practices, and hospitals to integrate AI into everyday clinical use. Clinicians should not view this as a “human versus machine” but rather as a partnership in an effort to improve clinical outcomes for a patient with celiac disease.

In Bourcier et al [13] research they develop and test a system using artificial neural networks (ANN) that can help doctors diagnose breast cancer quickly and accurately. Breast cancer is the most common type of cancer among women, the second leading cause of cancer death worldwide, and early detection of cancer followed by appropriate treatment can reduce the risk of death. As specialized doctors can misdiagnose the disease, then the use of artificial intelligence methods such as neural networks can greatly improve the accuracy of diagnosis. The ANN is an effective tool to help clinicians make diagnoses in the medical field. (ANN) has proven its efficacy in diagnosing breast cancer, as its use makes the diagnosis more accurate and reliable, and thus increases patient satisfaction. However, it should only be counted as a tool to support the final decision of the clinician, who is ultimately responsible for the final evaluation. The results of this experiment showed the accuracy and reliability of the proposed diagnostic system (ANN), as the sensitivity, specificity, and accuracy reached 96.2%, 100% and 99%, respectively.

The main aim and conclusion of this article is that there are two roles of artificial intelligence in cardiovascular imaging. The first being the automation of tasks usually performed by humans, such as image segmentation and measurement of structural and functional information of the heart. The second is the discovery of clinically important insights, as most of the reported applications have focused on task automation. Furthermore, algorithms that can obtain cardiac measurements are also being developed. In the next stage, AI is expected to expand and enrich existing knowledge with the continuous development of technology, so the researcher reports that cardiologists must become well versed with the new knowledge of AI and be able to harness it in the clinical environment where AI can be integrated into daily clinical practice so as it becomes a valuable aid to many healthcare professionals who deal with cardiovascular disease.

3. Discussion of the Result

By exploring, reviewing and analyzing previous studies, it was found that they focused and addressed the following points, Previous studies have shown that interest in applying artificial intelligence methods and tools in the medical field is extremely important because of its many positive effects, including study [18] that mentioned that the goal of this thesis is to know how artificial intelligence tools and methods can be applied to improve the field of diagnosis.

This included testing the proposed technique, a multi-layer (perceptron) training and a type of artificial neural network with a backpropagation training algorithm to diagnose and predict five blood disorders. Through this, it got effective results in the complete blood count examination, and here comes the role of technicians or owners of this field to adopt this matter and apply it on the ground effectively. Studies [19-23] agreed that by means of artificial intelligence through algorithms, predictive models and amplified detection could be used to diagnose diseases and predict therapeutic response and potential preventive medicine in the future which may improve artificial intelligence diagnostic accuracy and improve efficiency in the workflow.

Some studies, including studies [5, 9, 12], in regard to the legal and ethical aspects of applying artificial intelligence systems in the medical field have shown that ethical tools are not sufficient to ensure that artificial intelligence is used ethically and legal systems must be updated to meet new challenges and emerging in the field of artificial intelligence. Also, it is possible that the risks become legal afterwards such as who is given consent and who bears responsibility in the event of an unfavorable development? The study concluded that the main challenge is not related to the technology itself, which is developing rapidly and revealing new horizons in the field, but it is related to the legal side, which clearly lacks proper regulations and some political, ethical and financial shifts. Thus, the basic questions regarding this are as follows: Is technology inherently appropriate for healthcare at all? Does the current legislative framework seem appropriate to regulate AI in terms of safety and efficiency? In short, there are many questions that must be addressed in order to move in line with the development of the technology and to obtain the benefits of its practical implementation. It was mentioned in some studies such as studies [1, 6, 8] and [10] the application and use of artificial intelligence systems in the medical field, but it was used to a limited extent, such as obtaining some statistics and results or some information. For example, but not limited to, the study [1] proposed technology was a multi-layer (Perceptron) training, which is a type of artificial neural network with a backpropagation training algorithm to diagnose and predict five blood disorders, through the results of the complete blood count test. Study [6] stated that a diagnostic system was applied to detect the type of the brain tumor and its classification among three types in the magnetic resonance image. Study [8] stated that the use of artificial intelligence methods such as neural networks can significantly improve the accuracy of diagnosis.

Study [19] entitled: Development and evaluation of an artificial intelligence system for COVID-19 diagnosis mentioned the role of artificial intelligence technologies in confronting the Coronavirus, and interest in the field of artificial intelligence as the savior solution for future epidemics. It stated that through this study, the following results were obtained:

- Using artificial intelligence technologies to limit the spread of the Coronavirus.
- The importance of artificial intelligence, especially in the medical field and robots are a complementary alternative to medical staff and assistance in hospitals.
- The use of drones for awareness and disinfection.
- Reliance on smartphone applications to monitor patients.

Study [8] showed that there is a clear need for future clinical trials, and it assumes that improving general descriptions of algorithms and study designs can lead to better acceptance by clinicians and society at large. This would also help organizational decision makers who will need to adopt positions on responsibility, so I agree with this study and commend the need to adopt, test, and evaluate applications, tools and methods for artificial intelligence by experts and designers related to this field to apply it on the ground.

4. Results and Discussion

The results of the scientific study showed that, The study concluded that the use of artificial intelligence in the medical field has become a major factor in diagnosis, drug production and improving workflow in hospital corridors and between medical departments and other departments. Artificial intelligence gives computers the ability to learn by entering huge amounts of data. It is committed to developing automated systems, i.e. machines with learning and logical processing capabilities that are used for research and physicians' work integration. This means that human intelligence and artificial intelligence are integrated to achieve further development in this field.

Artificial intelligence plays a major role in improving the medical sector and health care, but it has not reached the stage of fully treating diseases and developing strategies through which to confront pandemics and epidemics. The existence and application of artificial intelligence will achieve efficiency, save time and effort, and reduce errors. In addition, artificial intelligence supports doctors, not replaces them, as these machines lack human qualities such as empathy, compassion, etc. In his study entitled "Artificial intelligence in medicine" [12] noted that artificial intelligence algorithms and their applications need further study and validation. Furthermore, additional clinical data will be required to demonstrate its efficacy, value, and impact on patient care and outcomes. Finally, we will need to develop cost-effective AI models and products to allow clinicians and practitioners and hospitals to integrate AI into everyday clinical use. Clinicians should not view this as a "human versus machine" but rather as a partnership in an effort to improve clinical outcomes for a patient with celiac disease.

In his study entitled "A Systematic Review of Artificial Intelligence Techniques in Cancer Prediction and Diagnosis" [15] mentioned that to achieve the main objective, they developed a research scheme. In this hypothesis, different scientific journals including Google Scholar, IEEE, Science Direct, Web of Science, Wiley Online Library and Elsevier were selected to bring in papers published from 2009 to 2019. All retrieved papers are distributed based on authors and year of publication, various AI tools, fuzzy methods, machine learning methods, deep learning methods, different types of diseases, outcomes, and finally the impact of AI methods applied in disease detection. The results showed that the pace of paper publication in the medical field has improved rapidly. Another aim of this study was to verify the most effective AI method for diagnosing disease according to most researchers. Based on their study, they concluded that the applied methods of AI in healthcare provide useful outcomes through improved diagnostic processes and early disease detection that follows to select the appropriate treatment plan. Another basic concept to bear in mind is that they have researched three AI technologies (fuzzy logic, machine learning, and deep learning) that are widely used in healthcare and they produced their results using these three methods. In addition, the effect of each AI technology was analyzed based on the frequency of the effect recorded by the papers.

The main medical areas they reviewed were related to heart disease, neurology, cancer, kidney disease, diabetes, cholera, and dental disease, respectively, using AI diagnostic criteria, the researcher reports. Besides, they also discovered that papers vary greatly depending on the type of disease. In this study, we noted that artificial intelligence is not limited to identifying any particular disease. We can use various artificial intelligence technologies to detect any type of disease or to improve the diagnostic process for all. Here are some studies that reached conclusions that can be briefly mentioned:

Table. 2. Previous study conclusion

#	Study title	Objectives	Results and recommendations
1	Artificial intelligence in medicine [12]	The objective of this paper is to discuss the modern scientific literature and	1- Validation of artificial intelligence-based technologies.

ISSN 2723-6471

		provide perspective on the benefits, the future opportunities and risks of well-established artificial intelligence applications in clinical practice for clinicians, health care institutions, medical education and bioethics.	2- Ethical implications and continuous monitoring. 3-Educate future medical leaders for the challenges of artificial intelligence in medicine. The application of artificial intelligence in clinical practice is a promising area of development, which is rapidly evolving with other modern areas of precision medicine, genomics and teleconsultation. While scientific progress must remain rigorous and transparent in developing new solutions to improve modern healthcare, health policies must now focus on addressing the ethical and financial issues associated with this cornerstone of the development of medicine.
2	Introduction to artificial intelligence in medicine [7]	The goal of this article is an updated review of artificial intelligence in medicine, with a particular focus on its applications in radiology, pathology, ophthalmology, and dermatology. We will discuss a selection of papers illustrating the potential uses of AI in a technologically advanced future.	AI has many potential applications in medicine. It remains to select which of these will take root and be implemented, but the certainty lies in the inevitability of change. Therefore, it is important for all clinicians to be aware of recent advances in artificial intelligence, as they are likely to affect healthcare delivery in the future.
3	A Systematic Review of Artificial Intelligence Techniques in Cancer Prediction and Diagnosis [15]	The aim of this article is to review the application of AI in cancer diagnosis and prediction, and to summarize its advantages. The aim of this article is to review the application of AI in cancer diagnosis and prediction, and to summarize its advantages.	The review presented in this paper shows that researchers are rapidly gaining a much deeper understanding of the challenges and opportunities presented by AI as an intelligent information science in the field of cancer diagnosis and nurturing the potential of AI for different types of cancer diagnosis. However, the limitation of the review is that it did not include genomics and radiology data applied by AI to obtain accurate

			clinical medicine. We anticipate that AI-based clinical cancer research will lead to a paradigm shift in cancer treatment, resulting in a significant improvement in patient survival due to enhanced prediction rates. Thus, it is logical to predict solving cancer diagnosis challenges through AI developments in the near future.

5. Conclusion

In light of the results of the study, the following recommendations can be made:

- The necessity of conducting more experimental and exploratory studies that deal with artificial intelligence methods and tools and their impact on the medical field, especially in our Arab countries.
- The necessity of holding local, Arab and international conferences and seminars in a sufficient and periodic manner, in order to introduce the latest developments in this field.
- The necessity of local action and conducting scientific studies and research in line with the Kingdom's vision 2030, in the field of artificial intelligence and applying its tools and methods on the ground with high efficiency.
- The necessity of having Arab studies and research in the field of applying tools and methods of artificial intelligence due to its lack of Arab references.
- The need for the relevant authorities to adopt some of the applications, tools and methods used in the field of artificial intelligence in diagnosing and detecting various diseases such as neural networks, deep learning and others to treat and develop them for the possibility of their application on the ground, which were mentioned in previous studies.

Recent developments in artificial intelligence technologies have led to successful applications, tools, and methods of artificial intelligence in the field of health care and in the medical field. It has even become a controversial topic of debate about whether artificial intelligence systems will eventually replace human doctors. However, we consider the fact that an AI system can help a human clinician make a better decision or even replace human judgment in some cases. Various AI technologies can help learn information from a large amount of clinical data. In addition, artificial intelligence methods are trained in such a way that they can have the ability to self-learn, correct errors, and produce results with high accuracy.

In recent times, artificial intelligence has made remarkable progress in the field of diagnosis and early detection of diseases. The importance of artificial intelligence methods and tools lies in the ability to diagnose diseases and analyze the relationship between prevention or treatment methods and patient outcomes. The tools, methods and applications of artificial intelligence that have been developed and their applications contribute to diagnostic processes, the development of treatment protocols, the development of medicines, personal medicine, patient monitoring and care, etc. The importance of these methods and tools used is that they have the ability to predict the possibility of a health crisis before it occurs.

Many medical centers have developed algorithms, methods, and tools of artificial intelligence for their facilities in the field of diagnosis and disease discovery. We mention, for example, some of the proposed methods and tools that were mentioned in this article, such as the proposed technology, multi-layer training (Perceptron), a type of artificial neural network with an algorithm Reverse diffusion training for diagnosis and prediction, which was mentioned in study [1], as well as industrial neural networks and their applications, which were mentioned in studies [1], [6] and [8]. In addition, study [3] mentioned some of the applications used in this field. These include image analysis and classification and some of the tools used such as the risk assessment calculator tool and the ulcer and psoriasis tool. Study [4] indicated that deep learning is very popular among current researchers, especially in the field of medical sciences. There are also several articles that used fuzzy logic, machine learning, and deep learning, respectively. Study [6] stated that the proposed algorithm was first applied to the use of SOM self-organizing maps to segment the image and reveal the tumor area followed by image processing and optimization processes and tumor characteristics extraction. Forward propagation neural networks were also used in order to diagnose the type of tumor based on the detected characteristics. In Study [12], a simple tool was proposed for people who wish to use artificial intelligence in mental health and suicide prevention called Canada Protocol (MHSP), which is the first tool of its kind in the field of artificial intelligence ethics, according to the researcher. This tool is designed to cover the challenges that have been identified in the field of suicide prevention and mental health.

The main challenge is not related to the technology itself, which is growing and developing rapidly and revealing new areas for its use. Rather, there are several obstacles that prevent the use of methods and applications of artificial intelligence and its ability to diagnose and discover diseases on the ground. Among these obstacles, we would mention the legal concern. Study [5] mentioned that the obstacle that may prevent the application of AI is that it lacks appropriate regulations and some political, ethical and financial transformations. Does the current legislative framework seem appropriate to regulate artificial intelligence in terms of safety and efficiency? Study [9] stated that there are some difficulties and obstacles to the application of artificial intelligence. It was stated that it is devoid of other basic components of our intelligence like awareness, empathy, benevolence, subjectivity, intuition, and adapting to unusual situations. The quality of the human-patient relationship remains irreplaceable.

References

[1] P. Dande and P. Samant, “Acquaintance to Artificial Neural Networks and use of artificial intelligence as a diagnostic tool for tuberculosis: A review,” Tuberculosis, vol. 108, pp. 1–9, 2018, doi: https://doi.org/10.1016/j.tube.2017.09.006.

[2] Y. Liu, R. Sun, and S. Jin, “A survey on data-driven process monitoring and diagnostic methods for variation reduction in multi-station assembly systems,” Assem. Autom., vol. 39, no. 4, pp. 727–739, Jan. 2019, doi: 10.1108/AA-10-2018-0174.

[3] S.-L. Wamba-Taguimdje, S. Fosso Wamba, J. R. Kala Kamdjoug, and C. E. Tchatchouang Wanko, “Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects,” Bus. Process Manag. J., vol. 26, no. 7, pp. 1893–1924, Jan. 2020, doi: 10.1108/BPMJ-10-2019-0411.

[4] C. Kahraman, İ. Kaya, and E. Çevikcan, “Intelligence decision systems in enterprise information management,” J. Enterp. Inf. Manag., vol. 24, no. 4, pp. 360–379, Jan. 2011, doi: 10.1108/17410391111148594.

[5] F. F. Kharbat, A. Alshawabkeh, and M. L. Woolsey, “Identifying gaps in using artificial intelligence to support students with intellectual disabilities from education and health perspectives,” Aslib J. Inf. Manag., vol. 73, no. 1, pp. 101–128, Jan. 2021, doi: 10.1108/AJIM-02-2020-0054.

[6] M. Jain, A. Goel, S. Sinha, and S. Dhir, “Employability implications of artificial intelligence in healthcare ecosystem: responding with readiness,” foresight, vol. 23, no. 1, pp. 73–94, Jan. 2021, doi: 10.1108/FS-04-2020-0038.

[7] Y. Mintz and R. Brodie, "Introduction to artificial intelligence in medicine," Minim. Invasive Ther. Allied Technol., vol. 28, no. 2, pp. 73–81, Mar. 2019, doi: 10.1080/13645706.2019.1575882.

[8] P. Cunningham, J. Carney, and S. Jacob, "Stability problems with artificial neural networks and the ensemble solution," Artif. Intell. Med., vol. 20, no. 3, pp. 217–225, 2000, doi: https://doi.org/10.1016/S0933-3657(00)00065-8.

[9] J. Patel and R. Goyal, "Applications of Artificial Neural Networks in Medical Science," Curr. Clin. Pharmacol., vol. 2, no. 3, pp. 217–226, 2008, doi: 10.2174/157488407781668811.

[10] F. Amato, A. López, E. M. Peña-Méndez, P. Vaňhara, A. Hampl, and J. Havel, "Artificial neural networks in medical diagnosis," J. Appl. Biomed., vol. 11, no. 2, pp. 47–58, 2013, doi: https://doi.org/10.2478/v10136-012-0031-x.

[11] D. D. Miller and E. W. Brown, "Artificial Intelligence in Medical Practice: The Question to the Answer?," Am. J. Med., vol. 131, no. 2, pp. 129–133, 2018, doi: https://doi.org/10.1016/j.amjmed.2017.10.035.

[12] A. N. Ramesh, C. Kambhampati, J. R. T. Monson, and P. J. Drew, "Artificial intelligence in medicine," Ann. R. Coll. Surg. Engl., vol. 86, no. 5, pp. 334–338, Sep. 2004, doi: 10.1308/147870804290.

[13] S. Bourcier, J. Klug, and L. S. Nguyen, "Non-occlusive mesenteric ischemia: Diagnostic challenges and perspectives in the era of artificial intelligence," World J. Gastroenterol., vol. 27, no. 26, pp. 4088–4103, Jul. 2021, doi: 10.3748/wjg.v27.i26.4088.

[14] K. S. Alqudaihi et al., "Cough Sound Detection and Diagnosis Using Artificial Intelligence Techniques: Challenges and Opportunities," IEEE Access, vol. 9, pp. 102327–102344, 2021, doi: 10.1109/ACCESS.2021.3097559.

[15] Y. Kumar, S. Gupta, R. Singla, and Y.-C. Hu, "A Systematic Review of Artificial Intelligence Techniques in Cancer Prediction and Diagnosis," Arch. Comput. Methods Eng., 2021, doi: 10.1007/s11831-021-09648-w.

[16] M. Hügle, P. Omoumi, J. M. van Laar, J. Boedecker, and T. Hügle, "Applied machine learning and artificial intelligence in rheumatology," Rheumatol. Adv. Pract., vol. 4, no. 1, p. rkaa005, Jan. 2020, doi: 10.1093/rap/rkaa005.

[17] N. Hurvitz, H. Azmanov, A. Kesler, and Y. Ilan, "Establishing a second-generation artificial intelligence-based system for improving diagnosis, treatment, and monitoring of patients with rare diseases," Eur. J. Hum. Genet., vol. 29, no. 10, pp. 1485–1490, 2021, doi: 10.1038/s41431-021-00928-4.

[18] G.-D. Liu, Y.-C. Li, W. Zhang, and L. Zhang, "A Brief Review of Artificial Intelligence Applications and Algorithms for Psychiatric Disorders," Engineering, vol. 6, no. 4, pp. 462–467, 2020, doi: https://doi.org/10.1016/j.eng.2019.06.008.

[19] C. Jin et al., "Development and evaluation of an artificial intelligence system for COVID-19 diagnosis," Nat. Commun., vol. 11, no. 1, p. 5088, 2020, doi: 10.1038/s41467-020-18685-1.

[20] M.-H. Tayarani N., "Applications of artificial intelligence in battling against covid-19: A literature review," Chaos, Solitons & Fractals, vol. 142, p. 110338, 2021, doi: https://doi.org/10.1016/j.chaos.2020.110338.

[21] Z. Ezziane, "Applications of artificial intelligence in bioinformatics: A review," Expert Syst. Appl., vol. 30, no. 1, pp. 2–10, 2006, doi: 10.1016/j.eswa.2005.09.042.

[22] H. Liang et al., "Evaluation and accurate diagnoses of pediatric diseases using artificial intelligence," Nat. Med., vol. 25, no. 3, pp. 433–438, 2019, doi: 10.1038/s41591-018-0335-9.

[23] K. Chayakrit, Z. HongJu, W. Zhen, A. Mehmet, and K. Takeshi, "Artificial Intelligence in Precision Cardiovascular Medicine," J. Am. Coll. Cardiol., vol. 69, no. 21, pp. 2657–2664, May 2017, doi: 10.1016/j.jacc.2017.03.571.