LUPINE PUBLISHERS

Open Access Journal of Complementary & Alternative Medicine

DOI: 10.32474/OAJCAM.2021.03.000168

ISSN: 2644-1217

Mini Review Article

Artificial Intelligence and Its Impact on Healthcare

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Received: October 02, 2021 **Published:** October 26, 2021

Abstract

Artificial Intelligence (AI) is globally emerging as a logistic tool in digital technology and depicts its wide range of relevance in preventive medicine and its management. Smart Hospitals or Hospital 4.0 is a basic need for today's scenario seeking to COVID 19. [1] Coronavirus has become epidemic and claim for imperative medical supplies, medicines along with the synthesis of neutralizing antibodies which can block the virus particles. Industrial Internet of things (IIoT) known as the fourth industrial revolution served to be at rest during COVID-19 crunch. IIoT has assassinated the demands of individualized face conceal, mitten and enabled to conduct all relevant research and assisted to provide the data immediately for the treatment of COVID-19 patients. Effective upturn off wearables and sensors (like Apple Watch, MI Band) has escort a new generation of telemedicine, where patients could be cared virtually by hospital staff. The employment of these technologies would help people to get [2] enlighten regarding their wellbeing. These smart manufacturing technologies could provide a lot of resourceful brainstorm band-aid to scuffle geographical and global medical emergencies.

The aim of chapter is to through light on the smart system of Industry 4.0 during this pandemic of COVID 19 by providing better digital techniques without imposing the risks to [3] healthcare. This paper overall deals with how AI and Industry 4.0 co-jointly can change the whole scenario of our medical procedures as well as healthcare systems and in addition to that many technologies which are currently helping in the medical field are also being discussed.

keywords: Coronavirus, wearables, sensors, Industry 4.0

Artificial Intelligence: An Overview-

Artificial Intelligence refers to machine learning, i.e. intelligence and machinery are computed. Basically, machines [4] showing human intelligence depicts artificial intelligence but in addition to it the machine should behave humanly in every possible way i.e action, reaction, and thinking. AI research objectives includes reasoning, representation, planning, realization and manipulation of objects.

Artificial intelligence term is used to describe the use of technology with intimation of machines and human intellect which are programmed in such a way that they imitate and stimulate human [5] actions. AI is a technology based on high-tech robotics, science fiction and can seem intimidating to some. Over past 50 years, this field has grown appreciably but the major force which tends to pull it towards a brighter spot is the fourth industrial revolution. AI in many forms appears in wide range of technologies starting from today's most preferrable and basic need our smartphones to every possible corner to make the processing of the work easy and convenient for everyone.

Artificial intelligence is basically related to every field, or we can say it touches every corner and hence it pursues better devices and [6] improvements to every field including medical field. AI employs computer skills to perform clinical diagnoses, treat and predict the results. AI provides strong relevance to healthcare in those fields where there is lack of trained staffs and people die due to lack of resources. In today's era, AI is a broad field and can provide a developed and better future related to healthcare1.

Applications of AI on healthcare sector and impact on industry 4.0:

Artificial Intelligence has benefitted a large number of industrial sectors including healthcare. It is becoming productive for doctors, patients and administrators. Some of the applications of AI realm are listed below:

Additive Production

Recently published "Standard Terminology for Additive Manufacturing- Coordinate systems and Test Methodologies" (ISO/ ASTM52921-1) describes it as "those processes [7] that aggregate materials in order to create objects starting from their 3D mathematical models, usually by overlapping layers and proceeding in the opposite way to what happens in subtractive processes or by chip removal". 3D printed customized surgical tools and implants are manufactured which are lower time consuming and cost effective.

Robotic

Robotics has marked its presence in every discipline like in industry, security, healthcare, tourism, agriculture, retail and education. Menial, monotonous and dangerous jobs are easily assisted by robots. In present [8] scenario of covid 19, robots has served as a shield between the patients and healthcare staffs. Surgical robots carry out operations more precisely. Robots can serve as good caretakers for patients by performing various tasks like providing mental strength, checking venous pressure, temperature and blood glucose levels.

Holography

Holography furnishes as an excellent tool for the examination of various body parts like bones, tooth, cornea, cochlea, chest and skull via 3D images. Various surgical [9,10] operations have been profitably completed like valve renewal, joint replacement and closing of holes in heart with the use of holography. Holography loupe, holography prints, digital holograms and holography software are precisely developed

Sensors

Sensors support the physicians to assess the health state of the patient by information generated through reports. Sensors are now a part of our daily routine as they help in sleep monitoring, heartbeat detection, pulse rate and oxygen level. Sensors can be set up as per the demand of the medical industry as in hospital beds, battery operated infusion, homecare wearable devices etc.

Internet of things

Healthcare is becoming costlier day by day. Digitalization and technology cannot stop the spread of diseases but can make it pocket friendly. IoT can serve to improve the quality and efficiency of treatments by making medical checkups home centric. Smartphone apps are used for health data collection and can be easily shared with the concerned physician. Doctors could easily track and monitor the reports and furnish the patient instant treatment and care.

Massive information in health care

Wellness is a multilateral system established with the aim for the prevention, diagnosis and treatment of clinical related issues. Health IT is the key where Electronic Medical record (EMR) gathered from patients are stored2 and thus monitoring patient's health can be easily done. Doctors and patients have transparency related to symptoms of diseases and illness with minimum errors.

Artificial intelligence in medical field

Advances in computational power paired with massive amount of data generated in healthcare make many clinical problems ripe for AL applications. Deep learning Algorithms (CT, MRI, genomics and proteomics) helps in diagnosis of the patient. Accordingly intelligent retrieval assists to spot diseases, embellish drugs, personalize treatments and even edit genetics.

Significance of artificial intelligence in the domain of healthcare

AI can help in determining a lot of diseases and as we can reach out easily at the data of the diseases, we will be able to cure it on fast scale in comparison to beginning with having low data.

Detection of skin cancer

The skin cells which generally produce melanin are caused by cancer categorised as melanoma (skin cancer) and this is a type of cancer which is easily confused by skin allregetic problems so except for professional one cannot easily identify the problem, there should be a properly trained staff to detect it. But coming to the rescue, again technology got more points than humans assistance. Dermatologists use infrared light to evaluate pigmented lesions. These AI algorithms evaluate that scanned data is a malignant skin lesions, including melanoma3. Infact as per the results of one study conducted AI works 8-9% more effectively than that of human doctors. It gave performance results of upto 95% which clearly shows the importance of AI on diagnosis of Melanoma. Some progressing apps like SkinVision and MoleMapper allow you to take serial photographs of your moles and track them over time, these types of apps help in long time diagnosis of the disease and makes the way easier.

Redefining eye health using AI

Eyes are the most important part of our body, the part by which we can access the world, we are able to define everything on the basis of pictures created by our eyes only otherwise everything becomes worthless. So, eye health become important to be taken in consideration and as we know if any problem can be detected in its early stages then the chances of curing the disease becomes greater and problem like eyesight loss can be prevented. The combination of ophthalmology with AI is the best option to overcome it. Within the next few years, artificial intelligence (AI) will revolutionize eye care—and screening for diabetic retinopathy and diabetic macular edema is the first area to benefit from AI advanced Health. The most advantage gaining fields are- Retinopathy of Prematurity (ROP), Macular Degeneration, Glaucoma (having less research till now comparison to retinopathy), Identifying refractive error from fundus photos (for increasing the percentage of accuracy of physicians). Research on deep learning algorithm reported an accuracy percentage of more than 90 in the detection of retinopathy. So, we can clearly analyze that opthomologists along with AI can bring a revolutionary change to the healthcare industry.

Developmental processes of a drug

AI being a technical assistant gives more proper and accurate results which is much greater than humans. AI easily catches the target, it's starting materials and I addition to that it easily gets all the information available related to the case study, research going onto the topic ,the progress made till that point, all the clinical trials, and the problem related to idiosyncratic symptoms that on what scale it can affect the patient's body, tissues etc. which automatically brings the correct position from where the work has to be started and on which path we have to work to get more effective results which itself makes the manufacturing process faster and easy availability to each and every requirement.

Stimulation of a patient in vegetative states(coma)

The vegetative states or the state of being alive in unconsciousness is the only state where human mind cannot predict that by how much time the person will be able to regain its original state or it will never be able to gain it. This state just works on precisions predicted on the basis of some series of some experiments and on whose basis doctors can only place a scorecard to measure the current situation of the patient which sometimes become inappropriate too. But in case if AI which detects the condition of cells, muscular flows and rates of blood flow etc. and on the basis of all those facts it gives an exact result and it was found that AI has an accuracy of 90% by keeping the brain activity record of the patient. In Journal eLife in August 2018 the results of a study conducted on AI algorithm were announced which analyzed fMRI scans of a patient's brains to gauge that how blood flows to different areas of the brain, in addition to that the information like the patient's age, by how much time the patient has lost consciousness, and cause of the vegetative state. And it was found the results were much accurate and all the predictions given worked 98-99% accurately in many cases.

AI advancement to emotions: Identification of Depression

Human body is not only a structure made by bones, muscles, skin and blood but it also has different types of emotions depending upon the type of suffering by which the body has gone through either happier or saddened which generally causes a change in mood of the person and worsened effect of which can cause disturbance in activities of the person or can lead to a state know as mind illnesses. In these states the person generally doesn't want itself to be exposed so it becomes hard to keep a record of the illness but we can track it by using AI. The device most-closest to humans nowadays is our smartphones which can also track it, it keeps a record of the things we see, we click on, in which way we are scrolling our feed which essentially tracts the moods and in a long time can also track the illness (as per magazine article -Mindstrong- california based)8. AI not only keeps the track of the activities but on the basis of detected mood it also suggests some activities on the basis of congenital behavioral therapy as per e- book issued by National institute of mental health. On the basis of an experiment conducted it was seen that people who got chat secession with AI got lesser impacts of mental illnesses on them9. So, AI can work in the advancement of recognition and curative of depression.

AI Robots as medical professionals

Artificial humans are more capable in the storage of data on a Faster scale in comparison to humans itself. We can learn anything, but it requires time to grasp everything on the other hand AI catches mote information in lesser time and it can store the data in large quantities. So being its advantage it can also study human body faster and can remember it and in addition it itself can keep records of the patient's illnesses with all the research results related to that particular illness and all the ways to cure it. As per research conducted in China the AI robot named iFlyTek learned all the data present in medical textbooks, around 2m of case history and 400,000 review papers and it passes the license exam with 456 marks where only 360 were required. So, we can conclude that robots can work as doctor and can give more accessible results10.

Conclusion

Industry 4.0 powerfully inspires good producing knowledge and also the pathway by which healthcare industry can easily gain advantages of this new revolution. The field of science and technology square has measured a surpass in speed in healthcare and financial models, regulative structure and different judging systems. As a result, the fourth industrial revolution show effects on health and wellness of humans along with communication of machines with humans and each other. Presently, the results of certain technological evolutions have taken place in a very granary manner. Great changes are never easy so there is a need to make it clear to public, to the policy makers, suppliers concerning the transformation, good governance systems and to manufacture a interrelated and United framework.

AI besides new age historic period provides good quality healthcare devices and elements exploitation, advanced potential benefits to fulfill the requirement of every individual. Within the medicine field, it will facilitate to extend a completely virtually scheduled program of monitoring patients. It persuasively endorses significant personalization that fulfills the first needs. This revolution features a higher bang for economic development, national security, health sector and cities 4.0 with assistance of varied advanced producing, sensors, holography, AI, Robotics, huge knowledge and IOT devices. There is square measure numerous distinctive needs for consummated industry 4.0, like delivery upon modernization with the assistance of optics and VR. Physicians and surgeons will have blessings of this rebellion for scanning, development and wonderful aid to the victim within the coming years, it'll offer tumultuous transformation to the medical field.

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DOI: 10.32474/OAJCAM.2021.03.000168