



Watson Health

Understanding AI's fundamental value to healthcare

IBM Watson Health Imaging

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What is AI?

It seems nearly impossible to contemplate the current state of healthcare technology without discussing artificial intelligence (AI). To call AI a buzzword is an understatement.

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Why apply AI to healthcare?

But what exactly are we talking about when we talk about AI? And more importantly, can AI and its value for healthcare possibly live up to the hype?

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How AI can address radiology's complexity?

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What is AI?

Perhaps the best place to start is by defining the terms frequently used to describe AI and its applications:

Artificial intelligence

Artificial intelligence (AI) is the general concept that machines can be “taught” to mimic human decision-making and learning behaviours. The term is older than you may think, dating back to initial uses in the 1950s.

Neural network

A neural network is a computing system based on the way neurons in the brain operate. The network is trained by being given correct answers, from which it builds its own patterns to process raw data. For example, a system may learn to identify images of a cat by being given a pool of images labelled as “cat” or “not a cat” (as opposed to being given instructions based on characteristics of a cat, such as having whiskers or a long tail).

Machine learning

Machine learning is the application of AI through the creation of neural networks that can demonstrate learning behaviour by performing tasks that are not explicitly programmed. Whether or not we realise it, we witness machine learning in action all the time. Examples of machine learning include a streaming service recommending a film based on our viewing history, or an internet browser promoting a targeted ad based on our browsing history.

Deep learning

Deep learning is a type of machine learning in which systems can accomplish complex tasks by using multiple layers of choices based on the output of the previous layer, creating increasingly smarter and more abstract conclusions. Deep learning systems can prioritise the criteria most important to reaching a decision, and they are designed to process massive amounts of data very quickly. In fact, the key to deep learning is large amounts of data – the more data a deep learning system is given, the better it performs. Examples of deep learning at work include more complex AI tasks, such as analysing images to recognise a face or an anomaly in a medical scan.

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Why apply AI to healthcare?

AI is being used in many fields and industries: finance, telecommunications and transportation, to name a few. Yet a lot of the buzz surrounding AI's emergence has centred around its ability to transform the way healthcare is delivered.

The primary reason that AI is being applied to healthcare is how well suited it is for the industry. AI's strengths complement the myriad challenges involved in the delivery of healthcare – challenges that are only growing.

AI is ideally suited to meet healthcare challenges, particularly for medical imaging, in three ways:

1. AI thrives on an overabundance of data.

Due to the explosion of health information in the form of patient records, breakthroughs in genomics, population health data and a steady stream of new studies and journal articles, healthcare providers are drowning in data.

Much of the data in the EHR is unstructured, such as clinician's notes or radiology reports, which is difficult and time-consuming to search through. As a result, providers' time is being consumed by the hunt for relevant patient data, which impacts both workflow efficiency and patient care.

Image volume has become a problem too. In the past, imaging studies produced a handful of images, but advanced imaging technologies today produce hundreds or even thousands of images per study. A 2016 estimate by Watson Health concluded that in order to keep up with current imaging rates, radiologists would need to view an image about every two seconds – every weekday, all day long – in order to review all relevant images.

This massive amount of data makes healthcare a great place for AI to prove its value. The same image and data overload that is a burden for humans can help a deep learning system thrive. Through their ability to tackle large amounts of health data, AI systems can help provide quick access to a comprehensive patient record or the latest treatment guidelines.

2. AI can “see” what humans may miss.

In addition to tackling large amounts of data, AI is also adept at a function that is inherently challenging for humans: seeing patterns that are outside the scope of where their attention is focused. In other words, people are good at finding what they are looking for, but not so

good at finding what they're not looking for. This human tendency is known as inattentive blindness.

AI systems, however, have no preconceived assumptions about expected findings that could blind them to unexpected results. Since missed findings can lead to negative health outcomes, the ability of a system to catch an abnormality that a practitioner may have missed makes it very valuable in healthcare – even essential.

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3. AI integrates with – and helps leverage – existing systems and workflows.

AI systems are not very useful if they require separate infrastructure, systems, workstations or logins. An AI application that complicates workflows may make it challenging for organisations to demonstrate ROI, or may deter them from implementing it in the first place. A well-designed AI solution is not only compatible with existing infrastructure and workflows – causing minimal need for extra resources or disruption – but can help organisations utilise their existing systems more effectively. For example, an AI solution that can search for relevant patient information in the unstructured data of the EHR, such as IBM Watson Imaging Patient Synopsis, actually increases the value of the EHR.

With the capability to ingest large amounts of data, “see” hidden findings and fit into existing workflows, AI has great potential to help healthcare organisations achieve their central aim: improving their quality of care.

How AI can address radiology's challenges

Beyond healthcare in general, AI is well equipped to assist providers and improve patient care by addressing obstacles in the field of radiology.

As patient data is increasing in volume and complexity, there is also growing pressure on radiologists to be more efficient and tackle larger patient volumes. The shift to value-based care makes reimbursements more elusive, driving organisations to look for ways to boost efficiency and productivity in order to meet their financial goals. As one would expect, these changes and growing demands have led to mounting provider frustration and burnout.

With more incoming data and less time to review it, how are radiology practices to manage? One solution is to incorporate AI into the radiologists' workflow.

With its powers of image and data analysis, AI may be able to assist providers by performing tasks such as:

- Image acquisition
- Initial reads and interpretations
- Study prioritisation and triage
- Recommendations of relevant findings from patient records in the EHR
- Recommendations of relevant findings from literature or clinical guidelines

By quickly gathering relevant data that may be difficult to find or access manually, AI has the potential to help providers be both more informed and more efficient. Everyone in the organisation can benefit from AI's capacities: Business staff see greater levels of productivity. Providers can better manage their workload and focus on patient care. Patients can feel confident that comprehensive and up-to-date information is helping inform their diagnoses and treatment.

Essentially, AI can create a more personalised, informed and patient-centric approach to care today, while also preparing organisations to adapt to the evolution of imaging in the future.

[Visit our web page](#) to see how AI is helping Watson Health Imaging clients to provide care more efficiently and effectively. You can also learn about our [comprehensive radiology solution suite](#).

Human + machine = greater than the sum of its parts

Humans excel at:



Common sense



Dilemmas



Morals



Compassion



Imagination



Dreaming



Abstraction



Generalisation

Machines excel at:



Natural language



Pattern identification



Locating knowledge



Machine learning



Eliminating bias



Endless capacity

About Watson Health

Watson Health Imaging, a segment of IBM Watson Health, is a leading provider of innovative artificial intelligence, enterprise imaging and interoperability solutions that seek to advance healthcare. Its Merge-branded enterprise imaging solutions facilitate the management, sharing and storage of billions of patient medical images.

With solutions that have been used by providers for more than 25 years, Watson Health Imaging is helping to reduce costs, improve efficiencies and enhance the quality of healthcare worldwide.

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Produced in the United States of America
December 2018

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GABO-1721 Rev 2.0