**Artificial intelligence and machine learning is going to revolutionize healthcare**

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There has been a lot of discussion around artificial intelligence, or generative AI in particular, in the recent months. Everyone is talking about generative AI applications like chatbots you can talk with like with a regular human and which can answer any question. Other tools generate photorealistic images after telling it what the image should look like. But this is just scratching the surface of what AI can really do. And it is going to change the healthcare sector forever.

For the last many years health information has been collected in digital format, accounting for petabytes of data. The biggest problem is almost all this data (as estimated – around 97%) was not being used to its full potential until today. The main reason was that the information is unstructured and consists of totally different types of data: medical imaging reports, physician notes, medical histories etc. There was no easy way to normalize and sort the data and extract valuable information from it. Artificial intelligence and machine learning turned out to be the perfect solution for this problem.

To tell you the truth, artificial intelligence is nothing new. The term was used for the first time in 1956 by John McCarthy during a conference in Darthmouth. But for the next 50 years the development of AI was advancing very slowly due to the lack of computing power. Fortunately computers speed up at exponential rate and this is the key driver to enable AI to the mainstream today.

And the use of AI in healthcare is also not a new phenomenon. It has so many applications already and the pandemic was the real turning point. I’ll give you some examples.

The term inextricably associated with AI is automation. The first area in the health sector which is already automated by AI are telehealth tools, including the process of setting up appointments with a doctor, facilitation self-service pre-screenings and triage or talking to a virtual nurse assistant. All thanks to chatbots (“chat robots”) or voicebots (“voice robots”).

Chatbots you are already familiar with allow you to talk to a computer using natural language. Many years ago we were able to get into simple conversations typing commands on the keyboard of our computers, but artificial intelligence moved chatbots extremely forward. AI-powered voice recognition and voice transcription turns what you speak to text. Natural language processing (NLP) converts this text into commands understandable for computers, which they are able to process and – thanks to voice generation (text-to-speech) – are able to answer your questions. The effect: patients no longer have to que for an hour to set up an appointment with a doctor. Thanks to AI-powered voicebots setting up appointments is now instant – patients are now talking on the phone with robots instead of humans.

But calling for a visit is just a tiny part you can do. Patients can even get the first advice from a “computer-powered doctor”. They are being asked by voicebot about the symptoms and in many cases the computer is able to run a triage and suggest a treatment, or suggest visiting a doctor with more serious issues.

What’s even more, not only the voice is converted to text. During the pandemic scientists at MIT devised a system which – thanks to machine learning - was able to detect special marks in patient cough and tell if the patient is an asymptomatic carrier of coronavirus. Patients could even record their cough on their own smartphones to get a diagnosis.

Another example is image recognition (so called computer vision) possible thanks to deep learning, a subset of machine learning. Computers are now able to analyze radiology images and flag embolisms or detect cancer cells with a 99% accuracy. They do it thousands of times faster than a human radiologist.

AI also helps operating ultrasound devices with less training and helps interpret the captured images, and make more consistent measurements. All this leads to a much better detection of potential diseases on a much earlier stage of development which obviously can save thousands of lives.

Even the patients can use this technology on their own. Netherlands-based company SkinVision developed a solution which detects skin cancer on a very early stage. Patients need to take a picture of suspicious skin spots and the solution, powered by deep learning, is able to tell if the mark is nothing to worry about or might by something much more dangerous, like a melanoma for example, and needs immediate consultation with a doctor.

Computer vision is not only used across radiology, but also oncology, ophthalmology and dermatology to predict diseases and health events.

Machine learning lets also clinicians forecast other clinical events besides cancer, like strokes or heart attacks. This lets them intervene early and cure the patient much faster and efficient.

ML also helps automate the schedules for surgeons. AI analyzes patient admissions, discharges and hospital capacity in real-time and provides care to the most critically-ill patients.

The biggest turning point is the availability of Generative AI which is a subset of deep learning. Traditional machine learning models required labeled data to train their neural networks which restricted their area of usage. In comparison, GenAI is powered by so called foundation models trained on unlabeled data. GenAI not only can generate text or images, as stressed in the beginning of this article. It can also extract information and summarize it. And this is the most important aspect for the healthcare. Vast amounts of disparate data mentioned before can finally be sorted, structured and indexed. It now turns out this information is priceless for the healthcare sector.

Generative AI is able to unify images, clinical notes and conversations. It also identifies similar patients for information on therapies and clinical trial enrolment. It helps to prioritize patients needing immediate treatment. It also reduces manual burden with intelligent document processing. But these are just some basic examples of the potential of GenAI. The more advanced include disease gene prediction and protein design for drug discovery. We already experienced the power of technology when Moderna was able to prepare their vaccine for COVID-19 in just 65 days thanks to AI.

Until not so long ago artificial intelligence has been used only by skilled IT professionals who perfectly understand neural networks and had access to extremely powerful computer systems running in huge data centers. But times have changed. Deep learning and artificial intelligence is now available to everyone and all healthcare providers and life sciences companies are able to utilize its power. They don’t need to hire skilled IT professionals and invest in expensive IT infrastructure. All applications are now run in the cloud and thanks to solutions like Amazon HealthLake or Amazon Conprehend Medical, which run on Amazon Web Services (AWS), are very easy to use. Physicians, clinicians, nurses and even patients alone are now able to utilize the potential given by AI.

It is important to stress that AI is not going to replace human physicians or nurses. It simply helps them to automate tasks and run many of them hundreds of times faster than before. AI also helps significantly reducing costs, especially administrative costs which are now estimated to be at around one third of all spending on health in the US – twice as much as US spends on caring for cardiovascular disease and three times what it spends on cancer care.

According to the [World Health Organization](https://www.who.int/news-room/facts-in-pictures/detail/patient-safety) (WHO), there is a 1 in a million chance of a person being injured while travelling by aircraft. In comparison, there is a 1 in 300 chance of an individual being harmed throughout the patient journey. Prior research has shown that [up to 50% of all medical errors](https://apps.who.int/iris/rest/bitstreams/1070131/retrieve) in primary care are due to administrative reasons. The global shortage of medical professionals further compounds these problems. The WHO also estimates a projected shortfall of [10 million health workers by 2030](https://www.who.int/health-topics/health-workforce#tab=tab_1), mostly in low- and lower-middle-income countries making it increasingly challenging to provide care to everyone in need.

Artificial intelligence should be treated as an augmenting tool, just like an electric saw instead of a handsaw. AI will help save thousands of human lives, reduce costs and reduce the burden of healthcare sector employees.