Benefits of Artificial Intelligence in Medicine

Samira Yeasmin
College of Engineering & Architecture
Al Yamamah University
Riyadh, Kingdom of Saudi Arabia
samira.yeasmin@ieee.org

***Abstract*— Artificial intelligence is one of the most discussed topics of the present time. The burning question of today about artificial intelligence is "will it be beneficial or dangerous for a human being". This research paper analyzes the benefits of artificial intelligence in medicine. It examines how artificial intelligence assists the medical field as well as how patient's health is affected using this popular phenomenon in diagnosing diseases, patient's treatment, reducing errors, and virtually being present with the patients. Finally, the paper reveals how artificial intelligence may have an impact on medical science. A survey was conducted to learn about people's perspective towards artificial intelligence in medicine and the results are shared in the paper.**

Keywords- artificial intelligence, medicine, clinical diagnosis, treatment, human errors, health.

I. INTRODUCTION

In this digital age, computer systems have made a profound impact on health sciences. Intelligent computer systems provide support to health professionals and patients. Amongst all the systems, artificial intelligence can cope with a large amount of clinical data and information.

Artificial intelligence is the theory and development of computer systems able to perform tasks, such as visual perception, speech recognition, decision making, and translation between languages, normally requiring human intelligence (Google Definition). Artificial intelligence is helping every field of medicine. As Elliot (2009) stated that artificial intelligence would help doctors in operation and it would be safer and better [1]. In treatment as well, artificial intelligence will treat cancer patients who are 230,000 per year in the US [2]. The goal of this research paper is to offer a broad view of this exciting field which is artificial intelligence and how it is providing great help in medicine. This research paper will analyze artificial intelligence in medical diagnosis, in medical treatment, in reducing human errors, the virtual presence of artificial intelligence, and the future of artificial intelligence in medicine.

II. AI IN MEDICAL DIAGNOSIS

Artificial intelligence helps in fast and accurate medical diagnosis. Accurate medical diagnosis is one of the most important things to treat patients because it is the first step to treat patients and it assists in reducing mortality rates. Fast, accurate, and precise medical diagnosis will help patients to improve their health.

According to Macdonald (2017), robots, such as Husky, can spot skin tumors more accurately and speedily [3]. There are many cases where robots have diagnosed diseases and it is as accurate as human doctors. A robot diagnosed 340 brains for MRI and it was 100% accurate [4]. In addition, AI can diagnose diseases just by seeing images of affected areas of the patients' bodies.

Blood drawing is scary for people who are afraid of needles. Again, it takes a lot of time and more than one attempt until the nurse finds an appropriate vein to carry out the procedure. Veebot, a blood-drawing robot will assist the healthcare to carry out this procedure in no time [5]. It takes only a minute for Veebot to draw blood, and tests prove that it can identify vein with 83% accuracy, which is as good as a professional nurse.

A correct medical diagnosis can save many lives. Approximately 400,000 deaths in the US occur due to doctor's decision-making errors (Journal of Patient Safety, 2014), which leads to having errors in medical diagnosis. AI can assist doctors to make better decisions when diagnosing a patient medically.

AI can alert doctors when the patient's situation is being worsened. Bloch-Budzier (2016) stated that AI alerted doctors of patients who had acute kidney injury [6]. Therefore, AI is helping doctors in every way possible to diagnose patients carefully.

In diagnosing cancer, it can be noticed that robots are assisting doctors. Nowadays, numerous people die just because of wrong medical diagnosis. Baranuik (2016) explains that Google's artificial intelligence, a case in point is DeepMind, will diagnose oral cancer of one in 75 men and one in 150 women [7]. Thus, AI is being used everywhere around the world, especially in medicine.

Radiology is an integral part of healthcare. To diagnose a patient, radiology is a must. Food and Drug Administration approved the first artificial intelligence for cardiac imaging developed by Arterys in 2017 [8]. Anna Fernandez, Health Informatics/Precision Medicine Lead at Booz Allen Hamilton said that people would have artificial intelligence in clinics in just 3 years. Taking over repetitive tasks and diagnosing simple cases will be done by artificial intelligence.

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Currently, there are lots of robots who are being carried out to test if they can work in the medical field and the results are amazing. Mortality rates have decreased and the reason behind this is just using AI in medical diagnosis. Medical diagnosis is the first stage of treatment hence, it should be as precise as possible. By using AI in diagnosis, accurate treatment can be achieved.

III. AI In Medical Treatment

Artificial intelligence can reduce treatment time and help to get accurate treatment. Accuracy is one of the essential steps of the treatment plan. Treatment plays a vital role in patients' lives. If treatment time can be reduced, it will be better for a patient's mental health. Artificial intelligence will most likely help healthcare move from traditional medicines, one medicine works for all, medical solutions towards targeted treatments, personalized therapies, and uniquely composed drugs. This is called, "Precision Medicine".

According to Baranuik (2016), it is hoped that artificial intelligence will reduce the treatment time [7]. Instead of 4 hours, artificial intelligence will take only 1 hour to complete the treatment. Better treatment plan and accuracy can be achieved by using artificial intelligence. In addition, Max Planck Institute researchers are experimenting with exceptionally micro sized, meaning they are smaller than a millimeter, robots that will swim through patient's bodily fluid and it could be used to deliver drugs or other medical relief [8]. These robots are designed to swim through the bloodstream or across the surface of eyeballs. It will be a revolution in medical history.

AI can help reduce the side effects of medicines by providing precise treatment. Patients' lives can be saved by taking the help of AI.

AI can prescribe medication just by using a smartphone camera [9]. Nowadays, almost everyone has a smartphone and if it can be used for medication, it will be a great help for patients who are unable to go to doctors. Moreover, AI will replace the memory problems of Alzheimer patients, and problem-solving abilities of patients [9]. AI is helping the medical field and will continue doing the same.

Baranuik (2015) states that Google's AI will treat head and neck cancer [7]. Treating cancer is a complicated task. Doctors will be assisted by AI and will also reduce the treatment time. Furthermore, Oncologists, especially cancer specialists, will have great assistance from AI in making treatment suggestions because scientists are working very hard to make AI successful in treating cancer and tumors.

It is widely known that pet animals can reduce stress, reduce loneliness and divert the attention from pain. Paro, an interactive robot, is a baby harp seal covered with soft artificial fur, makes people feel comfortable, and it feels like they are touching a real animal [8]. It has been found that it can reduce stress which is experienced by both patients and caregivers.

Therefore, artificial intelligence is helping the medical field by making an accurate treatment plan and is speeding up the process of treatment which is saving the lives of numerous patients. Artificial intelligence can make treatment decisions and can suggest medicines. Patients will be helped by artificial intelligence.

IV. AI To Reduce Human Errors

In 2016, the Centers for Disease Control and Prevention reported that medical errors and misdiagnosing were the 3rd leading causes of death in the United States. Human doctor errors can be avoided by using artificial intelligence. Medical errors cause approximately 400,000 deaths in the US (Journal of Patient Safety, 2014). It can be realized that a great number of people die just because of doctors' error. AI can help reducing doctors' error and can save numerous lives. Usually, when patients seek medical help from healthcare professionals and doctors, they are given prescriptions based on questioning and routine check-ups. This process leaves a chance for errors and wrong diagnosis as the doctors are human and they need to diagnose dozens of patients in a single day. But with advanced artificial intelligence assistants, there will be less chance of errors. Artificial intelligence will be able to attend patients more efficiently as they will have the functions to diagnose a patient quicker than human doctors.

A person alone cannot take every decision. As Diprose and Buist (2016) stated machines are superior to human alone [10]. Machines can make better decisions than people. According to McFarland (2017), AI will not miss what doctors usually miss [2]. They will diagnose patients thoroughly which will help to get 100% accuracy in diagnosing and treating patients. Machines are man-made and that is why, if the machine has any problem, it can be solved. Hence, machines are updated and make fewer errors compared to a human being.

AI makes 72% more correct diagnosing than the high error rate of doctors [11]. Moreover, AI can scan hearts and it is remarkably accurate. AI is supporting people in every possible way, for instance in medicine, to reduce problems of people. It can be concluded that AI can make amazing changes in medicine. Moreover, AI performs better in diagnosis and treatment which can reduce human error [10].

According to a 2016 study by Frost and Sullivan, medical errors by 30%-40% and treatment expenses by as much as 50% has been reduced with the usage of artificial intelligence. According to WHO medical errors and wrong medical diagnosis are among the top 10 causes of fatalities worldwide and 1 in every 10 hospital admissions leads to a medical error and 1 in 300 admissions result in death because of medical errors. In this scenario, undoubtedly the best way to eliminate these errors and sad happenings, artificial intelligence is the hope for people. Indeed, artificial intelligence has changed our perception towards healthcare and it is going to benefit healthcare as much as it can.

Mistakes in the medical field cannot be eliminated. But this problem can be minimized with the help of AI. It is also helping the medical field by making all the procedures of medicine quick and easy.

V. Virtual Presence Of AI

Using a remote presence robot, doctors can engage with patients and staff without being there. AI is a great help for patients who need doctors almost all the time. Doctors cannot be present with the patients always, but machines can. AI can now be a virtual presence robot. They can serve patients properly and can assist them in their treatment.

Borukhovich (2015) claims that AI can remind patients to take medicines [9]. Medicine is the most important thing for a patient. AI can help to treat patients by telling them to take medications.

Furthermore, people may need doctors anytime. AI can help in this regard. Whenever or wherever people will need doctors, AI will assist them by being pocket doctors [12]. Pocket doctors, for example, smartphone applications, can be available anytime during day or night. It will help patients who may become sick late at night when there is no doctor available. Therefore, the virtual presence of AI will help people a lot.

AI can prescribe medicines [9] and will ensure whether patients are taking proper medications [13]. This can help patients who are always dependent on others, such as Alzheimer's patients. They can be helped by AI which will remind them to take medicines. Doctors cannot always connect to post-discharge patients. This problem can also be solved by AI. Machines will follow up with post-discharge patients [13] and it will help to improve patient's health more quickly. Post-discharge patients are not likely to take care of themselves. Thus, AI will take care of them and help them to be healthy.

IBM has been developing its artificial intelligence program, Watson, and puts it to use in cardiology and cancer care. Microsoft has also announced to launch its new healthcare division at its Cambridge research facility, as part of plans to use its artificial intelligence software to enter the health market. Monitoring systems are included in its research plans that can help keep patients out of hospitals, and large studies into conditions such as diabetes.

To conclude, virtually present AI is a great help for patients as well as for doctors. Doctors will get rid of extra work and can also have time free from work.

VI. Future Of AI In Medicine

AI will redesign healthcare. The future of AI is bright, and it will assist doctors and patients. It may also replace doctors. AI can now do almost everything in medicine, for instance, diagnosis, treatment plan and assisting patients, with 100% accuracy.

From IBM Watson through Philips, Agfa, Siemens to GE, giant healthcare players have already started integrating artificial intelligence into their medical imaging software systems. The U.S Food and Drug Administration, the FDA, granted the first pill with a digital ingestion tracking system in 2017. The Japanese Otsuka Pharmaceutical developed this drug called Abilify MyCite. It is augmented by an accompanying wearable patch produced by Proteus Digital Health. With the patient's approval, the patch communicates with the ingestible sensor and tell if the drug is taken, the information is transmitted to a smartphone or tablet of the patient. The aim is to measure drug adherence in the treatment of schizophrenia, acute treatment of manic and bipolar I disorder.

Baranuik (2016) claims that Google's AI will analyze MRI and CT scans of 700 radiotherapy patients [7]. Moreover, it will be able to differentiate between healthy and cancerous tissues. Scientists are trying to advance the job of AI for the future. AI is advancing rapidly, and it is hoped that it will help people more in the future.

Surgery is one of the important parts of medicine. Elliot (2009) believed that in 10 years, surgery would be scarless [1]. It means that there will be no requirement to cut the skin and surgery will be done. Nowadays people complain about scars that are left behind because of surgeries. This problem will be solved by using AI. In addition, diagnosis and treatment will be performed only by AI [10]. AI can diagnose diseases with 100% accuracy and its treatment decisions are precise.

AI will turn smartphones into cancer scanners [14]. There are medical applications, for example, Drugs and Medications, Ada-Personal Health Companion, which can provide medications. These applications can be used at anytime and anywhere. If a person fell sick and has no one to take him to a doctor, first aid can be given to him through these applications. In the future, these applications will be more advanced, and people will be helped, and it may save many people's lives. To conclude, the bright future of AI in medicine will help not only patients but also doctors.

VII. Primary Research Analysis

A. Introduction

This survey was conducted to analyze people's opinions towards artificial intelligence in medicine and if they thought that artificial intelligence was benefiting medicine. The survey concentrated on gathering information about the demographics of those who used artificial intelligence in their professional life and their experiences of using artificial intelligence, their opinions towards future of artificial intelligence, which area of medicine artificial intelligence supports the most, and whether artificial intelligence is dangerous for people.

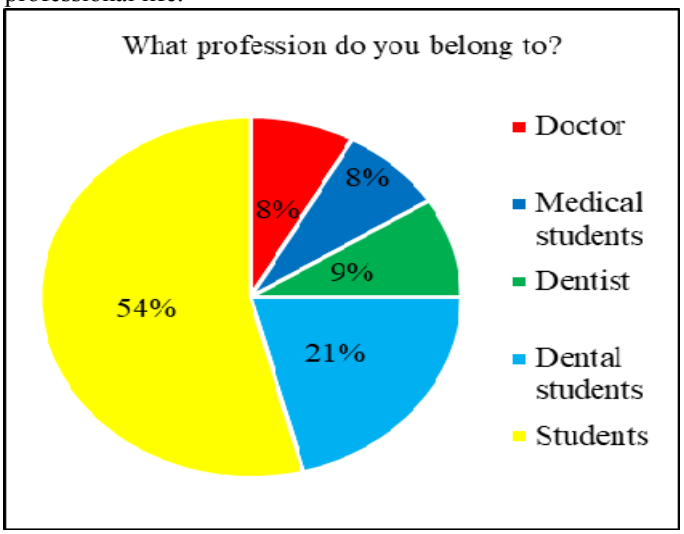
B. Method

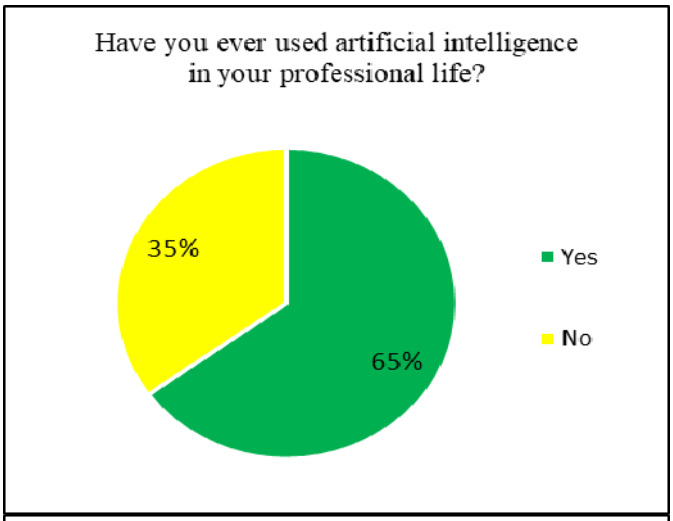
68 people from all around the world were surveyed between May 04-06, 2017. The survey was created on SurveyMonkey and it was shared on WhatsApp, Twitter, Facebook, and other social media applications. The responses were received from doctors, medical students, dental students, dentists, and students.

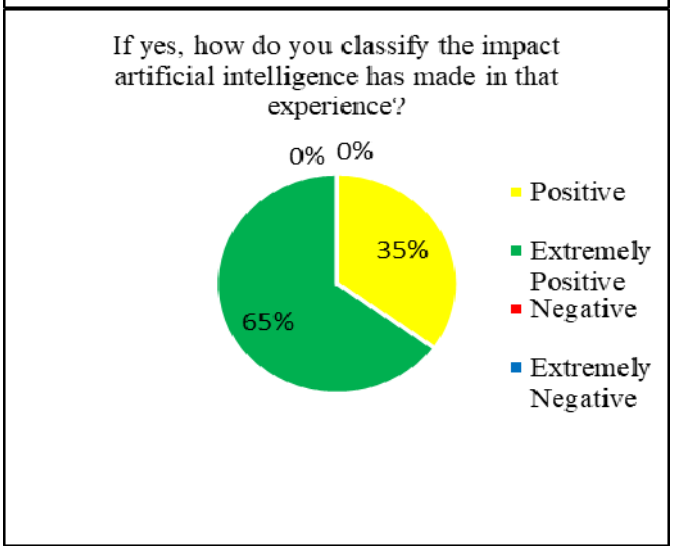
C. Findings

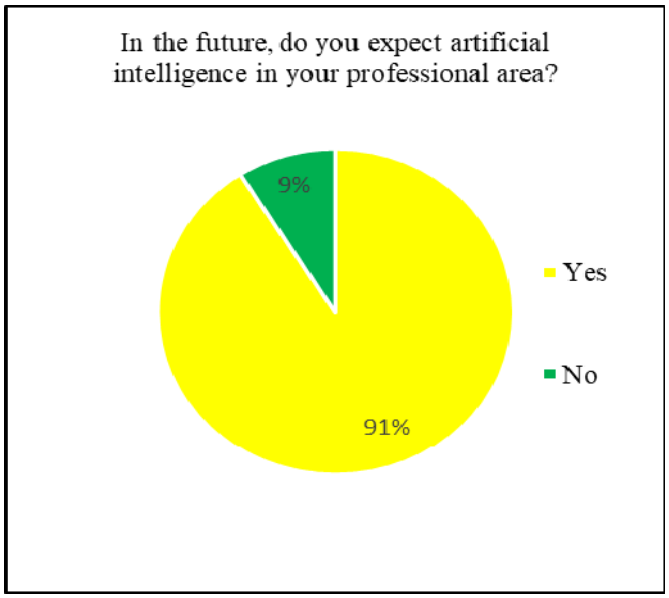
Based on the survey, most of the respondents were students (54%) and stated that they had (65%) used artificial intelligence in their professional life and the experience was extremely positive (65%). Furthermore, 91.18% of

participants are expecting artificial intelligence in their professional life.

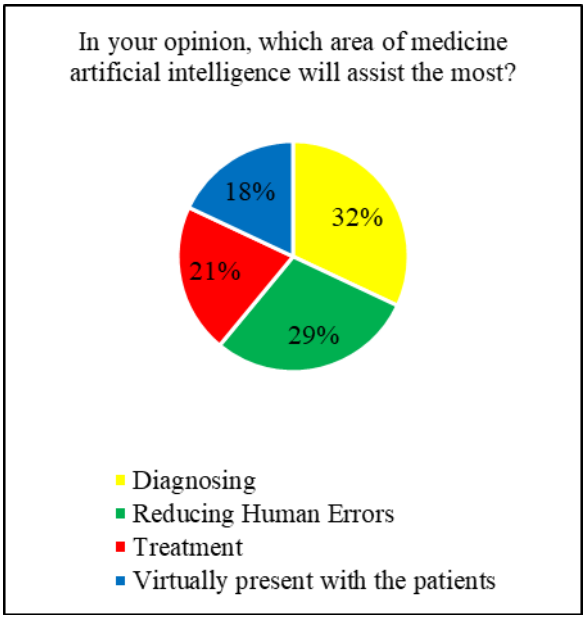


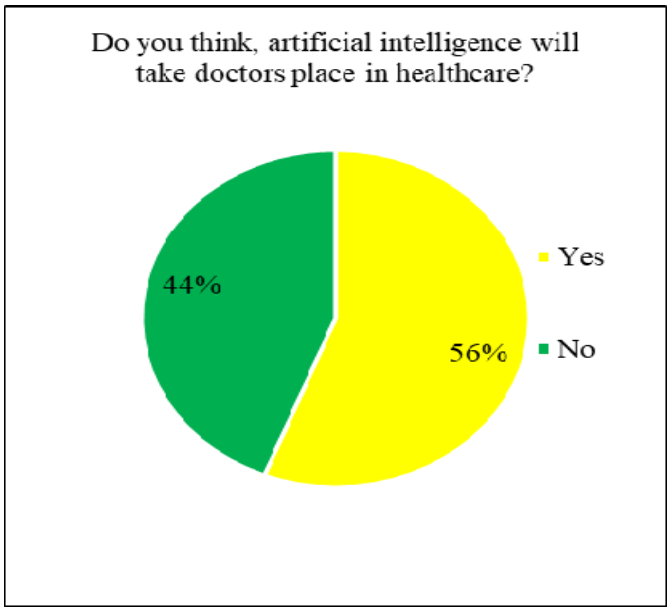




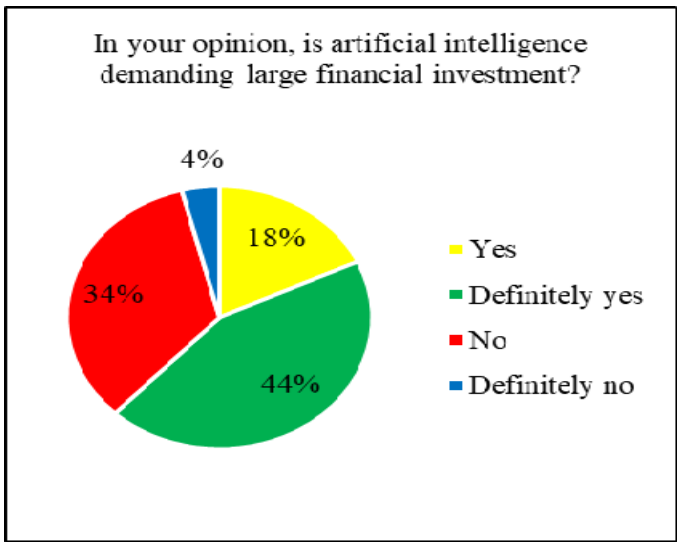


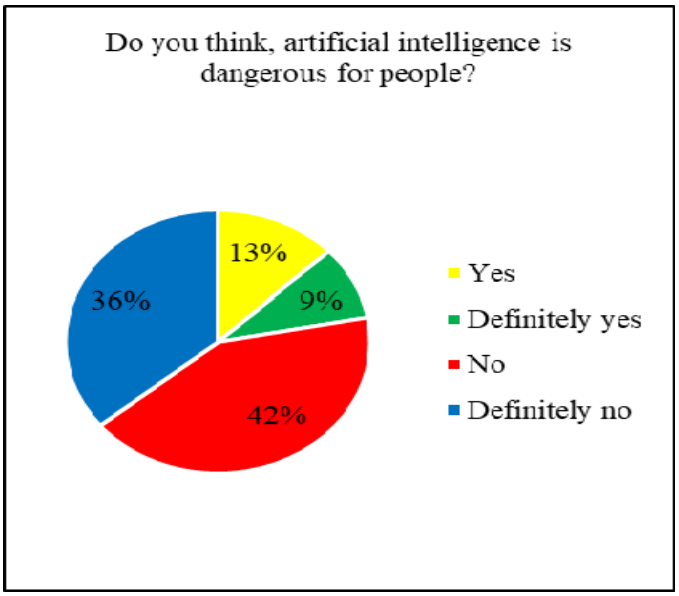
Similarly, 32.35% claimed that artificial intelligence would assist medicine the most in diagnosing. Over half of the participants thought that artificial intelligence would take doctors places.

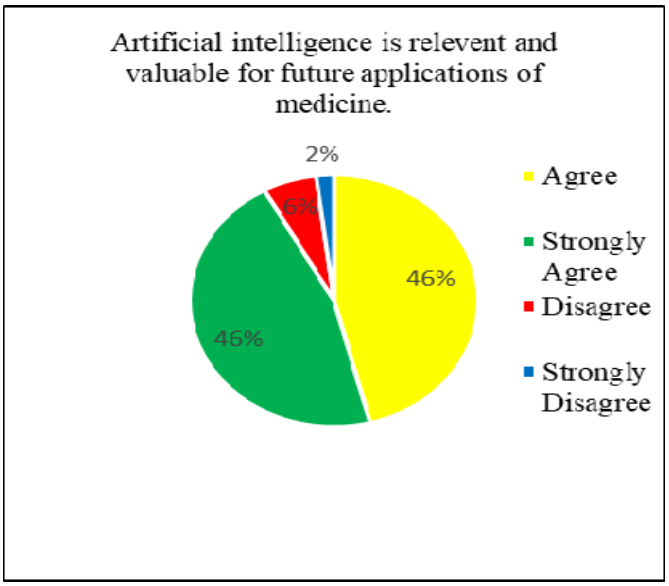


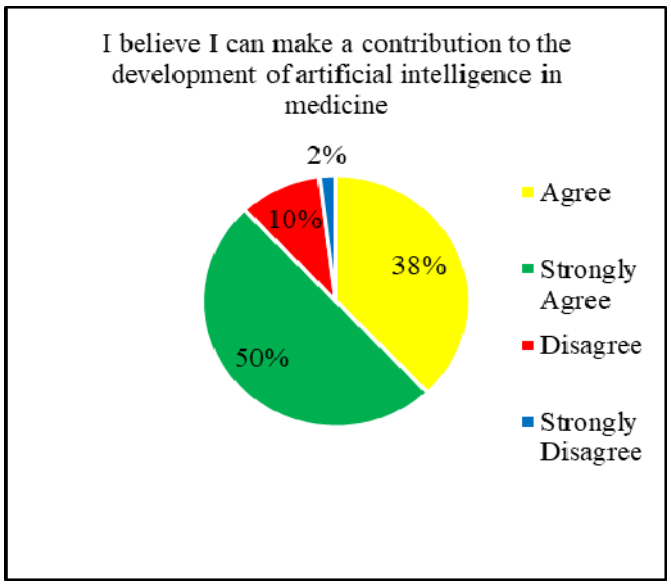


However, they (44.12%) stated that artificial intelligence was demanding large financial investment. Although 42% claimed that artificial intelligence was not dangerous for people and they were agreed and strongly agreed (46.27%) that artificial intelligence was valuable and relevant to future medicine.









Last of all, they (50%) hoped that they would contribute to the development of artificial intelligence.

D. Conclusion of the findings

This survey highlighted the present and future use of artificial intelligence. It confirmed that most of the participants (32.35%) think that artificial intelligence will assist medicine in diagnosing. It also confirmed that 42% of respondents agree with the statement that artificial intelligence is not dangerous for people. Therefore, it can be understood that there is a bright future for artificial intelligence. There were also some limitations to the survey, for instance, the small sample size, only 68 participants, just 2 days to survey, which was the obstacle for the survey to be more accurate.

VIII. Conclusion And Future Work

AI is replacing doctors and reducing mortality rates. Over the coming years, AI will change the traditional role of

doctors. It is providing support to tackle many problems of healthcare. Therefore, AI is beneficial in diagnosing, treating diseases, reducing human errors, and it will also be virtually present with the patients. Additional research is required in knowing the ability to take risks by AI. It will help people to know how much risk AI can take because there are numerous risky tasks in medicine. Nevertheless, there are reasons to remain optimistic that time could now be right for AI to transform the clinic into a much higher capacity and lower cost information processing care service.

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