



## Code Blue to Code New: When AI's Data Meets Diagnosis

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Developing within the brilliant age of innovation, technological advancements are continuously molding our lives. From the use of simple calculators to huge databases to manage the ever-growing data we deal with, technology is swiftly declaring itself as an indispensable part of almost everything we do. However, with the exponentially increasing amounts of data we have, we as humans find ourselves overwhelmed, trying to cope with it. Hence, there is a need for a high-tech aid that would enable us to cope with such a flood of information. Artificial Intelligence (AI) has stepped in to become a rapidly growing field in modern science.

The various applications of AI into the many chores we have are numerous, from data sorting to analysis, interpretation and drawing conclusions to act upon it. The medical field is one of those, where AI applications declare that the future is now. AI infiltrated medicine to become a cornerstone in epidemiology and biostatistics, public health simulations, screening, imaging and reconstruction, medical coding, medical documentation, and many others. This is why it became of utmost importance for any medical professional to familiarize him/her/them self with AI.

This should not come as a surprise, as the medical field is a hyperdynamic one, often interacting with other domains of science. Due to this, the competitiveness of a medical doctor is nowadays dictated by their knowledge of those fields, whether research, public health, statistics, physics, chemistry or business administration. AI has emerged as a field that actively integrates all those mentioned, with computer and information technology, a much-needed asset in all other fields.

Is AI here to replace humans? The short answer to this million-dollar question is a clear no. AI is here to be our aid, our assistant, our right hand. It cannot do and, for the time being, does not have the capacity to replace us in any way, and it is very far from being that. In fact, AI is here to do the jobs that are time-consuming and redundant to us in a faster and more efficient way, leaving the jobs

only humans can do to humans. This way, we can focus our energy on the things us, and only us should do, boosting our productivity like never before.

To dive further into that, we can discuss the way AI works. Being a machine learning model, it is very limited to do the specific tasks it is designed to do, and it does them in great precision. For example, if AI is designed to detect pneumonia on a Computed Tomography (CT) scan image, it would be an excellent detector for the common pneumonia presentations on CT.<sup>1</sup> However, AI does not have the clinical sense, nor can analyze the “overall picture” that medical doctors do to come up with a diagnosis. As a result, rare presentations of pneumonias on CT can and will be missed by AI, and AI will also fail to see any other finding on CT that is “not a pneumonia” picture. If we are screening 150 patients with respiratory infection symptoms for pneumonia, such an AI model will help identify most cases with certainty, and the doctor can examine and double-check that, paying more attention to the patients with atypical presentations.<sup>1</sup> Therefore, we can now see the difference between the AI and the human touch. Coupling them together, we can have a combo that has the human interpretation with the AI specific precision, leading to faster diagnosis, less error, and a more efficient workflow. A similar model can be applied for tumor detection as another example [1].

In genetics and drug development, AI shines. As geneticists look for specific sequences to target for treatment development or virulence analysis, they sometimes have to go through huge genetic codes or amino acid sequences [2]. AI models can read these codes much faster and with greater precision, giving scientists the highest yield areas to target in a DNA sequence, paving the way for much faster answers [2]. Similar models can be applied to epidemiology and biostatistics, where AI models do the redundant math when epidemiologists can focus more on the results and their relevance and impact on real life. AI is also being used in infectious diseases, antimicrobial resistance analysis and others [3].

For all those reasons, AI quickly became something all of us need to familiarize ourselves with. One's success is greatly impacted by their ability to keep up with the progressive pressures that evolution exerts. Change is the only constant, and it will happen, whether we resist it or not. It is true that AI is not here to replace humans, but humans who are not familiar with AI will be replaced. Some jobs will be diminished as a result of AI taking over, but newer ones are emerging because of it. Therefore, one can believe we should see AI as a new tool we should train on rather than a dangerous attack.

For sure, there are many risks AI poses. Data breaches are one of the major concerns we have when we use AI models. In addition, being new, we would expect them to be subject to cyber attacks and manipulation by hackers, which can lead to catastrophic results [4]. Over-reliance on AI can lead to more errors, as we always have to double-check what is generated by machine models, and solely relying on them is never advised. A lot of times AI generates fake references, that if not checked, feed the world with false information. Another risk is ethical breaches, sometimes exacerbating problems related to war, discrimination, sexism and inequalities [4]. To combat that, AI models are very tightly monitored and frequently updated based on continuous feedback. Some models have also made it possible to have institution-specific models where everything searched for in this institution does not leave it to the general database pool.

But how does AI do that? It "trains". Before AI models are released for public use, they are trained using real-world data in a very time and energy consuming process. This helps them to draw certain conclusions and understand certain interactions, making them very efficient in what they do. Sometimes, such conclusions are erroneous and need human feedback for guidance and correction. Therefore, proper training is the most important factor in generating a good AI model.

Anything interfering with AI training can lead to an inaccurate model, and this is the major threat AI faces. With the over-popularity of AI, humans are over-relying on it in everyday tasks. This has led to a flood of AI-generated data all over the internet, whether images, texts, articles or audio/video. Since AI uses real world data to train and draw conclusions, training AI on AI generated-data can be disastrous, as this would leave training stuck in a vicious loop of generating AI-content based on AI data, leading to less and less effective models, hence "AI entropy" [5]. This is why it is extremely important to have very robust filters on the data used to train new AI models, and to be able to identify AI-generated data [5].

Everything comes with its pros and cons, and everything comes with new challenges. This is how we move forward and evolve.

We are here to stay, as long as we move forward. In a world where information is hard to keep up with, we need an assistant that is dedicated to dealing with this data, giving us what we need when we need it, without diving into the endless ever-growing sea of information every time. This is what AI is for, and this is how we should be using it. Denying its existence will leave us outdated, and over-relying on it will plague us with error. After some back and forth, we will find out equilibrium with AI, and when we do, we will be the irreplaceable, and we will be the most successful.

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