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Significance of Artificial Intelligence in Medicines

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Abstract: *"Artificial Intelligence" (AI) is a common term implying that a computer is used to design intelligent behaviour with very less percentage of human involvement. Artificial Intelligence is generally considered to have begun with the robots inventions. The term applies to a wide range of biomedical products like medical diagnosis, robots, human biology-up and scientific data including the "omics" of today. AI has two main branches of science, which is the subject of this review: physical and virtual. The virtual field encompasses digital methods, including electronic health records, from deep learning information management to control systems in health management and constructive support for physicians in their treatment decision. The best representation for the physical branch is robots used to assist the attending surgeon or elderly patient. Targeted "Nano-robots", a unique new drug delivery system, are also embodied in that branch. These applications ' societal and ethical complexities require further reflection, proof of their medical utility, economic value, and the development of interdisciplinary strategies for their wider use.*

Keywords: *Artificial Intelligence, Applications, Medicines, Nano-robots, Physical, Virtual, Medical Diagnosis.*

I. INTRODUCTION

In general, "Artificial intelligence" (AI) is emerged with the invention of robots. In his play "R.U.R" writer Karel Capek introduced the word robot spelled robotic in Czech into the literature of his book. It meant a plant that used biosynthetic devices as forced labour. In the center of last century, in a collection of short stories in modern science fiction, Isaac Asimov immortalised the word "robot". Nevertheless, the first description of the humanoid technology can be dated back to the third century in China, when the mechanical engineer, "Yan Shi," introduced to the Emperor, "Mu of Zhou," a human-shaped model of mechanical handwork constructed of cloth, wood and artificial organs. A Muslim golden age scholar, inventor, polymath, and mechanical engineer named "al-Jazari" developed a humanoid robot capable of striking cymbals during the 12th century [1]. Leonardo da Vinci conducted a detailed study of human anatomy during the Renaissance period to design his humanoid robot. His drawings dated 1494 have only been rediscovered in the 1940s [2].

The robot of Leonardo was a knight robot who could stand up, wave arms, sit down, and move jaw and head. Cables and pulleys were used to operate it [3]. Perhaps significant than his contributions in this field, Da Vinci's sketchbooks have been a source of inspiration to a century of robotic engineers, some of whom served at NASA. In medicine, in recognition of his inspirational impact, a surgical system made by the American company, Intuitive Surgical, was named Da Vinci. It was approved in 2001 by the "Food and Drug Administration" (FDA), and the number of units in use around the world now exceeds 4000 [4].

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The system is commonly used for gynaecological surgical procedures and prostatectomies. It begins to be used for repair of cardiac valves. The development of robotics made a change of pace with the first device to be accepted as ground-breaking in its electronic practical idea of being the "Flute Player," invented by French designer Jacques de Vaucanson as an advanced "automaton" playing the instrument. It had a 13-song repertory. Two centuries later, William Gray Water became famous for the manufacture of the first autonomous electronic robot which he named Machina Speculatrix. His goal was to show how the brain works [5].

It revealed that connections could lead to very complex behaviours between a small numbers of "brain cells." The word "artificial intelligence" (AI) was invented by academics, describing it as "the science and engineering of smart machines." They were highly influential in early AI development. They developed the AI sector at an artificial intelligence conference at the University. The conference gave birth to what grew into a new area of interdisciplinary research. This offered an intellectual framework for all future research and development activities with computers. Computers began to solve many complex mathematical problems during the following years, which soon became of interest to the US Department of Defence. Then, after a period of slowdowns in the 90's, the use of logistic data mining and medical diagnosis restarted a new golden era. Instruments have been developed which have increased computational power. This latest technology eventually helped Big Blue to beat the world champion of Chess. Today, AI is seen as an engineering branch that implements new solutions and novel concepts to solve complex challenges. With ongoing progress in electronic speed, software programming, capacity, and computers might be as smart as humans someday [6].

Cybernetics, defined as a transdisciplinary approach, aims to control any system using technology that explores system regulation, structure and constraints, most notably physical, mechanical, social and biological ones. Cybernetics ' root is credited to a scholar who formalized the notion of input with consequences for electronics, system control, computer science, psychology, psychiatry, philosophy, and community organisation. Fields most influenced by cybernetics are theory of systems, psychology (cognitive psychology and particularly neuropsychology), sociology, and organizational theory (excluding the game theory).

- ***Virtual Branch of AI in Medicine:***

AI has two main branches of application in medicine: virtual and physical. The virtual component is represented by Machine Learning, (also known as Deep Learning), which is represented by mathematical algorithms that through experience improve learning. There are three types of machine learning algorithms: I unsupervised (ability to find patterns), (ii) controlled (classification and inference algorithms based on previous examples), and (iii) reinforcement learning (use of reward and punishment sequences to construct an operating technique in a specific problem space). An example of scientific progress is the unregulated protein-protein interaction algorithms that led to new findings of therapeutic goals. The approach used a mix of adaptive evolutionary algorithms and state-of - the-art methods of clustering dubbed' evolutionary enhanced Markov clustering.' It provided for the prediction of more than 4000 protein complexes, over 60 percent of which were enriched by at least one gene ontology feature term [7].

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Current statistical technology is also being established to classify DNA variants such as single nucleotide polymorphisms (SNPs) as disease or feature predictors, utilizing current evolutionary embedded algorithms that are more stable and less susceptible to overfitting problems that occur when a model has too many parameters compared to the number of observations. Today's "network research" around health care not only relies on the traditional patient-provider relationships, but also brings into consideration large-scale organisations and periods. In addition, the health care system must not be stationary but must learn from its own experiences and strive to continuously improve the processes [8].

This is a "Multi-Agent Model" (MAS) in which a group of agents placed in a shared setting interacts. This process involves creating an enterprise or engaging in it, and utilizes AI to make significant progress. Throughout psychology, an example of such a mechanism is the creation of problematically dynamic environments to manage persistent mental illnesses. Instead of focusing on health expenditures (in public health systems) or cost recovery (in health management organization), the MAS approach proposes capturing the dynamics of individual patients, including their responses to received medicines as well as their behavioural interactions within a broader societal ecosystem [9].

The global integration of care technology enhances process modelling, promotes regulation, and further reflects system changes with a proven improvement in drug adherence, cost reduction, and more successful treatments. This introduction also enabled administrators of health systems to examine system performance patterns through shifts in elements of medical, financial, and criminal justice. Electronic medical records are included in AI's automated systems where different algorithms are used to classify subjects with a family history of a hereditary disease or an increased risk of a chronic disease. Artificial Intelligence is used to develop the performance of organizations by enabling people to capture, share and apply their communal knowledge to make "optimal real-time decisions." As a consequence, electronic medical records and monitoring of the health care cycle are critical to ensuring the consistency sought. Information needs to be collected in a digital format that is available as individual data, as well as in aggregated formats for epidemiological research and planning, from traditional medical record keeping of variable quality. Big contributions from academics and the information technology sector are required to achieve the desired effectiveness and reduce costs [10].

The present state of medical records is for the most part in the context containing incommunicable silos of unnecessary material for the health system and for the acquisition of knowledge. For order to accelerate the introduction of electronic health records, hospitals and clinicians need to operate closely. Data needs to be captured in real time, and institutions should encourage their transformation into smart processes. New clinical and scientific researches should be shared through open source, and distributed data should be displayed by scientists and physicians for open access, and made available automatically as level-of-care information. The readability simplification, and clinical usefulness of data sets should be made clear, and the clinical applicability of each result must be questioned. The researchers have established this kind of concept as shown in Fig. 1. Electronic medical records or health records are important tools for personalized medicine and early detection and targeted prevention, once again with a view to increasing their clinical value and reducing health costs.

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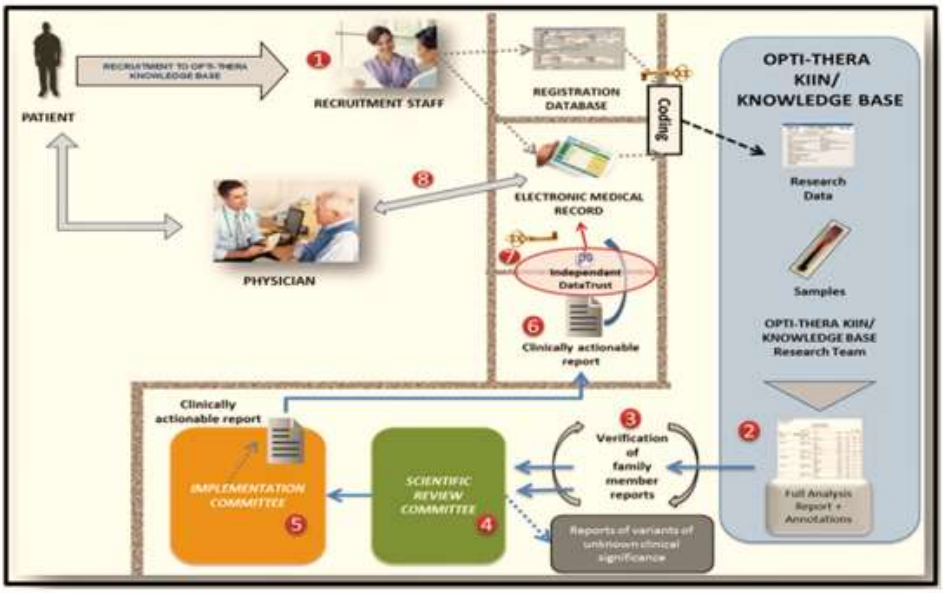

Fig. 1: Data-Trust Pipeline Flow Integration

In medicine, further "virtual application" of AI is use of softbots, as psychotherapeutic avatars. Avatars are the result of the famous James Cameron movie featuring a human-alien hybrid produced to facilitate communication from the planet called as "Pandora". The use of teachable emotionally sensitive avatars is gaining recognition in medicine. It has been used to control pain in children with cancer (called "pain body") and is capable of detecting early emotional disturbances in young people in Native American reservations, including suicidal tendencies. That approach seems to work better than interventions by humans. The clearest example of this is the regulation of delusional visions when the victim creates his own character portraying in his imagination the persecutor. The system encourages the subject to engage with his persecutor, who is gradually learning to moderate such destructive behaviour. Attainment of a lower level of hallucinations and vocal threats have demonstrated initial successes with this technology. Maybe the most useful purpose will be to care for the elderly, in which the pace, calming quality, and sincerity of what's being said are all important factors of effective communication.

- *Physical Branch of AI in medicine:*

The second form of AI application in medicine includes physical objects, medical devices and highly sophisticated robots participating in care (care-bots) delivery. Perhaps the most effective solution is to use robotics as assistants; for example, a robot friend with cognitive decline or limited mobility for the aging population. The most sophisticated examples of that system are Japanese care-bots. Robots are used as support surgeons or even as solo artists in surgical procedures. One of the most important instances of the effectiveness of robotics is their ability to communicate and educate autistic children. In many circumstances that could benefit from robotic involvement, significant ethical considerations will have to be overcome before AI robotics can be widely used in today's medical environment. Apart from ethical issues, the clear need for standardized, correlating evaluation of the impact of robotic systems on aspects of health, and measurements of changes in

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physical and psychological status, outcomes and side effects are a major challenge in this new dimension of medical care.

- *Monitoring effectiveness of treatments using Robots:*

Even robotics can be helpful in evaluating changes in human behaviour in conditions such as recovery. One field where AI could be used helpfully is to track drug delivery to specific cells, tissues or tumours. For starters, hearing about the recent development of Nano-robots built to solve distribution problems that arise when difficulties are faced in distributing the therapeutic agent to a place of interest, is inspiring. This problem occurs when the therapist attempts to target the core of a tumour that tends to be anoxic, less vascular, but most active in proliferation [11].

Researchers have managed to harness a natural agent with desired properties to overcome limitations of radioactive or mechanical robotics as a replacement of "intelligent" Nano-particles alone. To this end, they study a special type of “marine coli”, named "Magnetococcus marinus”, which spontaneously travels to low oxygenated zones. An external magnetic trigger gives initial instructions, and intrinsic properties of Nano-robots are then put into play. These Nano-robots can be covalently bonded to therapeutic properties of Nano-liposomes. Early data showed a substantial increase in the gradient of target product into hypoxic regions.

Most of these new AI applications in medicine require further research, especially in areas of human-computer interactions. Scientists developed the notion of "uncanny valley" where the "human-robot interaction" (HRI) area is an important theme. In these experiments, humanoid robots were assessed as factors allowing experience of robots either hated, appropriate, or dismissed for their obvious nature, eeriness, and attractiveness [12].

II. DISCUSSION

The advances in technology have rapidly changed the fields of radiotherapy and clinical oncology. Improvement of computer processing capacity and image quality have heralded accurate radiotherapy, allowing reliable, safe and effective transmission of radiotherapy for the benefit of the patient. Artificial Intelligence (AI) is an emerging computer science field that uses computer models and algorithms to replicate human-like intelligence and perform specific tasks that offer immense potential for health care. The history, development and progress in the fields of radiotherapy, clinical oncology and machine learning is studied and discussed [13].

There exists a lot of treatments for different diseases. No human being can possibly know all of the diseases and medicines. So, the problem is that no one can have the info of the diseases or medicines in any place. What if there's a place where you can find your health problem just by entering the symptoms or just scanning an ECG or you can check if the prescribed medicine should be used the way you're told. It will then help the people deduce the question and check the answer. The proposed idea is to create an artificial intelligence system that is capable of meeting the needs [14].

Manufacturing any new medicine requires answers to many preparation issues. The most important of these is to establish the series of chemical reactions needed to physically produce the drug. Surprisingly, in a discrete,

fully observable state space, these organic syntheses can be modelled as branching pathways, making the construction of new medicines an application of heuristic search. Researchers describe a structure of organic chemistry that is suited to traditional game tree search, regression, and automatic assembly sequencing AI techniques [15].

Artificial Intelligence (AI) has achieved capacities at the human level, and continues to improve exponentially. AI can enhance decision-making for the pharmaceutical industry and transform the quest for better prescription drugs. The keys invest in data management and internal AI expertise which can create value by using corporate data to solve critical business issues [16].

III. CONCLUSION

Artificial Intelligence will live with all for personal use much like biology will tend to provide personal services. So it is important to consider how AI can support the growth of one's health care systems as well. Scientists suggested "My Finder" as a customized group computing to address the complexities of medical genome resources, working in tandem with AI and informing potential personalized and participative health care. The aim of this website is to provide engagement of the specific genome system in both directions: effect of genes on disorders, health and medication reactions, and influence on gene function in behaviour, environment and wellbeing.

AI applications will become increasingly useful for consumers with the unparalleled amount of data available, coupled with advancements in the processing of natural languages and social awareness algorithms. This is especially true in healthcare and medicine, where there are many data to be used from medical records of patients and lately also from information obtained from sensors which are wearable. This enormous volume of data should be analysed in detail, not only to provide patients who really want lifestyle suggestions but also to produce information intended to improve healthcare design based on patient habits and needs.

It's necessary to break down AI's biases and fears and realize how it could be beneficial and how the people may be able to cope with its perceived or actual drawbacks. The biggest fear is that AI will be so sophisticated that it will outperform human brain capabilities and ultimately take control of all lives. However, if researchers succeed in producing ethical standards, designing performance and efficacy metrics, making them available to the public, and not just to the medical institutions of the Ivy League, by making AI software open-source and user-friendly and of demonstrated clinical value, then societal benefits can increase with the use of AI.

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