Artificial Intelligence Fuelling the Health Care

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Abstract Artificial intelligence (AI) is defined as the power of intellectual human mind that designs an intelligent working system which proves in terms of computational power designed by the human intelligence. AI is designed in such a way that it commences to simulate the thought of brain, their thinking pattern, analysing approach and way of computing the problem. AI is one of the most notable fields in the current scenario of Fourth Industrial Revolution. AI is not a concept which finds its application in single field, but it can be used in many domains such as health care, medicines, evolutionary computation, security purposes, diagnosis and evaluation, image classification, accounting databases, transportation and smart cities. AI explores new routes of computation and follows heuristic approaches in order to solve biological problems. The present paper defines applications and current role of AI in health care and how it relates in studies including diagnosis process, image classification for diagnostic sciences, measuring the tendency of congestive heart failure, genetic analysis, drug discovery and much more. New techniques and methods are always a great tool to learn more, analyse more, as well as extract some useful information. Finally, a broad perception of this emerging topic is mentioned here to prove the positive role of AI with biotechnology and health care.

Keywords Artificial intelligence · Biotechnology · Diagnosis and health care

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N. Marriwala et al. (eds.), Mobile Radio Communications and 5G Networks,
Lecture Notes in Networks and Systems 140,
https://doi.org/10.1007/978-981-15-7130-5_40
1 Introduction and Impact of AI

AI is a track in the field of computer technology that stresses on the curation of intelligent machines that perform tasks and think relatively just like humans as per the report present in brookings.edu. Innovative word like AI was first coined by John McCarthy in 1956 during his first academic conference. AI is not just a word, but a tool that forces the people to integrate the information that comes in their mind or enables them to rethink for enhancement purposes of previous given information [1]. AI improves the concept of decision-making by analysing the data and exerts the resulting insights in terms of transforming every walk of life [2]. AI is the analytic approach in the development of computer systems that matches the perception level of the human intelligence.

There are lots of working model to prove that level such as speech recognition by intelligent machine, visual perception in behalf of natural intelligence, decision-making skill and some more [3]. Human brain is considered as the supreme source of intelligence, and this is absolutely true. For the sake of simplicity, it is assumed naturally that AI can be accomplished by constructing a brain-like structure, matching with the concept of neuron like processing units working in collaborative manner. Intelligence is a term that is present in both human beings and the word AI that specifies the cognitive ability of human beings in contrary to the computational ability of the intelligent system.

AI is a technology and as you know human study comes under biology, so it is really a good approach when combine both terms and study the role of AI in biotechnology [4]. In simple words, AI has taken root in different areas, increases the efficiency of computation, provides efficient result and cures a problem in most statistical way. AI also increases the employability status that reduces depression level of unemployability in the candidates. Some of the common form of AI is machine learning, neural networks, deep learning and natural language processing.

There are lots of divisions where AI is used such as AI techniques smartly working in the power system stabilizer (PSS) design. It is used to add damping to electromechanical oscillations [5]. It is also used for the security purposes for protecting computer and communication networks from intruders. Also, there are lots of factors where AI shows their potential in almost every field of medical area. From cure to treatment, it shows miracles.

AI is not stopped there, and it follows broad prospect and shows their capability and effectiveness in terms of computational power. From accounting databases to large volumes of data, an accurate approach with or without direct participation of the decision maker to be possible with the investigation role of intelligent system such as AI. It changes the theme and visualizing pattern of gaming world. AI adds the features to the games such as path finding for the non-playing character, decision-making and real-time learning and some more. AI does not give a command to see a future, and it is a realistic term which is here today and established into a variety of domains. These include fields of finances, securities, health care, transportation, smart cities, etc. AI makes an impact on the world by following the natural intelligence and reinforcing human potentials in extreme ways [6].
2 Scenario of AI with Health Care

Historically, biology field is used in correlation with the deep learning which is one of the parts where AI shows their existence and to be more meticulous where the whole scenario is revolving around statistics and genetics. It is noted that Gregor Johann Mendel's experiment of pea breeding provided decisive data for the expansion of the statistical theories given by Pearson and Fischer. Heredity laws uncovered by Mendel provided crucial data which gives the pea plant genetic factors that are further moved to the offspring as stated by a certain direction to determine the traits of offspring [7]. Relationship between genetic factor and the observed traits is described on the collaborative studies on statistical models defined by Mendel, Pearson and Fischer.

As compared with the image or text data sets, biological data is much more networked and multidimensional. Indeed of this, you can say that a simple statistical model for biological data sets is more appropriately represented using AI model. You can consider to uncover the genetic factors as the key objective of biological research. Based on the automated robots, results of high-speed DNA synthesis technology created by the J. Craig Venter Institute [8] are calculated on the basis of first artificial micro-organism and the artificial yeast synthesis project [9].

In health care, AI plays differently such as AI tools helps designers to improve computational sophistication. Let us take an example of Merantix, a German company [1] that applies deep learning concepts to originating medical issues. This includes lymph node detection using computer tomography (CT) images in the human body [10]. This one is not a such type of computation that humans cannot perform but the problem is that a radiologist may be able to carefully read only four images an hour and charge $50 per hour as per their need. Let us consider 50,000 images, the cost of this process would be $625,000, which is extremely high, and the casualty offer in terms of increase in cost and decrease in computation power. Now the question is that how AI solves this situation; basically, it trains intelligent machine on given data sets which is created on the basis of previous computation that learns to differentiate between the lymph node regularities. So, here AI plays their role and increases the computation power and correctness of the labelling. Further, radiological with the help of this intelligent system apply imaging constraints to patient and calculated the thoroughness of lymph nodes either is at risk of cancer or not.

In AI, fuzzy logic is a concept which is used for data handling methodology but sometimes it permits ambiguity and hence this type of concept plays their role in the medical applications. AI role is there in a way that it uses the conviction of fuzziness in a computationally effective manner. Second role is the evolutionary computation, in which natural selection method is taken into consideration for the best fit in unfold real-world problems. Genetic algorithms are the most useful example for medical applications used as an evolutionary computation. In the medical area, AI is used for the enhancement purposes and improves the steps of decision-making. And the example of such area where AI is used such as Clinical decision support system, i.e. one of the first successful application of AI. As well as analysis of model-based
intelligent system and tools for decision-making are important in medical imaging for computer-assisted diagnosis and evaluation. Here, AI techniques are used in the biomedical image classification for diagnostic sciences. Some common examples are artificial neural networks focusing on diagnostic science, endoscopic images and MRI brain tumour analysis.

One of the big roles of AI has been applied to measure the tendency of congestive heart failure, an ailment that is mainly seen in the senior citizens. In order to cure a disease, a prevention on time is necessary, so AI tools are benevolent here because they estimate the potential challenges in advance and dispense the proper resources to patient education, sensing and dynamic interventions that keep patients out of the hospital [11]. Currently, genetic analysis is one of the most obvious implementations of ML techniques for diagnostics named as Sophia Genetics [12], a Swiss-based start-up that exemplifies the state of the art. They take a blood sample from the patient and, with the help of their powerful analytical AI algorithms, process it and then analyse the data. Nowadays, gene editing or data analysis done in the laboratory is handed to AI programs as a form of secretarial work [13].

Using CRISPR, desktop genetics that works through AI designed constructs for gene editing. In health care, a booming business is created by AI with the development of drugs around 21% of global demand for pharmaceuticals [14]. In the last decade, the emergence of biotechnologies seen in many areas such as technology is used to convert any blood type into universal donor type O, human organs printed by SD printers, monitoring fetal genetic abnormalities using non-invasive techniques & now infamous CSISPR/cas9 gene-editing technique have inspired a serious ingress of interested investors into biotechnologies. In medical field, case sheets of each and every patient are maintained. These case sheets carry all information related to the patient’s disease. Some of the disease like STDs has a marked social stigma attached with them. Because of such reason, patients do not want to disclose them. Nowadays, AI offers 100% privacy to data. Fusion of AI with biotechnology I shown in Fig. 1.

3 AI is the Future of Health Care

Whether it was Google, Microsoft and any other big MNCS, everyone was trying to explore the new era of artificial intelligence in each and every field. No matter how big the deal is, but each and everyone was trying to grab the new in AI. But above all this, use of AI in biotechnology proved to be a bloom for mankind. In the discovery and development of drugs, AI plays a crucial role. Some sort of new chemical entities can be recognized that based on the discovery of drug metabolites. The conventional method used in drug discovery was very obsolete as it is very much time consuming and fleeting as it takes several years and a lot of investment averaging over $2.5B or more [15].

Apart from all these, major drawbacks are they are labour- and resource-intensive. Some of the drugs failed due to economic and technical reasons and the wrong combination of compounds. AI resolves all these problems. Its effectiveness was amazing,
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**Fig. 1** Fusion of AI with biotechnology. From the discovery to development when AI works with the biotechnology, the fusion or the role of both increases the experiment role of many applications in the area of healthcare.

For example, deep learning algorithm, in which model is defined that calculates 70% accurate reaction types. Result demonstrates AI has certain predictive ability and application value. Another exclusive feature of AI is its assistance to people with information gathering, data crunching, routine customer service and physical labour, thereby freeing them for higher-level tasks that require leadership, creative thinking, judgement and other human skills. All of the above-mentioned facts prove that AI had an extreme impact on humanity at large.

Humans have a tendency to make things smarter and smarter. Another example is where humans enabled a computer to ingest data, process it and provide an outcome. In layman terms, this is cognition and technologies that enable cognition are AI in short. Surely, this will impact human race at a large scale. Even today, we have AI complimenting humans and not replacing them; for example, AI assesses an X-ray and helps a doctor to arrive at better diagnosis. This fascination with biotechnological advancement makes life comfortable for all. Humans, their expectations and field associated with them are vast, and they continuously tried their best to chase them to make life more comfortable and easy. Amongst all these fields, health care is one of the most highlighted and star marked. AI plays a vital role in promoting and improving health care. In many fields like oncology, neurology and immunology, works of AI were really fruitful [15]. From hours to minutes, then confinement to just mini seconds was really amazing. Primary aim of health-related AI application is to analyse the input and patient outcome.

Another most important aspect of AI in medical field is its nursing assistance. Hospitals cannot be run alone by single member, and all the working members have to work as a single unit. A single mistake can deteriorate the condition of patient.
AI can work here as a virtual nursing assistant which can give accurate medical advice and observe patient’s health based on the symptoms that a person can initially describe to an AI model (i.e. virtual nurse).

AI also plays an important role in inventing a new drug, which was not an easy task to perform. It takes millions of expenditure, and along with these it was a time-consuming process. But in the emerging situations like pandemics or epidemics, it is very essential to launch a new drug in a limited span of time. Currently, a disease spreads like a fire such as coronavirus. Scientists have no idea related to its treatment, but with the help of AI they can do this difficult task in a short time span with the use of MTDTI (i.e. Molecule Transformer Drug Target Interaction) [16]. It is based on the principle of identification of effective drug based on the compounds present in them. Finally with the help of AI, we got Favilavir, first effective drug against coronavirus. So, we can say that AI can execute healthcare tasks better than humans and also AI can shorten the time involved in overall process.

4 Conclusion

Artificial intelligence is not just two or more words or phrases that can be concluded. It is a perspective that can be explored on a large scale. In every field, it works like multi-specialist. Its accuracy, precision in work and time-saving qualities make it different from others. This is the main reason for the flourishing of AI in all sectors specially biotech of biomedical. Right from the diagnosis to treatment, it fulfils all the tasks with such an accuracy that was impossible for human being to achieve it alone. Right from the emergence of existence of human being on the earth, evolution was taken place. It is an ongoing process. From human beings to animals, a lot of major and minor changes were going to happen for the sake of betterment, to adjust themselves according to changing external factors like temperature, weather, etc. They want to live their life in a standardized manner. There is no chance of mistake. And with the advent of AI in every field specifically in biotechnology, our dream of being perfect looks some mile away from us. AI has taken root in biotechnology and increase the efficiency of computation provides efficient result. AI agents, in turn, can assist people with information gathering, data crunching and physical labour so that AI will flourish well. Early enthusiasm for the application of AI must be needed. So, it can be concluded that AI can suppress the large-scale automation of healthcare professional jobs for a considerable period. Hence, we cannot deny its existence in our life. It is the need of the hour that we all work in collaboration with the flourishing of AI to make our present secure and future brighter.
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