S'MUN2030

SINGULARITY MODEL UNITED NATIONS

W H O

AI and Global Health: Applications in medical diagnosis and prevention.

SMUN2030

World Health Organization

SINGULARITY FOUNDATION

ST.PETER´S SCHOOL BARCELONA
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World Health Organization (WHO)

AI and Global Health: Applications in medical diagnosis and prevention.

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Singularity Foundation Model of United Nations

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SINGULARITY FOUNDATION

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1. Introduction:

What is the World Health Organization?

Established on the 7th of April 1948, the World Health Organization (WHO) was created as an specialized agency of the United Nations (UN) with the objective of achieving the highest possible level of health to all people. It's currently based in Geneva, Switzerland, and it has 141 local offices that report to six regional offices worldwide. WHO inherited assets, personal and specific tasks for health issues from the Health Organization of the League of Nations (predecessor of the United Nations), however, it broaden its mandate and now seeks to promote health worldwide, serve the vulnerable, advocates for universal health care coverage and coordinates responses to health emergencies, among other functions. It also works as a forum for discussions and debates about health issues.

As for the administrative management of WHO, it operates through a World Health Assembly (WHA) as the general policy making body and an Executive Board of health specialists elected by the Assembly. On the other hand, the Secretariat, formed by experts, staff and field workers, carries out routine operations such as the implementation of plans and strategies. The organization is led by a Director General appointed by the WHA.

Economically, WHO is financed primarily from the 194 member states' contributions based on each ones' relative ability to pay. There are also many voluntary contributions from states which account for the majority of its budget. Moreover, WHO was allocated substantial resources from the expanded technical-assistance program of the United Nations after 1951.

What is Artificial Intelligence?

McCarthy defines Artificial Intelligence (AI) as the science and engineering of making intelligent machines, especially intelligent computer programs, and using computers to understand human intelligence. AI started after World War II (WWII) when a number of people independently started to work on intelligent machines, by the 1950s, there were many researchers basing their work on programming computers.

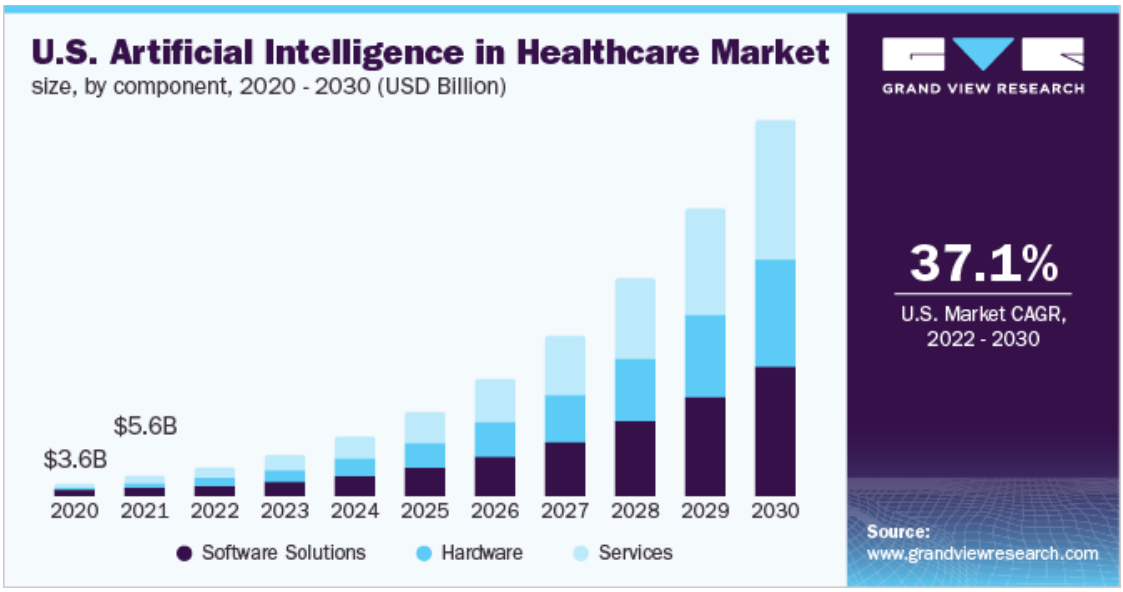
What are the applications of Artificial Intelligence in health?

In the case of health, AI can be connected with many aspects of it, however it's undeniable its strong link with the developments of medicine. Therefore, we could understand Artificial intelligence as a branch of computer science capable of analyzing complex medical data, which allows us to exploit meaningful relationships within a data set that can be used in the diagnosis, treatment and predicting outcome in many clinical scenarios.

Medicine was faced with the challenge of developing new strategies to treat and solve many clinical problems. Artificial Intelligence provided a solution for the latter and was designed to support healthcare workers in their everyday duties, assisting with tasks that rely on the manipulation of data and knowledge. However, it's undeniable that by 2030, the technology provided by AI has not only managed to achieve correct assistance but to replace and provide new methods of surgery, medicines, diagnosis, and treatment.

2. Current situation:

Artificial intelligence (AI) found its way into healthcare in the early 1970s. Since then, it has massively increased in usage. In 2028 only, the total Global Artificial Intelligence in Healthcare Market reached $95.65 Billion up from $6.60 Billion in 2021 (see graph below).



What are the main usages of AI in the health sector?

1. Disease Diagnosis

   To be able to correctly diagnose illnesses, years of medical training are required and only a small group of people commit to this training. As a result, the demand for expertise has always been considerably outnumbered by the available supply, which in turn, puts doctors under a lot of pressure, and causes life-saving patient diagnoses to be delayed. But, in recent years, AI has made disease diagnosis cheaper and more accessible. Machine learning algorithms have been subject to concrete examples in order to understand the symptoms of a variety of diseases. Among them, machines are able to detect lung cancer or strokes based on CT scans (see picture below) or classify skin lesions using skin images. Algorithms are becoming just as good at diagnostics as the experts. The difference is that algorithms can draw conclusions in a fraction of a second, and can be reproduced inexpensively all over the world. Soon everyone, everywhere could have access to the same quality of top experts in diagnostics, for a low price.

2. Faster Drug development

   Developing drugs is a notoriously expensive process. It requires four steps: identifying targets for intervention, discovering drug candidates, speeding up clinical trials and finding biomarkers for diagnosing the disease. Usually, this process takes several years.

But today, Machine Learning allows us to provide drugs in only a few months. A good example was how society used AI during the covid-19 pandemic of 2020, to address the virus variants and for data management. AI helped scientists analyze the virus' genetic information or develop and test vaccines.

3. Personalized treatment

   Diverse patients have different reactions to medications and therapy regimens. As a result, tailored therapy has a huge potential to extend patients' lives. Machine Learning is helping us to determine which variables suggest that a patient will have a certain reaction to a given treatment by automating this complex statistical work. As a result, the algorithm can forecast a patient's likely reaction to a given therapy. The system learns this by comparing and cross-referencing similar patients' treatments and outcomes. The outcome forecasts that result make it much easier for clinicians to construct the best treatment strategy.

4. Improve gene editing

   Clustered Regularly Interspaced Short Palindromic Repeats, short CRISP, represents together with many other technologies a significant advancement in our capacity to alter DNA in a cost-effective and accurate manner, much like a surgeon. Short guide RNAs (sgRNA) are used in this approach to target and edit a specific place on the DNA. However, the guide RNA can suit several DNA sites, which might result in unexpected consequences (off-target effects). A key bottleneck in the use of the CRISPR technology is the careful selection of guide RNA with the fewest hazardous side effects. When it comes to forecasting the degree of both guide-target interactions and off-target effects for a particular sgRNA, Machine Learning models have been shown to yield the best outcomes. This might hasten the synthesis of guide RNA for every segment of human DNA.

As you can see, AI has really improved our lives. But this is only the start. The more we digitize and integrate our medical data, the more AI can assist us in identifying useful patterns — patterns that can be used to make correct, cost-effective judgments in complicated analytical procedures.

What are the problems of AI?

Today, almost all businesses invest in one way or another in AI. Their production process depends on machines, their distribution networks are connected via computers and most firms even have after-sales services connected to all kinds of algorithms. However, AI presents several problems. Among them are the typical questions: How do machines affect our behavior and interaction? Or what happens after the end of jobs? But more recent studies identify the three major areas of ethical concern for society: privacy and surveillance, bias and discrimination. Machines are programmed by people and can't make important decisions as profoundly. Delegates must take into account several questions such as, who do we sue in case of malpractice? Who is legally responsible? Under what ethical criteria do machines operate? Does there always have to be a human decision maker as the ultimate decision maker or not?

3. What to tackle:

As it's been mentioned, AI offered huge advantages that led to the development and updating of clinical methods in health. However, it's important to understand that not all of the countries around the world had access to AI, which then shows a huge inequality in the achievement of the fourth Sustainable Development Goals (SDGs): "good health and wellbeing for all". This committee should make sure that these new technologies and advancements can reach all populations around the world and that the possibility of being healthy is not limited and correlated to the purchasing power of each individual or even each country.

On the other hand, Artificial Intelligence has also posed an ethical and legal dilemma for the circumstances we've explained before. Therefore, members of WHO should be able to find solutions in order to eliminate or reduce the disadvantages of using AI, as well as coordinate and establish measures that would solve the moral dilemma of using technology on humans.

Moreover, there are many advantages to using AI on health, but technology advancements take time. Consequently, this committee should analyze how to encourage new perspectives of development in AI, as well as make sure that the ones already working keep being effective and efficient.

Questions A Resolution Must Answer (QARMA):

- How can member states avoid inequality in the access to the advantages of Artificial Intelligence?
- How can countries cooperate to invest more in AI technologies?
- To what extent should countries supervise AI usage in the medical field?
- What kind of measures can states implement in order to keep Artificial Intelligence working on health?
- How can AI be implemented in other aspects of health and wellbeing apart from the medical one?
- Should countries consider the ethical dilemma or just focus on their citizens' health improvements? And if they do, how are they going to tackle the problems?

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5. Vocabulary:

Artificial Intelligence: Theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

Machine learning: Type of artificial intelligence in which computers use huge amounts of data to learn how to do tasks rather than being programmed to do them.

Disease diagnosis: The act of discovering or identifying the exact cause of an illness or a problem.

Health care: The organized provision of medical care to individuals or a community.

Genetically Modified Organisms (GMO): An organism that has been modified by the addition (from the same or different species) or deletion of genetic material, or by some other genetic alteration, to enhance its capabilities.

Vital statistics: Figures that show the number of births and deaths in a country.